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ARTICLE

Comparing music- and food-evoked autobiographical memories in young and older adults: A diary study

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Abstract

Previous research has found that music brings back more vivid and emotional autobiographical memories than various other retrieval cues. However, such studies have often been low in ecological validity and constrained by relatively limited cue selection and predominantly young adult samples. Here, we compared music to food as cues for autobiographical memories in everyday life in young and older adults. In two separate four-day periods, 39 younger (ages 18–34) and 39 older (ages 60–77) adults recorded their music- and food-evoked autobiographical memories in paper diaries. Across both age groups, music triggered more frequent autobiographical memories, a greater proportion of involuntary memories, and memories rated as more personally important in comparison to food cues. Age differences impacted music- and food-evoked memories similarly, with older adults consistently recalling older and less specific memories, which they rated as more positive, vivid, and rehearsed. However, young and older adults did not differ in the number or involuntary nature of their recorded memories. This work represents an important step in understanding the phenomenology of naturally occurring music-evoked autobiographical memories across adulthood and provides new insights into how and why music may be a more effective trigger for personally valued memories than certain other everyday cues.

KEYWORDS

ageing, autobiographical memory, diary methods, involuntary memory, music-evoked autobiographical memory, retrieval cues

BACKGROUND

Music can bring back vivid memories from across one's lifespan (Belfi et al., 2016; Cady et al., 2008; Janata et al., 2007). Over the past decade, researchers have shown increased interest in music-evoked autobiographical memories (MEAMs; Belfi & Jakubowski, 2021), perhaps because music is a valued and easily accessible commodity that many people engage with daily across the world (Juslin et al., 2008; North et al., 2004). Music also appears to be a particularly effective cue for positive autobiographical memories (Jakubowski & Eerola, 2021; Janata et al., 2007) that are intimately connected to one's sense of identity (Lamont & Loveday, 2020; Loveday et al., 2020). In addition, music may be a means of spared access to autobiographical memories in comparison to other cues (e.g., verbal prompts) in certain clinical populations, in particular people with Alzheimer's disease (Kaiser & Berntsen, 2022). However, there is a lack of empirical evidence on the everyday experience of MEAMs (beyond the laboratory), particularly in relation to other types of memories and healthy ageing. Such evidence is important for developing a more comprehensive and critical understanding of the widespread belief that music may be in some way privileged as a memory retrieval cue and can inform practical usage of music in everyday, commercial, and clinical settings.

Comparing MEAMs to other autobiographical memories

Several studies have compared MEAMs to autobiographical memories evoked by other cues in healthy adults. For instance, music has been found to trigger more episodically detailed autobiographical memories than photographs of famous faces (Belfi et al., 2016), more embodied memories than word cues (Zator & Katz, 2017), more vivid, positive, social, and personally significant memories than TV cues (Jakubowski et al., 2021), and more positive memories than environmental sound and word cues (Jakubowski & Eerola, 2022). Conversely, music is not *always* superior to other retrieval cues; for example, music was found to cue fewer autobiographical memories than famous faces, sounds, and word cues, MEAMs were rated as less unique than word-evoked memories, and MEAM descriptions contained less social content than famous face-evoked memories (Belfi et al., 2016, 2022; Jakubowski & Eerola, 2022).

All previous studies comparing MEAMs to other autobiographical memories have been conducted in laboratory or online settings, with musical and non-musical cues pre-selected by the researchers (except Jakubowski et al., 2021). There are several advantages to making a more ecological comparison between MEAMs and other autobiographical memories in participants' everyday lives. For instance, the range of possible retrieval cues encountered are likely to be more diverse, and personally relevant, which may impact the range and content of memories that are accessed. Previous MEAM experiments have primarily utilized chart-topping pop music as cues (e.g., Belfi et al., 2016, 2022; Janata et al., 2007; Zator & Katz, 2017), and thereby sampled from a very limited range of styles and artists. By contrast, the one previous diary study of MEAMs revealed that memories were triggered by a wide range of songs and genres, from pop and rock to hip-hop, folk, classical, soundtracks, and jazz music (Jakubowski & Ghosh, 2021).

Existing experimental paradigms also may not fully invoke the involuntary retrieval process that appears to be more frequent in everyday autobiographical remembering (including MEAMs, see Jakubowski & Ghosh, 2021) than deliberate, intentional retrieval (e.g., Rasmussen et al., 2015; Rasmussen & Berntsen, 2011). Involuntary autobiographical memories are, on average, both more specific and retrieved significantly faster than voluntary autobiographical memories (Berntsen et al., 2013; Berntsen & Hall, 2004; Haque & Conway, 2001; Schlagman & Kvavilashvili, 2008). When considering findings on MEAMs, participants in a diary study (Jakubowski & Ghosh, 2021) recorded more than twice as many memories of specific events[1] than those in an experiment with pre-selected cues (Janata et al., 2007). Memory retrieval times from previous MEAM experiments (M = 12.54 s in Jakubowski & Eerola, 2022;

[1]Rather than a lifetime period, or general memories of a person/place.

M = 57.40 s in Zator & Katz, 2017) are also notably longer than retrieval times found for involuntary autobiographical memories triggered by word cues (M = 4.84 s in Schlagman & Kvavilashvili, 2008). Taken together, these findings suggest that MEAMs reported in previous experiments may have been predominantly voluntary memories. Since involuntary and voluntary autobiographical memories differ on a range of features (e.g., Berntsen & Hall, 2004; Schlagman & Kvavilashvili, 2008), it is therefore important to capture and examine these more spontaneous everyday occurrences of MEAMs and compare them to other everyday autobiographical memories.

Age differences in autobiographical memory

Various age-related differences in autobiographical memory have been previously documented. Whilst experiments invoking strategic recall of episodic memories and voluntary autobiographical memory tasks have typically shown significant age-related decrements (Grady & Craik, 2000; Levine et al., 2002), several diary and laboratory studies have found no difference between young and older adults in the frequency of involuntary autobiographical memories reported (Berntsen et al., 2015, 2017; Schlagman et al., 2009) or the frequency of experiencing involuntary past and future thoughts (Warden et al., 2019). In addition, an age-related decrease in autobiographical memory specificity has often been found (Levine et al., 2002; Piolino et al., 2002, 2006). However, some research on everyday involuntary autobiographical memories has found no difference in memory specificity between healthy young and older adults (Schlagman et al., 2009), suggesting that the involuntary mode of remembering may also circumvent age-related reductions in the retrieval of detailed episodic memories. Finally, an age-related 'positivity effect' has revealed that older adults typically report more positive voluntary and involuntary autobiographical memories than young adults, which has been considered an indicator of healthy ageing (Mather & Carstensen, 2005; Reed et al., 2014; Schlagman et al., 2006).

A handful of studies on MEAMs have replicated age-related findings from the wider autobiographical memory literature. For example, older adults rated their MEAMs as more emotionally positive and more vivid[2] in comparison to young adults (Cuddy et al., 2017; El Haj et al., 2012; Jakubowski & Ghosh, 2021). One study compared age effects between MEAMs and autobiographical memories evoked by TV cues and found that vividness ratings increased and negative emotions decreased with age for *both* memory types (Jakubowski et al., 2021). However, Jakubowski et al. (2021) used a retrospective survey for reporting memory experiences, and thus no previous research has compared the experience of MEAMs to other autobiographical memories across different age groups as they occur in everyday life. In light of research suggesting music may be a means of spared access to autobiographical memories compared to other cues in older adults with Alzheimer's disease (Kaiser & Berntsen, 2022), it is important to consider whether MEAMs might be particularly resistant to age-related changes in healthy adults as well.

