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How do we remember public events? Pioneering a new area of everyday memory research

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ABSTRACT

Although most of us consume news reports about public events day by day, little is known about how memories of public events are remembered in everyday life. Across three studies, we examined voluntary (deliberately retrieved) and involuntary (spontaneously arising) public event memories by directly comparing them with voluntary and involuntary personal event memories. In particular, we examined the relative frequency of public event memories, correlations with individual differences measures, the emotional tone of remembered public events, phenomenological characteristics associated with remembering, and functions of public event memories. Against a background of replications of well-established findings from the autobiographical memory literature, several novel findings on public event memories emerged: Public event memories arose both deliberately and spontaneously in daily life, but they were less frequent and less positive than memories of personal events. Similar to personal memories, frequency estimates for involuntary public event memories correlated significantly with individual differences measures of daydreaming as well as depressive and PTSD symptoms. The phenomenological characteristics of public event memories showed large differences to personal event memories. For example, they were judged to be more emotionally negative, less specific, less vivid and to come with a lower sense of reliving. Moreover, public event memories seemed to predominantly serve a social function. The results suggest that deliberate and involuntary memory retrieval of public events in daily life may support the formation and maintenance of collective memories.

1. Introduction

Recent years have shown an increased interest in research on collective memories, that is, memories that are shared by members of groups and that are central to the group's identity (e.g., Hirst & Manier, 2008; Roediger & Abel, 2015; Wertsch & Roediger III, 2008). The size of a collective can vary, so that collective memories can be examined for members of groups as large as a nation and beyond, but also for other communities (e.g., citizens of a specific city or region). What collective memories of many larger groups have in common is that they rely on memory for public events. Here, we define public events as events relevant to the general public. Most public events will not be directly experienced in one's personal life but learned about via the media and other types of reports (e.g., political events, environmental events, or sporting events). Notably, such events can hold importance on different levels. Some public events may be relevant to an international audience, whereas other events may be important for national or even smaller regional audiences. Despite the omnipresent media exposure to these different types of public events, both fake and real, throughout our daily lives, surprisingly little is known as to how we remember public events in our day-to-day living. In the present work, we adopted a rather broad and integrative approach and aimed to fill this gap by connecting across several different literatures. In particular, we drew heavily upon the autobiographical memory literature and used already accumulated knowledge on how personal memories are remembered in daily life to ask if the same patterns apply to public events.

In general, remembering is not a unitary phenomenon. Memories can be recalled in different ways. In certain situations, you may deliberately want to recall something, such as when trying to remember where you last put your keys, the exact date of a friend's birthday, or the name of the restaurant you went to recently. Such planned and voluntary attempts at recall are often the focus of experimental lab studies, with subjects being asked to first study some materials and to deliberately try to recall them later. In daily life, however, memories frequently come to

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mind in a different manner, namely spontaneously, without any conscious attempts to prompt their recall. A song may remind you of a night out with friends, the smell of cinnamon may prompt memories of baking cookies with your grandma, or while engaged in something else entirely you may find yourself smiling because you just remembered the funny thing your 2-year-old nephew did last week. Such spontaneous or involuntary remembering has so far predominantly been investigated for autobiographical memories (e.g., Ball & Little, 2006; Berntsen, 1996, 1998; Mace, 2004; Schlagman & Kvavilashvili, 2008; for a review, see Berntsen, 2010, 2021). Several studies indicate that, in daily life, involuntary memories of personal events may be at least as frequent (if not more frequent) than memories brought to mind deliberately (e.g., Rasmussen & Berntsen, 2011; Rasmussen, Ramsgaard, & Berntsen, 2015; Rubin & Berntsen, 2009).

Although a few studies indicate that involuntary memories can also arise for other contents than autobiographical events (e.g., more semantic contents, like single words, phrases, or images, see Kvavilashvili & Mandler, 2004), it has to date not been investigated if involuntary memories can also arise for public events. The goal of the present study is to examine this issue, and to directly compare voluntary and involuntary memories of personal and public events. In contrast to personal events, people rarely experience public events directly in their own lives. Rather, they are typically learned through the media. Although there may be instances when the personal and the public become intertwined (e.g., when actively participating in a political protest, or when going to the stadium to support your favorite sports team), we predominantly learn about public events via the media, other news outlets, or via social interactions in our community. Thus, there may be reason to expect that memories of public events differ from memories of personal events. Addressing how public events are remembered in daily life is interesting in its own right but may also give insights into mechanisms supporting the development of collective memories in larger social groups. Based on cognitive research on the testing effect, Roediger III, Zaromb, and Butler (2009) suggested that the act of retrieving information from memory might contribute to creating and maintaining collective memories. For larger social groups, this must be assumed to comprise the retrieval of public event memories, but so far, it is unclear if and how frequently such memories are recalled in daily life.