The present study

We built on the diary method of Jakubowski and Ghosh (2021), adding two novel points of comparison. First, we compared MEAMs to autobiographical memories triggered by another common everyday cue: food. Second, we compared MEAMs and food-evoked autobiographical memories (FEAMs) between groups of young and older adults. Previous research has indicated that comparing music-related memories against *any* other autobiographical memory a participant experiences can produce results in which MEAMs are rated as more vivid and emotional than other memories simply because the search space for 'other' memories is considerably larger (Halpern et al., 2018). Hence, we chose to compare music against another specific cue that was similar on several key properties. We chose food as a compara-

[2]Several studies of autobiographical memory in general have similarly found that older adults rated their memories as more vivid than young adults (Luchetti & Sutin, 2018; Rubin & Berntsen, 2009; Rubin & Schulkind, 1997).

tor because it is encountered daily, and music and food commonly present opportunities to serve as memory cues both during periods of focused (e.g., watching a concert/cooking) and diffuse attention (e.g., hearing music in the background/exposure to a wafting smell). Music and food both contribute to individual and cultural identity (Ashley et al., 2004; Lidskog, 2016; Tarrant et al., 2002) and elicit a similar range of emotional and hedonic responses (Juslin & Sloboda, 2013; Kaneko et al., 2018; Sescousse et al., 2013; Zatorre, 2015). Preliminary analysis of data from a previous diary study (Schlagman & Kvavilashvili, 2008) revealed that music and food serve as cues for involuntary autobiographical memories with a similar frequency.

We examined the number of autobiographical memories[3] evoked by each cue type (music/food) in each age group (young/older) and compared characteristics of the memories (e.g., valence, specificity), as well as cue-specific properties (e.g., exposure, liking). This approach, in which we consider both differences in features of the memories as well as differences between the cues themselves, allowed us not only to gain a clearer picture of *how* MEAMs differ from other autobiographical memories but also to begin to formulate an explanation as to *why*. As no previous research has compared MEAMs and FEAMs in everyday life, we did not make a priori predictions about the direction of possible differences between these memory types, or how features of these two memory types might interact with age. For the age comparisons, we anticipated that our diary method would primarily capture involuntary autobiographical memories (Jakubowski & Ghosh, 2021), and hence we predicted that young and older adults would show no difference in the number of memories reported (Schlagman et al., 2009). We also predicted older adults would rate their autobiographical memories as more positive in valence, more vivid, and more rehearsed than young adults, in line with previous research (Jakubowski et al., 2021; Schlagman et al., 2009).

METHOD

Design

The diary study used a mixed design with a within-subjects factor of cue type (music/food) and a between-subjects factor of age group (young/older). Each participant recorded MEAMs and FEAMs separately over 4 days, with diary completion order counterbalanced across the sample.

Participants

A power analysis was conducted using G*Power software (Faul et al., 2007), based on the results of Schlagman et al. (2009), who used a similar 2 × 2 mixed design diary method. Using the smallest significant effect size reported for their between-subjects variable ($\eta_p^2 = 0.06$ for the age-related positivity effect), it was determined that a total sample size of 68 was needed to obtain 80% power.

In total, 106 participants completed our initial screening interview. They were recruited by word-of-mouth, email lists, posters, and social media and were required to fall into the age ranges of 18–35 or 60–80 years. Approximately half of the participants were recruited in the United Kingdom (England) and half in the midwestern United States.

Our criteria for excluding prospective participants following the screening interview were: (1) a score of less than 21 (out of 39) on the modified Telephone Interview of Cognitive Status (TICS-M; Brandt et al., 1993), (2) a history of certain neurological, psychiatric, psychological, or eating disorders (full list in Supplementary Materials), (3) cochlear implants for hearing impairment, and/or (4)

[3]Both voluntary and involuntary autobiographical memories were considered in our study, in line with previous research (Jakubowski & Ghosh, 2021).

self-reported music listening (including both active and passive/background listening) of less than 30 min/day. The cut-off point of 21 on the TICS-M was based on previous research (de Jager et al., 2003) and corresponds to the standard cut-off used for the Mini-Mental State Examination (<25). We excluded participants who reported listening to music less than 30 min/day, as participants with such a low daily music exposure rate would thereby be unlikely to experience MEAMs during the diary study. In addition, we presumed 30 min/day was a likely minimum level of exposure to food cues, given that participants would be exposed to food at mealtimes, if not more often. (This assumption was also supported by our analysis of the diary study data, in which music and food were shown to be well matched on overall daily exposure rates; see 'Results' section). In total, seven participants were excluded in line with criterion 4, and one participant was excluded based on criterion 2. They were entered in a prize draw for completing the screening tasks (£20/$25 Amazon voucher) but were not invited into the diary study.

Of the eligible participants invited to the diary study, 94 agreed to participate, although 16 dropouts (10 young, six older adults)[4] occurred during the study. Here, we make use of the data from the 78 participants who completed both 4-day diary data collection periods.[5]

These 78 participants comprised 39 young adults (aged 18–34 years, M = 21.56, SD = 3.79; 17 female, 22 male; 19 from the United Kingdom and 20 from the United States) and 39 older adults (aged 60–77 years, M = 67.10, SD = 4.52; 25 female, 14 male; 20 from the United Kingdom and 19 from the United States). All older and 85% of young participants spoke English as a first language.[6] Importantly, the young (M = 30.21, SD = 3.26, range = 24–39) and older group (M = 29.31, SD = 3.64, range = 24–38) did not significantly differ in their performance on the TICS-M ($t(75) = -1.15$, $p = .26$), indicating a similar level of cognitive functioning. All participants reported normal/corrected-to-normal vision and normal/corrected-to-normal hearing (two older participants wore a hearing aid). Two older participants reported mild impairments in their sense of taste or smell.

Table 1 displays further demographic information for the two age groups. Most young participants were current undergraduate/graduate students, while the older group had a wider range of educational backgrounds, although 74.36% held at least an undergraduate or other higher degree (e.g., Associate's degree). All participants reported their health as 'average' or better, and the 'same' or better than their peers. The older group did not significantly differ from the young group in ratings of their current health in a Wilcoxon rank sum test (Z = 751.5, p = .92), and even rated their health as somewhat better than their peers in comparison to the young group (Z = 1005.5, p = .007). Most participants did not currently play an instrument or sing in a choir, although the young group reported more years of musical training than the older group overall (young: M = 5.15, SD = 3.72, range = 0–14 years; older: M = 2.64, SD = 3.61, range = 0–13 years), $t(66) = -2.84$, $p = .006$. However, musical training was not correlated with any of the MEAM features (number of memories, proportion of spontaneous memories, proportion of specific memories, vividness, rehearsal, or importance ratings; $-.18 < rs < .15$, $ps > .14$), with the exception of a modest correlation between musical training and MEAM valence ($r(66) = -.30$, $p = .01$), with MEAMs reported by more highly trained participants being rated as *less* positive.

Participants received £25/$30 compensation for completing the full study, or £8/$10 if they dropped out after completing the first diary.

[4]Although more young adults dropped out than older adults, this may be a result of the timing of the study; we began testing young adults just before the first Covid-19 lockdown, and had three young adult dropouts during that period. When we resumed testing after the initial lockdown, the dropout rates were similar (seven young, six older adults).

[5]Out of the 78 participants included in the final analyses, three participants carried their diaries for both of the 4-day data collection periods, but did not experience any relevant memories during *one* of the diary periods (two had no MEAMs, one had no FEAMs). These participants were still included in the data analyses where relevant, as not having a memory evoked by one of the cue types was still considered a valid response to the task.

[6]Two US and four UK young adult participants spoke English as a second language, but showed sufficient comprehension in the screening interview to complete the diary study. All six of these participants were current undergraduate or graduate students at a university, and thus had also passed language proficiency exams for these programs.

TABLE 1 Participant characteristics by age group.

Demographic features	Young group (%)	Older group (%)
Highest educational qualification		
High school	0	15.38
Some undergraduate	71.79	10.26
Other higher degree	0	10.26
Undergraduate degree	5.12	20.51
Some graduate	17.95	10.26
Graduate degree	5.13	33.33
Current health		
Poor	0	0
Below average	0	0
Average	7.69	12.82
Good	61.54	53.85
Excellent	30.77	33.33
Health compared to peers		
Significantly worse	0	0
Worse	0	0
Same	48.72	23.08
Better	46.15	56.41
Significantly better	5.13	20.51
Play an instrument or sing in a choir		
Yes	35.90	28.21
No	64.10	71.79

Materials

Screening interview

A telephone screening interview was utilized to determine the suitability of prospective participants for the diary study, in line with the four exclusion criteria outlined in the 'Participants' section, as well as to collect initial demographic information. A full description of this interview and list of included questions is provided in the Supplementary Materials.

Diaries

A4-sized paper diaries were developed for recording MEAMs and FEAMs (see Appendices). Each diary booklet consisted of two sections: (1) daily music/food exposure logs and (2) MEAM/FEAM diary report forms. Participants were instructed to open each diary only on the designated start date of that 4-day portion of the study.

The music/food exposure log (see Appendices A and C) was used by participants to record the amount of time they had been exposed to music/food at the end of each of the 4 days of the diary period, on a 7-point rating scale ('None' to '3 hours or more'). Music exposure could include instances of making music, focused listening, or background music. Food exposure could include such activities as eating, cooking, watching a baking program, or looking at food in a supermarket.

The MEAM and FEAM diary report forms (see Appendices B and D) each comprised 17 questions, to be completed each time a MEAM/FEAM was experienced. We did not specify that participants should record only involuntary or only voluntary autobiographical memories, to reduce the complexity of the task instructions and to align with previous research (Jakubowski & Ghosh, 2021); rather, participants were asked to indicate in their diaries whether each memory came to mind spontaneously, or they made a deliberate effort to recall it (with 'Not sure' option also provided). The questions were mostly identical between the two memory types, including the time and date of the memory, the time the memory was recorded in the diary, the activity at the time of the memory, and an open description of the memory. Participants were asked how old they were during the remembered event and classified the specificity of the memory (*single event lasting less than 24 hr; single event lasting more than 24 hr; repeated event; lifetime period*). Ratings of rehearsal frequency, vividness, valence, and importance of the memory were collected on five-point scales. In addition, several ratings of the music/food that cued the memory were collected, specifically, how much they liked it, their previous exposure to the particular cue, and whether the cue was present at the original event. For the MEAM diary, participants were additionally asked the name and performer of the song/piece of music that cued the memory. The FEAM diary included questions on the type of food that cued the memory and modality via which the food cued a memory.

The MEAM and FEAM diaries each contained report sheets for 16 memories total.[7] Participants were advised that the exact number of memories experienced was likely to vary from person to person and were asked to simply log all MEAMs/FEAMs they experienced. They were provided with the experimenter's contact information in case they needed to request more memory report sheets during the study. Two participants requested and were provided more pages for their MEAM diaries only.

Post-diary questionnaires

At the end of each diary period, participants were asked to open and complete a sealed post-diary questionnaire (see Supplementary Materials), which was based on the work of Laughland and Kvavilashvili (2018). Participants were asked about any periods they had been unable to keep the diary with them, to estimate the percentage of their MEAMs/FEAMs that they were able to successfully record in the diary, to comment on what they thought the purpose of the study might be, and to optionally provide any additional comments. The post-MEAM diary questionnaire also asked participants to report any previous formal musical training, in years.

Procedure

Following initial advertisement, prospective participants contacted the study team via email or phone to schedule a telephone screening interview. If deemed eligible following screening, they were sent an email invitation describing the basic requirements of the diary study. Participants were not informed that the study was focused on music and food cues to avoid biasing the sample towards people with a particular interest in music/culinary activities. Participants were able to select two 4-day periods to complete the diary study, with the condition that each data collection period should be on the same days of the week, 1 week apart.[8] Participants were instructed to choose two periods that reflected normal life, without unusual disturbances (e.g., exams, moving house).

Participants received all diary study materials in an envelope by post or in person. An information sheet and consent form were included to be read and signed before beginning the study. Participants were then instructed to open Diary 1 (which could be the MEAM or FEAM diary, due to counterbalancing)

[7]We assumed 16 sheets would be sufficient for our 4-day diary period, given that the maximum number of MEAMs reported in Jakubowski and Ghosh's (2021) diary study was 16 MEAMs over a 7-day period (they provided 24 report sheets).

[8]For example, if Diary 1 was kept on Thursday–Sunday, Diary 2 would be completed the following Thursday–Sunday.

only on the morning of the first day of the study. They were asked to carry the diary with them throughout the day and record MEAMs/FEAMs as soon as possible after they occurred. They were also asked to complete the cue (music/food) exposure log at the end of each of the 4 days. The post-Diary 1 questionnaire was opened and completed at the end of day 4 of the study. The same procedure was followed for Diary 2 the following week.

Due to the prolonged data collection period, we also sent four brief reminder messages to participants (either by email or text message, as selected by each participant). These were sent on the day before the Diary 1 and Diary 2 start dates (to remind them to commence each diary on the subsequent day) and the afternoon of the fourth day of each diary collection period (to remind them to complete the post-diary questionnaires). Upon completion, participants returned materials via a prepaid envelope or in person.

Analysis

In a preliminary stage, data collected in the United Kingdom and United States were analysed separately. As both subsets of data revealed similar patterns of results, these sets were combined in all subsequent analyses, to increase statistical power and focus on the main comparisons of interest: the effects of cue type (music/food) and age group (young/older) on memory properties.

Numeric dependent variables (e.g., age at event, cue liking ratings) were averaged across each memory type (MEAM/FEAM) for each participant and analysed via 2 (cue type) × 2 (age group) mixed ANOVAs. Ratings of memory characteristics (vividness, rehearsal, valence, importance) were analysed via a 2 × 2 mixed MANOVA, with post hoc univariate ANOVAs run where appropriate. For binary dependent variables, we calculated the proportion of memories falling into a particular category for each memory type for each participant (e.g., proportion of memories rated as spontaneously recalled) and used these proportions as the dependent variable in 2 × 2 mixed ANOVAs.[9] We used mixed effects models to investigate the effects of particular cue properties (e.g., exposure, liking) on memory retrieval features (number of memories, spontaneity of recall), implemented via the 'lme4' (Bates et al., 2015) and 'lmerTest' (Kuznetsova et al., 2017) packages in R. Data are available at: https://osf.io/u67qb/.

RESULTS

In total, 982 memories were recorded in the diaries. After checking the memory descriptions (see Supplementary Materials for procedure), five MEAMs and nine FEAMs were excluded as they did not fit the definition of an autobiographical memory (e.g., participants described their current activities or opinions about the music/food). This left 553 MEAMs and 415 FEAMs for analysis.

Task compliance

Overall, we found high compliance with the task instructions (see Table 2). No significant effects of cue type, age group, or interactions were found in 2 × 2 mixed ANOVAs on the number of hours the diary was carried, the time lag between a memory occurring and being logged in the diary, and the word count of the memory descriptions (all $ps > .08$). Participants estimated they were able to capture a greater percentage of their memories cued by food than music ($p = .005$), but no difference between age groups or interaction was found in this ANOVA ($ps > .22$). See Supplementary Materials for full ANOVA results.