This introduction is organized in two parts. First, we provide an overview of what is currently known about public event memories. In particular, we review and integrate separate lines of prior research focusing on very different aspects of memories for public events (sections 1.1, 1.2, and 1.3). Second, to motivate the present work and its methodological approach, we briefly describe relevant work on autobiographical memory, from which we borrowed methods and measures to examine public event memories. By directly contrasting public with personal event memories using similar methods, our goal was to generate new knowledge on how public events are remembered in daily life.

1.1. Previous work on memory for public events and "learning from the news"

Driven by the establishment of mass media, early research from academic disciplines other than psychology or cognitive science (e.g., communications studies) examined the extent to which people learn from news reports. Some of this work suggests that only little is retained when one is exposed to public events in the form of news. Neuman (1976), for instance, reported that, on average, only 6% of the evening news headlines could be freely recalled by viewers that were interviewed on the same evening. When the interviewers provided the headlines as retrieval cues, viewers reported recognizing about 50% of these headlines and could recall details for roughly half of the reported events (for similar findings, see Larsen, 1983; Stauffer, Frost, & Rybolt, 1983; for a review, see Berry, Gunter, & Clifford, 1981). Based on psychological concepts like the levels-of-processing framework (e.g., Craik & Lockhart, 1972), Eveland (2001) suggested that learning from the news depended on viewers' motivation and the way in which they processed the single news items (see also Booth, 1970). Interestingly, several factors discussed as making news stories more memorable in this earlier literature (like repeated exposure, or the use of pictures; e.g., Katz, Adoni, & Parness, 1977; Berry et al., 1981) are today also discussed in the context of research on fake news and subjective feelings of truth for news headlines (e.g., Newman, Garry, Bernstein, Kantner, & Lindsay, 2012; Pennycook, Cannon, & Rand, 2018; see also Brashier & Marsh, 2020; Schwarz, Newman, & Leach, 2016).

In separate parts of the earlier literature, psychologists took advantage of the verifiability of public events and constructed public events quizzes as a means to assess remote memories and potential memory impairments in normal aging and specific patient populations (e.g., Howes & Katz, 1988; Warrington & Silberstein, 1970). For instance, this approach brought forward the well-known finding that memories for remote events that occurred across several decades show little forgetting, even in amnesiacs who suffer from severe impairment for more recently encoded information (Squire, Haist, & Shimamura, 1989; Squire & Slater, 1970). Similarly taking advantage of news items as stimulus materials in an online study, Meeter, Murre, and Janssen (2005) examined forgetting curves for news events in more than 14,000 participants. Across comparatively "short" retention intervals of up to two years, normal time-dependent forgetting for news events was observed. This forgetting was independent of initial degree of learning, which corresponds to findings on other types of memories in the literature (e.g., Bahrick, 1984; Slamecka & McElree, 1983). Moreover, recall of news events has also been shown to follow a serial position curve (Gunter, 1979; Tannenbaum, 1954) and to be affected by proactive interference (Gunter, Berry, & Clifford, 1981; Gunter, Clifford, & Berry, 1980) as well as contiguity effects (Uitvlugt & Healey, 2019).

In sum, these findings may suggest that public events do not make up their own category of memories, because they largely follow the same principles and regularities as, for instance, memories for lists of words. Yet, what distinguishes memories for public events and simpler experimental stimuli is not only that public events are more complex, but also that at least some of them may be relevant to people's personal lives. This connection between the personal and the public domain has been explored in another area of the literature.

1.2. Previous work on the relation between public event memory and autobiographical memory

One branch of research indicating that personal and public events can be linked consists of work on so-called flashbulb memories (Brown & Kulik, 1977; for reviews, see Hirst & Phelps, 2016; Luminet & Curci, 2018). This term refers to memories for the circumstances under which one learned of a typically surprising public event (e.g., 9/11, or the death of Princess Diana). Essentially, flashbulb memories are autobiographical in nature and capture one's own situation while first hearing about the event. Thus, in a way, flashbulb memories may relate one's own life to the course of history. Most studies in this area are focused on the flashbulb memories themselves, but some studies additionally examined event memory, suggesting differences between flashbulb and public event memories (e.g., regarding which factors affect their retention; see Curci, Luminet, Finkenauer, & Gisle, 2001; Hirst et al., 2015; Larsen, 1992; Tinti, Schmidt, Testa, & Levine, 2014).

A few studies have also examined if recall of public events, similar to recall of autobiographical events, show a so-called reminiscence bump (i.e., higher recall probabilities for events that happened during one's adolescence or young adulthood; Rubin, Wetzler, & Nebes, 1986). Although findings are somewhat mixed, it seems that a reminiscence bump can emerge for recall of public events as well, but may be attenuated and less robust compared to autobiographical memories (e.g., Holmes & Conway, 1999; Howes & Katz, 1992; Koppel & Berntsen, 2016; Tekcan, Boduroglu, Mutlutürk, & Erciyes, 2017; for a review, see

Koppel, 2013; for related work on generational cohort effects, see also Corning & Schuman, 2012, 2015; Schuman & Scott, 1989).