[9]These analyses of memory ratings all involved aggregated means/proportions across multiple memories per participant, which follows the analysis protocol used in other related studies (e.g., Berntsen & Hall, 2004; Schlagman & Kvavilashvili, 2008; Schlagman et al., 2009). When the disaggregated data from each memory are entered into mixed effects models with 'Participant' as a random effect, all statistically significant effects we found in the ANOVA analyses are replicated.

TABLE 2 Descriptive statistics for task compliance measures.

	Young adults		Older adults	
Dependent measure	**MEAM mean (*SD*)**	**FEAM mean (*SD*)**	**MEAM mean (*SD*)**	**FEAM mean (*SD*)**
Time spent carrying diary (hours)[a]	63 (3)	61 (8)	62 (5)	62 (7)
Memories recorded (%)	86 (16)	89 (11)	85 (18)	91 (15)
Time lag to report memories (min)	21.93 (19.68)	22.07 (20.87)	22.40 (21.39)	31.49 (24.96)
Memory description word count	20.78 (7.11)	21.11 (10.57)	22.20 (12.55)	24.64 (12.80)

Abbreviations: FEAM, food-evoked autobiographical memory; MEAM, music-evoked autobiographical memory.

[a]Values calculated by subtracting the number of hours participants reported that they did not carry the diary from 64 hr (4 days × 16 hr, assuming participants slept 8 hr/day).

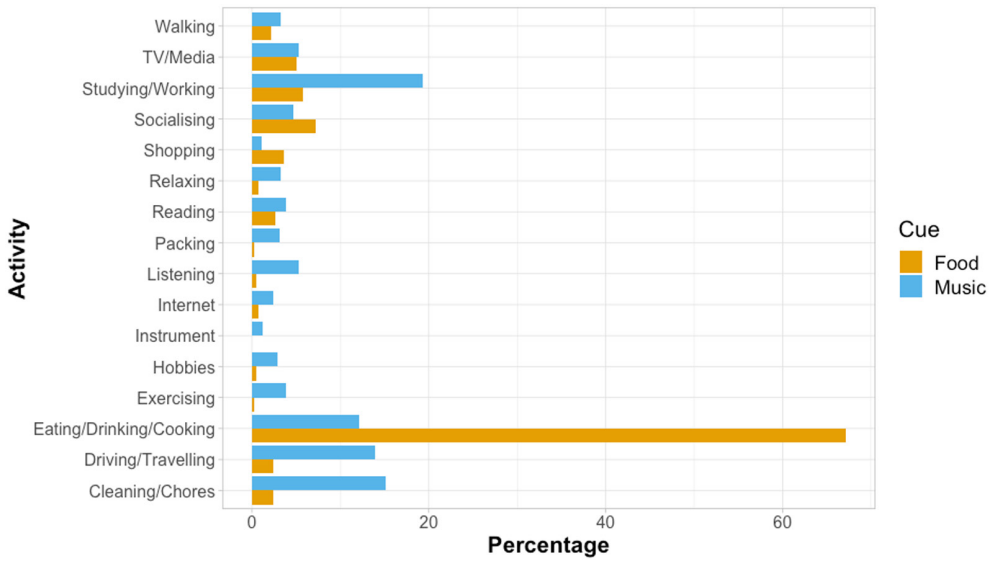

FIGURE 1 Activities during which autobiographical memories occurred, by cue type. Only activities mentioned five or more times are displayed here.

Cue and concurrent activity descriptions

MEAMs were cued by a wide range of types of music (e.g., pop, classical, theme tunes, Christmas songs) and, similarly, FEAMs were cued by wide range of food types (e.g., drinks, snacks, desserts, and main courses). Food cues triggered memories via sight (43%), smell (26%), and taste (39%), as well as other means (23%; e.g., conversations/thoughts).[10] The most frequent activities during which MEAMs and FEAMs occurred are shown in Figure 1. This reveals that the primary activity during which FEAMs occurred was eating or preparing a meal, while MEAMs occurred in a more diverse range of situations, most prominently: studying/working, cleaning/chores, and driving/travelling.[11]

[10]Note that participants could choose more than one option in response to this question.

[11]This pattern of results was highly similar across both age groups, with the only notable exception being that the prominence of MEAMs during studying/working was primarily evidenced in the young group.

Number, spontaneity, specificity, and age of memories

Descriptive statistics for all analyses reported in this section are displayed in Table 3. The number of MEAMs reported by each participant ranged from 0 to 36, and the number of reported FEAMs ranged from 0 to 16. A 2 (cue type) × 2 (age group) mixed ANOVA revealed a significant effect of cue type on the number of autobiographical memories reported ($F(1,76) = 10.73$, $p = .002$, $\eta_p^2 = 0.12$), with music evoking more memories than food. The main effect of age group was not statistically significant ($F(1,76) = 1.56$, $p = .22$, $\eta_p^2 = 0.02$), nor was the age group by cue type interaction ($F(1,76) = 2.45$, $p = .12$, $\eta_p^2 = 0.03$).[12] Diary completion order did not affect the number of memories reported by cue type; there was no significant difference in the number of MEAMs reported by the participants who completed the MEAM diary in the first or second week of data collection ($t(64) = 1.57$, $p = .12$), and the same was true for FEAMs ($t(69) = -0.07$, $p = .94$).

The majority of memories were reported as being recalled spontaneously (83% overall). For subsequent analysis, we calculated the proportion of spontaneously retrieved memories for each participant and cue type (see Table 3).[13] A 2 × 2 ANOVA revealed that the average proportion of memories rated as spontaneously retrieved was higher for music than food cues ($F(1,72) = 5.72$, $p = .019$, $\eta_p^2 = 0.07$), with no significant main effect of age group ($F(1,72) = 1.57$, $p = .22$, $\eta_p^2 = 0.02$) or interaction between cue type and age group ($F(1,72) = 0.35$, $p = .56$, $\eta_p^2 = 0.005$).

To examine memory specificity, we classified memories as single event memories lasting less than 24 hr ($N = 534$ specific memories) or extended/repeated events ($N = 433$ general memories). We then calculated the proportion of specific memories reported for each cue type for each participant. In a 2 × 2 ANOVA, we found a significant main effect of age group on the proportion of specific memories recalled ($F(1,73) = 5.85$, $p = .018$, $\eta_p^2 = 0.07$), with older adults reporting a lower proportion of specific memories than young adults. No main effect of cue type ($F(1,73) = 0.02$, $p = .89$, $\eta_p^2 < .001$) and no interaction effect were found ($F(1,73) = 0.95$, $p = .33$, $\eta_p^2 = 0.01$).

We investigated two age-related features of the memories: (1) age at event (i.e., the participant's age when the event originally occurred) and (2) age of memory (i.e., how old a memory was, calculated by subtracting the age at event from the participant's current age). Some responses to this diary question

TABLE 3 Descriptive statistics for memory features by age group and cue type.

	Young adults		Older adults	
Dependent measure	**MEAM mean (*SD*)**	**FEAM mean (*SD*)**	**MEAM mean (*SD*)**	**FEAM mean (*SD*)**
Number of memories recorded	8.05 (6.19)	5.44 (4.02)	6.13 (3.90)	5.21 (3.34)
Proportion of spontaneous memories	0.92 (0.14)	0.83 (0.29)	0.95 (0.09)	0.90 (0.21)
Proportion of specific memories	0.58 (0.28)	0.62 (0.35)	0.49 (0.27)	0.44 (0.33)
Age at event	17.44 (2.81)	16.43 (2.94)	32.41 (12.47)	32.11 (14.40)
Age of memory	4.16 (3.06)	5.17 (3.98)	34.47 (13.19)	34.78 (13.87)
Vividness rating	3.29 (0.57)	3.00 (0.78)	3.49 (0.71)	3.60 (0.58)
Rehearsal rating	2.83 (0.61)	2.57 (0.89)	3.29 (0.87)	3.25 (0.76)
Valence rating	3.86 (0.49)	3.82 (0.53)	4.22 (0.49)	4.17 (0.57)
Importance rating	2.64 (0.85)	2.13 (0.87)	2.96 (0.88)	2.79 (0.78)

Abbreviations: FEAM, food-evoked autobiographical memory; MEAM, music-evoked autobiographical memory.

[12]Note that this pattern of results remains even when removing one young participant who reported an unusually high number of MEAMs (36 total). Music cues still evoked a significantly greater number of memories than food cues ($F(1,75) = 13.08$, $p < .001$, $\eta_p^2 = 0.15$), with no significant effect of age group or interaction ($ps > .23$).

[13]'Not sure' responses ($N = 71$, 7% of all memories) were excluded here.

consisted of a range of ages; in such cases, we took the median age from this range for analysis. Figure 2 shows the participants' age at event for all reported memories. Analyses of the two age variables in 2 × 2 ANOVAs revealed that the older adults' reported age at event was older overall than the young adults, $F(1,71) = 76.48$, $p < .001$, $\eta_p^2 = 0.52$. In addition, young adults reported more recent memories than older adults, $F(1,71) = 276.99$, $p < .001$, $\eta_p^2 = 0.80$. However, cue type did not significantly impact either of these dependent variables and did not interact with age group ($ps > .63$). Additional analyses of the reminiscence bump for the older group are included in the Supplementary Materials.

Ratings of memory characteristics

The 2 × 2 MANOVA on the ratings of memory vividness, rehearsal, valence, and importance revealed significant main effects of cue type ($F(4, 70) = 4.08$, $p = .005$) and age group ($F(4, 70) = 7.03$, $p < .001$), but no significant interaction ($F(4, 70) = 1.92$, $p = .12$). We thereby ran post hoc univariate ANOVAs with these two main effects and found that the older group consistently rated their memories higher on all features (vividness: $F(1, 73) = 9.42$, $p = .003$, $\eta_p^2 = .11$, rehearsal: $F(1, 73) = 13.09$, $p < .001$, $\eta_p^2 = .15$, valence: $F(1, 73) = 15.29$, $p < .001$, $\eta_p^2 = .17$, importance: $F(1, 73) = 7.76$, $p = .007$, $\eta_p^2 = .10$), but the only significant cue type effect was on memory importance ratings ($F(1, 73) = 15.43$, $p < .001$, $\eta_p^2 = .18$), with music evoking memories rated as more important than food. All other post hoc cue type effects were non-significant ($ps > .11$). Descriptive statistics are displayed in Table 3.

Cue feature ratings

Next, we investigated whether there were any differences between the two cue types on relevant features (e.g., exposure, liking; see Table 4 for descriptive statistics). For the daily cue exposure logs (in which total daily exposure to music/food was rated on a scale from 1 = *None* to 7 = *3 hr or more*), we averaged participant responses across each 4-day diary period. We found no significant main effects of cue type ($F(1,67) = 0.11$, $p = .74$, $\eta_p^2 = 0.002$) or age group ($F(1,67) = 2.95$, $p = .09$, $\eta_p^2 = 0.04$) in a 2 × 2 ANOVA on average daily cue exposure ratings, but a significant interaction between cue type and age group ($F(1,67) = 9.89$, $p = .002$, $\eta_p^2 = 0.13$). In post hoc *t*-tests with Bonferroni correction, older adults did not

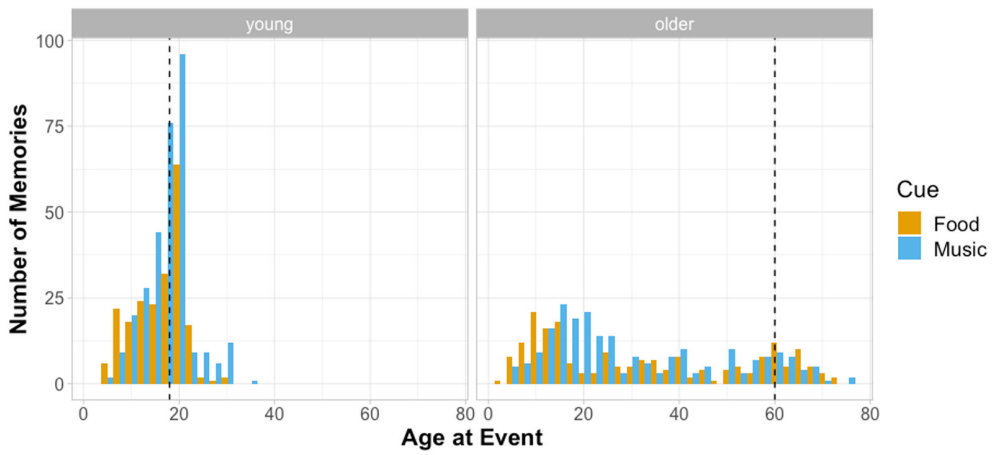

FIGURE 2 Age at remembered event by cue type and age group. Dotted vertical lines show the current age of the youngest participant in each group (thereby denoting the maximum age for which all participants in the sample would be able to report a memory).

TABLE 4 Descriptive statistics for cue features by age group and cue type.

	Young adults		Older adults	
Dependent measure	**Music mean (*SD*)**	**Food mean (*SD*)**	**Music mean (*SD*)**	**Food mean (*SD*)**
Daily exposure	5.51 (1.27)	4.95 (1.07)	4.59 (1.44)	5.05 (0.90)
Specific cue exposure	3.59 (0.64)	4.02 (0.80)	3.82 (0.72)	4.15 (0.60)
Cue liking	4.36 (0.34)	4.37 (0.46)	4.43 (0.43)	4.63 (0.41)
Cue at encoding (proportion)	0.79 (0.22)	0.87 (0.25)	0.84 (0.20)	0.88 (0.18)

differ in their daily ratings of exposure to food versus music, $p = .40$. Older adults also did not differ from young adults in their exposure to food cues, $p > .99$. However, young adults reported significantly more daily exposure to music than older adults, $p = .01$, but a non-significant difference in their daily exposure to music versus food, $p = .06$.

For each reported memory, participants also rated their previous lifetime exposure to the *specific* song/type of food that cued the memory. In a 2 × 2 ANOVA we found that the specific food cues were rated higher overall in previous exposure in comparison to music ($F(1,73) = 15.34$, $p < .001$, $\eta_p^2 = 0.17$). No main effect of age group ($F(1,73) = 1.94$, $p = .17$, $\eta_p^2 = 0.03$) or interaction of cue type and age group was found ($F(1,73) = 0.25$, $p = .62$, $\eta_p^2 = 0.003$).

Both music and food cues were rated as highly liked on average (mean ratings above 4 on a 5-point scale). There was no significant difference between these two cue types in a 2 × 2 ANOVA on cue liking ratings ($F(1,73) = 1.91$, $p = .17$, $\eta_p^2 = 0.03$), although the older adults gave significantly higher ratings than the young adults on this measure ($F(1,73) = 8.33$, $p = .005$, $\eta_p^2 = 0.10$). Cue type did not significantly interact with age group ($F(1,73) = 1.46$, $p = .23$, $\eta_p^2 = 0.02$).

Participants reported that the specific song/type of food that cued the memory was present during the event they recalled (i.e., at encoding) for most memories (76% of MEAMs and 84% of FEAMs). For subsequent analysis, we calculated the proportion of memories for which the cue was present at encoding for each participant and cue type.[14] No significant main effects of cue type ($F(1,72) = 3.40$, $p = .07$, $\eta_p^2 = 0.05$) or age group ($F(1,72) = 0.70$, $p = .41$, $\eta_p^2 = 0.01$) nor interaction of cue type and age group ($F(1,72) = 0.27$, $p = .61$, $\eta_p^2 = 0.004$) were found in a 2 × 2 ANOVA.

Predicting memory retrieval features using cue features

Finally, we investigated whether the number of memories and spontaneity with which memories were retrieved could be predicted by features related to the cues (e.g., exposure, liking). Our aim was to explore whether the differences we had found between MEAMs and FEAMs on these memory properties might be at least partially driven by differences between the cues themselves.

A linear mixed effects model was run with the number of memories recalled for each cue type for each participant as the dependent variable. The fixed effects included were mean daily exposure to a cue type (music or food, as recorded in the log at the end of each day), mean exposure ratings to specific cues across each cue type, mean liking ratings to specific cues across each cue type, and the proportion of memories for which the specific cue was present at encoding for each cue type. 'Participant' was included as a random effect. Results of this analysis are presented in Table 5. Mean daily exposure to a cue type was a positive predictor of the number of memories reported in response to that cue type. Mean ratings of previous exposure to and liking of *specific* cues that evoked the memories were negative predictors of the number of memories recalled. The presence of cues at encoding had no significant effect.

[14]'Not sure' responses were excluded ($N = 54$, 6% of all memories).

TABLE 5 Linear mixed model results for effects of cue features on number of memories recalled.

Predictor	Estimate	S.E.	*t*-value	*p*-value
Intercept	13.15	4.93	2.67	.009**
Daily exposure	0.83	0.32	2.62	.010*
Specific cue exposure	−1.05	0.52	−2.00	.047*
Cue liking	−1.82	0.90	−2.02	.045*
Cue at encoding	1.63	1.60	1.02	.31

*$p < .05$; **$p < .01$.

TABLE 6 Binomial mixed model results for effects of cue features on whether memory retrieval was spontaneous/deliberate.

Predictor	Estimate	S.E.	*z*-value	*p*-value
Intercept	2.55	1.18	2.17	.030*
Daily exposure	−0.03	0.16	−0.21	.83
Specific cue exposure	0.09	0.14	0.69	.49
Cue liking	−0.03	0.16	−0.20	.84
Cue at encoding	0.36	0.33	1.11	.27

*$p < .05$.

A binomial mixed effects model was fitted to predict whether each memory was spontaneously or deliberately retrieved. Fixed effects included here were mean daily exposure to the particular cue type, exposure and liking ratings of the specific cue for each memory, and whether the specific cue was present at encoding (as a binary variable); 'participant' was again included as a random effect. None of these fixed effects were found to be significant predictors (see Table 6).

Analysis of involuntary autobiographical memories

As previous research has revealed consistent differences between involuntary and voluntary autobiographical memories (e.g., Berntsen & Hall, 2004; Schlagman & Kvavilashvili, 2008), it is important to consider whether any of our results may be skewed by the inclusion of both involuntary and voluntary memories within the dataset. For instance, it is unclear whether the differences found between MEAMs and FEAMs may actually be driven by the fact that a greater proportion of MEAMs were involuntary memories. As most reported memories were rated as being spontaneously (involuntarily) retrieved, we thereby reran all analyses reported above on only this subset of involuntary MEAMs and FEAMs ($N = 803$ memories total). All patterns of statistically significant/non-significant results reported above were replicated, with three exceptions: In addition to replicating the previously significant effect of age group, cue type also displayed a significant effect on ratings of memory rehearsal ($F(1, 68) = 4.34$, $p = .041$, $\eta_p^2 = .06$), with MEAMs ($M = 3.12$, $SD = 0.81$) being rated as more rehearsed than FEAMs ($M = 2.91$, $SD = 0.93$). In the analysis considering the proportion of memories for which the cue was present at encoding, cue type now had a significant effect ($F(1, 66) = 5.64$, $p = .020$, $\eta_p^2 = .08$), with food cues ($M = 0.89$, $SD = 0.24$) being reported as present at encoding for a greater proportion of memories than music cues ($M = 0.81$, $SD = 0.18$). For the linear mixed model predicting the number of memories using cue features (cf., Table 5), daily exposure to a cue type ($\beta = 0.33$, $SE = 0.25$; $t(88) = 1.36$, $p = .18$) and cue liking ratings ($\beta = -0.23$, $SE = 0.66$; $t(117) = -0.35$, $p = .73$) were no longer statistically significant predictors, although exposure to the specific cues was still a negative predictor of the number of memories reported ($\beta = -0.89$, $SE = 0.44$; $t(106) = -2.04$, $p = .04$).

DISCUSSION

We compared music and food as cues for autobiographical memories in everyday life in young and older adults. Overall, music cued more autobiographical memories, a greater proportion of memories rated as involuntary, and memories rated as more personally important in comparison to food. Older adults and young adults did not differ in the number or involuntary nature of their memories, but exhibited several differences in the phenomenology of their memory experiences. A lack of significant interactions suggests healthy ageing impacts similarly on MEAMs and FEAMs.

Comparing music and food cues

Music evoked more autobiographical memories than food. This result contrasts with some previous studies, in which pre-selected musical cues triggered fewer autobiographical memories than famous faces, environmental sounds, and word cues (Belfi et al., 2016; Jakubowski & Eerola, 2022), suggesting experimental paradigms may underestimate the prevalence of MEAMs compared to more naturalistic approaches. It is notable that music evoked more memories even though the music and food cues did not significantly differ on several key properties, including overall daily exposure and liking. However, the specific foods that cued memories were rated higher in previous lifetime exposure than the specific music cues. It may be that the higher levels of previous exposure meant that these foods were associated with more autobiographical events than the music, which decreased cue-item discriminability for the food cues (Berntsen et al., 2013; Rubin, 1995). Indeed, our analyses of the relationship between cue features and memory features revealed that greater exposure to specific cues resulted in fewer memories being reported (see Table 5). Additionally, it is possible that music requires less exposure to become associated with an autobiographical memory, given that music is often spontaneously mentally rehearsed (e.g., as an earworm), which has been shown to also strengthen memory for associated events (Kubit & Janata, 2022).

Furthermore, we found that greater amount of daily exposure to music/food *overall* increases the chances of encountering a particular song/food that evokes a memory (see Table 5). However, in relation to the *specific* songs/foods, overexposure to a particular cue may decrease its efficacy in evoking a memory. For instance, a turkey sandwich that one eats for lunch every day might not be a particularly effective retrieval cue, given the multitude of previous memories that could be associated with this cue (Berntsen et al., 2013). Perhaps unexpectedly, higher cue liking ratings also predicted lower numbers of reported memories. This could be because exposure/familiarity with specific cues is often correlated with liking (Jakubowski et al., 2020; Krumhansl & Zupnick, 2013; Schulkind et al., 1999). Indeed, in our study mean cue exposure and mean cue liking were modestly correlated, $r(76) = .26$, $p = .022$.

Both cue types evoked more involuntary than voluntary autobiographical memories, but music evoked a greater proportion of involuntary autobiographical memories than food. Although cue feature ratings did not significantly predict the involuntary nature of the memories (see Table 6), one potential explanation for this finding is provided by the data on participants' concurrent activities (see Figure 1). Music co-occurred with a wider range of activities than food, whereas food was often the central focus of the activity during FEAMs. Many of the activities during which MEAMs occurred are relatively automatic (e.g., cleaning/chores, driving/travelling) and may invoke states where attention is not fully focused on the current task. Previous research has demonstrated that involuntary memories are more likely to occur during such periods of diffused attention (Berntsen, 1998; Kvavilashvili & Mandler, 2004). These findings also align with previous research suggesting that pure sensory cues (e.g., smell, taste) feature relatively infrequently as triggers for everyday involuntary autobiographical memories in comparison to more complex perceptual cues, such as words or music (e.g., Berntsen, 2009).

Although the music and food cues were rated similarly on liking and MEAMs and FEAMs did not differ in valence ratings, MEAMs were evaluated as significantly more important to one's life story compared to FEAMs. This suggests that, in comparison to food, music evokes memories more closely entwined with one's identity in both young and older adults. This links to previous studies that have revealed that

music plays a key role in both personal and social identity development (Lamont & Loveday, 2020; Peck & Grealey, 2020; Tarrant et al., 2002). Future research should explore whether music is present during important/self-defining life events more often than food, or whether music is a more effective retrieval cue for such events.

In the follow-up analysis comprising only involuntary autobiographical memories, we also found that involuntary MEAMs were rated as more rehearsed than involuntary FEAMs (cf. Barzykowski & Staugaard, 2018). This could be another explanatory factor underlying why MEAMs were more accessible to recall. Interestingly, this analysis also revealed that the specific foods that cued these involuntary memories were more often present at encoding than the specific pieces of music. Thus, music evokes more frequent involuntary autobiographical memories *even though* MEAMs do not necessarily involve memories of listening to the same piece of music. This suggests music may be particularly effective as a cue because it can evoke autobiographical memories via a diverse range of routes (e.g., the lyrics of a song may remind one of a similar situation from one's life, even if the song was not heard during the original event). Future research could also investigate the range of ways via which music might play a role in memory priming processes (e.g., music from high school primes retrieval of a high school memory later that day, or hearing a piece of music leads to associative priming of a related song which then triggers a memory; e.g., Mace, 2005).

It is important to note that MEAMs and FEAMs did not differ on several of the properties we examined (vividness, valence, specificity, and age of memories). This suggests that, in general, music and food evoke phenomenologically similar autobiographical memories in everyday life and provides counterevidence to the idea that music is broadly 'special' as a retrieval cue. This bears similarity to the results of Halpern et al. (2018), who found that autobiographical memories of music-related and dining experiences did not significantly differ in terms of their degree of recollection, vividness, or emotionality. Instead, our results provide a more nuanced insight, indicating that, in comparison to food, music may be a more effective cue for involuntary autobiographical memories that are more directly related to one's personal life story and that these differences may be at least partially explained by differences between the cues themselves and the situations in which the memories occurred.

Comparing young and older adults

Older adults did not significantly differ from young adults in the overall number of autobiographical memories recorded. This is likely attributed to the fact that most of the recorded memories were involuntary, which supports a small but growing body of research showing a lack of age differences in the frequency of everyday involuntary autobiographical memories and involuntary future thoughts (Berntsen et al., 2015, 2017; Schlagman et al., 2009; Warden et al., 2019; see also Jordão et al., 2019). Indeed, we also did not find any age differences in the proportion of memories that were rated as spontaneously (involuntarily) retrieved by young and older participants. Such results are in stark contrast to large age-related decrements typically found in laboratory studies of episodic and autobiographical memories that rely on more strategic and effortful retrieval processes (e.g., Grady & Craik, 2000; Levine et al., 2002).

However, when considering phenomenological features of the memories, several age differences emerged. Autobiographical memories were rated as more positive in the older group, replicating the age-related positivity effect that is typically found across a range of memory tasks (Cuddy et al., 2017; Mather & Carstensen, 2005; Reed et al., 2014; Schlagman et al., 2006). In addition, older adults recalled older memories, and rated their memories as more vivid and rehearsed; these findings also have parallels in previous literature (Jakubowski et al., 2021; Schlagman et al., 2009). Older adults in our study reported a lower proportion of specific memories than younger adults, which replicates several studies on autobiographical memory (Levine et al., 2002; Piolino et al., 2002, 2006), but contrasts the results of Schlagman et al. (2009), who found that young and older adults did not differ in the specificity of everyday involuntary autobiographical memories. One potential explanation for this difference is that Schlagman et al. (2009) considered *all* involuntary autobiographical memories that occurred in everyday life, whereas

we focused on autobiographical memories cued by music and food. This additional task demand imposed in our study may have limited the range of memories from which participants could draw upon and led the older adults to retrieve more generic memories than Schlagman and colleagues' less constrained task.

Finally, the lack of significant interactions between cue type and age group suggests MEAMs are affected by healthy ageing similarly to other autobiographical memories. This parallels results from the retrospective survey of Jakubowski et al. (2021), who found similar age effects across MEAMs and TV-evoked autobiographical memories in three age groups. Thus, it seems that the differences we found between MEAMs and FEAMs are relatively stable across adulthood.

Limitations

One limitation of this work is the possibility of demand characteristics imposed by our self-report diary method. To counteract this limitation, we did not reveal to participants that the study was about music or food until the first day of each diary period. Nevertheless, once they commenced the second diary, several participants had a general idea that the study aimed to compare music- and food-evoked memories. However, participants were not made aware of our specific hypotheses or the direction of these, and only three participants guessed there might be an age group comparison involved (according to the post-diary questionnaire). In addition, the findings that most reported memories were rated as spontaneously retrieved and nearly all our analyses were replicated when considering *only* the involuntary subset of memories gives further confidence that the results found here were not driven by participants purposely trying to recall certain types of memories in response to our task instructions.

It should be noted that these data were collected during the COVID-19 pandemic. As such, many participants were at home more often than usual, and thus our study may overestimate the proportion of MEAMs and FEAMs that occur at home. However, music and dining experiences were similarly impacted by restrictions during this time (running of restaurants and live music events were both limited, or shut down completely at times), and therefore both memory types are likely to have been comparably affected. Finally, our sample consisted of healthy Western, highly educated individuals, whose autobiographical memory experiences were likely largely influenced by the ways in which music and food are used within this culture. Future research on groups who place different value on music and/or food may reveal different patterns of results.

CONCLUSION

In sum, we found that music triggered more autobiographical memories, a greater proportion of involuntary memories, and more personally important memories than food cues in everyday life. Both music- and food-evoked autobiographical memories were impacted similarly by age, with older adults reporting a similar number of memories to young adults, but rating both memory types as more positive, more rehearsed, more vivid, and less specific than young adults. This study represents a significant step in advancing our understanding of the phenomenology of everyday MEAMs across adulthood. More broadly, this work provides new insights on how and why different types of common, everyday cues vary in their association to aspects of our personal pasts.

AUTHOR CONTRIBUTIONS

Kelly Jakubowski: Conceptualization; data curation; formal analysis; funding acquisition; methodology; project administration; supervision; visualization; writing – original draft. **Amy M. Belfi:** Conceptualization; funding acquisition; methodology; project administration; supervision; writing – review and editing. **Lia Kvavilashvili:** Conceptualization; methodology; resources; supervision; writing – review and editing. **Abbigail Ely:** Data curation; investigation; methodology; writing – review and editing. **Mark Gill:** Data

curation; investigation; methodology; writing – review and editing. **Gemma Herbert:** Data curation; investigation; methodology; writing – review and editing.

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CONFLICT OF INTEREST STATEMENT

We have no conflicts of interest to disclose.

OPEN RESEARCH BADGES

This article has earned an Open Data badge for making publicly available the digitally-shareable data necessary to reproduce the reported results. The data is available at https://osf.io/u67qb/.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are openly available at: https://osf.io/u67qb/.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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APPENDIX A

MUSIC EXPOSURE LOG

Appendix A: Music Exposure Log

Instructions: **At the end of each day of the study**, please record the date and **tick one box** to give an estimate of the total amount of exposure you've had to music that day.

Please include instances of focused listening to music, playing an instrument or singing yourself, as well as hearing music in the background while doing other activities (for example, during chores or driving, hearing film or TV soundtracks) when making your total estimate.

DAY 1

1. Date _____/_____/_____

2. For how much time in total have you been exposed to music today?

- *None*
- *1-15 minutes*
- *15-30 minutes*
- *30 minutes-1 hour*
- *1-2 hours*
- *2-3 hours*
- *3 hours or more*

DAY 2

1. Date _____/_____/_____

2. For how much time in total have you been exposed to music today?

- *None*
- *1-15 minutes*
- *15-30 minutes*
- *30 minutes-1 hour*
- *1-2 hours*
- *2-3 hours*
- *3 hours or more*

DAY 3

1. Date _____/_____/_____

2. For how much time in total have you been exposed to music today?

- *None*
- *1-15 minutes*
- *15-30 minutes*
- *30 minutes-1 hour*
- *1-2 hours*
- *2-3 hours*
- *3 hours or more*

DAY 4

1. Date _____/_____/_____

2. For how much time in total have you been exposed to music today?

- *None*
- *1-15 minutes*
- *15-30 minutes*
- *30 minutes-1 hour*
- *1-2 hours*
- *2-3 hours*
- *3 hours or more*

APPENDIX B

MUSIC-EVOKED AUTOBIOGRAPHICAL MEMORY DIARY

Appendix B: Music-Evoked Autobiographical Memory Diary

1. Date _____/_____/_____

2. Time diary completed: ____:_____ AM / PM (circle one)

3. Time of memory: _____:_____ AM / PM (circle one)

4. Name of song/piece of music that cued the memory:

_____

5. Performer of song/piece of music that cued the memory:

_____

6. Activity at time of memory:

_____

7. Did the memory that you recalled come to mind spontaneously, or did you try deliberately to recall it?

- *It came to mind spontaneously*
- *I made a deliberate effort to recall it*
- *Not sure*

8. Please **describe** the memory that you recalled. Please give as much detail as possible (such as **what** you were doing, **who** you were with, and **where** you were in the remembered event).

_____

_____

9. How old were you when the event or time period you remembered occurred? If you're not sure please estimate or give a range of years, such as "15-17 years old." _____ years old

10. Is this memory of?

- *A single event lasting less than 24 hours (e.g. your 50th birthday party)*
- *A single event lasting more than 24 hours (e.g. week-long honeymoon)*
- *A repeated event that has occurred more than once (e.g. daily commute)*
- *An entire lifetime period (e.g. primary school years)*

11. How often have you thought of this memory before?

1	2	3	4	5
Never before	*Once or twice*	*A few times*	*Several times*	*Many times*

12. How vivid was the memory (how clear was the image of the events in your mind)?

1	2	3	4	5
Not at all vivid	*A little vivid*	*Somewhat vivid*	*Very vivid*	*Extremely vivid*

13. How negatively or positively did this memory make you feel?

1	2	3	4	5
Very negative	*Somewhat negative*	*Neither positive/negative*	*Somewhat positive*	*Very positive*

14. How important is this memory to your life story?

1	2	3	4	5
Not at all important	*A little important*	*Somewhat important*	*Very important*	*Extremely important*

15. How much do you like **the song/piece of music** that cued your memory?

1	2	3	4	5
Dislike a lot	*Dislike a little*	*Neither like/dislike*	*Like a little*	*Like a lot*

16. Approximately how many times in your life have you heard **the song/piece of music** that cued your memory before?

- *Never*
- *Less than 10 times*
- *10-50 times*
- *50-100 times*
- *More than 100 times*

17. Was this music present during the original event that you recalled? For instance, did your memory involve a previous incident of listening to the same music?

- *Yes*
- *No*
- *Not sure*

APPENDIX C

FOOD EXPOSURE LOG

Appendix C: Food Exposure Log

Instructions: **At the end of each day of the study**, please record the date and **tick one box** to give an estimate of the total amount of exposure you've had to food that day.

Please include instances of cooking/baking, eating, or other exposure to food (for instance, watching a baking programme on TV, or looking at food in a supermarket) when making your total estimate.

DAY 1

1. Date _____/_____/_____

2. For how much time in total have you been exposed to food today?

- *None*
- *1-15 minutes*
- *15-30 minutes*
- *30 minutes-1 hour*
- *1-2 hours*
- *2-3 hours*
- *3 hours or more*

DAY 2

1. Date _____/_____/_____

2. For how much time in total have you been exposed to food today?

- *None*
- *1-15 minutes*
- *15-30 minutes*
- *30 minutes-1 hour*
- *1-2 hours*
- *2-3 hours*
- *3 hours or more*

DAY 3

1. Date _____/_____/_____

2. For how much time in total have you been exposed to food today?

- *None*
- *1-15 minutes*
- *15-30 minutes*
- *30 minutes-1 hour*
- *1-2 hours*
- *2-3 hours*
- *3 hours or more*

DAY 4

1. Date _____/_____/_____

2. For how much time in total have you been exposed to food today?

- *None*
- *1-15 minutes*
- *15-30 minutes*
- *30 minutes-1 hour*
- *1-2 hours*
- *2-3 hours*
- *3 hours or more*

APPENDIX D

FOOD-EVOKED AUTOBIOGRAPHICAL MEMORY DIARY

Appendix D: Food-Evoked Autobiographical Memory Diary

1. Date _____/_____/_____

2. Time diary completed: _____:_____ AM / PM (circle one)

3. Time of memory: _____:_____ AM / PM (circle one)

4. Type of food that cued the memory:

_____

5. What was it about the food that cued the memory?

- *Seeing it* • *Smelling it* • *Tasting it* • *Other:*_____

6. Activity at time of memory:

_____

7. Did the memory that you recalled come to mind spontaneously, or did you try deliberately to recall it?

- *It came to mind spontaneously* • *I made a deliberate effort to recall it*
- *Not sure*

8. Please **describe** the memory that you recalled. Please give as much detail as possible (such as **what** you were doing, **who** you were with, and **where** you were in the remembered event).

_____

_____

9. How old were you when the event or time period you remembered occurred? If you're not sure please estimate or give a range of years, such as "15-17 years old." _____ years old

10. Is this memory of?

- *A single event lasting less than 24 hours (e.g. your 50th birthday party)*
- *A single event lasting more than 24 hours (e.g. week-long honeymoon)*
- *A repeated event that has occurred more than once (e.g. daily commute)*
- *An entire lifetime period (e.g. primary school years)*

11. How often have you thought of this memory before?

1	2	3	4	5
Never before	*Once or twice*	*A few times*	*Several times*	*Many times*

12. How vivid was the memory (how clear was the image of the events in your mind)?

1	2	3	4	5
Not at all vivid	*A little vivid*	*Somewhat vivid*	*Very vivid*	*Extremely vivid*

13. How negatively or positively did this memory make you feel?

1	2	3	4	5
Very negative	*Somewhat negative*	*Neither positive/negative*	*Somewhat positive*	*Very positive*

14. How important is this memory to your life story?

1	2	3	4	5
Not at all important	*A little important*	*Somewhat important*	*Very important*	*Extremely important*

15. How much do you like **the type of food** that cued your memory?

1	2	3	4	5
Dislike a lot	*Dislike a little*	*Neither like/dislike*	*Like a little*	*Like a lot*

16. Approximately how many times in your life have you been exposed to (e.g. eaten or seen) **the type of food** that cued your memory before?

- *Never*
- *Less than 10 times*
- *10-50 times*
- *50-100 times*
- *More than 100 times*

17. Was this food present during the original event that you recalled? For instance, did your memory involve a previous incident of seeing/eating the same food?

- *Yes*
- *No*
- *Not sure*