Another line of research more directly focuses on how public events can affect autobiographical memory. Under certain circumstances, public events can act as temporal landmarks, and organize autobiographical events in memory by creating so-called historically defined autobiographical periods (Brown et al., 2009; Brown & Lee, 2010). A central assumption of this "living in history" framework is that public events function as temporal landmarks that signify pre and post eras in people's lives if they are "lived through" and heavily alter daily life. In empirical studies on the topic, subjects are typically asked to date personal memories from their lives and think aloud while doing so. The reconstruction of dates often involves references to periods in life, and if these references frequently make use of periods defined by public events (e.g., the Marmara earthquake that occurred in Turkey in 1999), it is concluded that a "living in history effect" is present in a certain population (e.g., in subject samples from affected areas). Although this work clearly demonstrates that the personal and the public can be linked in memory, "living in history" effects seem to occur rarely and only in cases where public events were disastrous and had a substantial and often dramatic influence on people's lives (see Brown et al., 2009; Brown, Schweickart, & Svob, 2016; Zebian & Brown, 2014; for recent evidence of a positive living-in-history effect, see Camia, Menzel, & Bohn, 2019).

In sum, many of these previous studies suggest that public events can be pervasive and influence our personal memory, especially when our lives are directly affected by them. Yet, the tasks used in these and similar studies tend to query participants' memories in very specific manners, with little regard for how public events are remembered in daily life. In particular, what has not been addressed so far is the question of how regularly public event memories are experienced in daily life, as we go about our usual business, and whether such memories of public events also arise both deliberately and spontaneously, as memories of personal events have been shown to do.

1.3. Directly comparing memories for personal and public events

Conceptually, a critical difference between personal and public events is that personal events by definition are directly experienced, whereas public events are not. Larsen and Plunkett (1987) argued that there should be several differences between directly experienced events and so-called reported events – that is, events that one did not experience directly but heard about via different kinds of reports (e.g., via the news). Reported events should be less frequently encountered than directly experienced events; they should be less perceptual in nature due to being known from symbolically coded information, with fewer representations of bodily sensations, and should be more isolated in memory (also see Larsen, 1988). Moreover, reported events should involve lower amounts of information due to prior selection before reaching receivers, but more coherent internal structure due to narrativization. To empirically examine the two types of events in memory, Larsen and Plunkett (1987) provided participants with cue words and asked them to recall and date either experienced events or reported events (encoded through reading, radio, television, or a social source). The main finding was that generating reported relative to experienced events took significantly longer, suggesting that reported events are less easily accessible in memory. Subjects also had more unsuccessful retrievals for reported events, whereas dating of events was not affected by event type. No further findings on phenomenological or functional characteristics related to the different types of event memories were reported. However, Larsen and Plunkett speculated that, based on the above considerations, reported events should be remembered less vividly than experienced events. Larsen (1992) reported related findings using a structured diary methodology with himself as the only participant. On a daily basis, he recorded both personal and public events (as well as their personal context) for which he later tested himself. He showed that memories for public events were less accessible, and less accurately remembered on a long-term basis than were memories for personal events.

1.4. The present research program

Despite their importance for our identity, perception of reality, political attitudes and general behavior, we currently know relatively little about how memories of public events are remembered in daily life. The present study aimed to fill this empirical gap by directly comparing personal and public event memories. In our attempt to do so, we drew heavily upon prior work on autobiographical memories. Given that currently little is known about how exactly we remember public events, our goal was not to examine memories for public events in isolation, but to directly compare them with memories for personal events. Thus, our first goal was to replicate central prior findings on autobiographical memories. Our second goal was to build upon these findings and to use the same methods, borrowed from autobiographical memory research, to generate new findings on public event memories.

The present research program focuses on five questions that were all clearly motivated by accumulated knowledge on personal event memories as they are experienced in daily life. First, there is robust evidence that memories for personal events frequently come to mind spontaneously – without preceding retrieval effort (e.g., Berntsen, 1996, 2009a, Mace, 2007). The first question therefore was if memories of public events can come to mind spontaneously, too, and if so, how frequent such involuntary memories are. For memories of personal events, involuntary remembering seems to be at least as frequent in daily life as deliberate remembering (e.g., Rasmussen et al., 2015; Rasmussen & Berntsen, 2011), but given the previous considerations and empirical data on the lower accessibility of public event memories (Larsen, 1992; Larsen & Plunkett, 1987), memories of public events could overall be less frequent than memories of personal events. Involuntary autobiographical memories have been shown to be cued by features in the ongoing situation, address more specific events and involve more emotional impact than voluntary autobiographical memories (Berntsen, 2009a). To the extent that people report involuntary memories for public events, we aimed to examine if their activation and differences to voluntary public event memories are comparable to what has been found for autobiographical memories. The second question addressed the relation of the frequency of involuntary memories for public events to relevant individual differences measures. Self-reported frequency of involuntary memories for personal events is related to measures of emotional distress, such as symptoms of depression and PTSD, and the propensity for engaging in daydreaming (e.g., Berntsen, Rubin, & Salgado, 2015). To date it has not been examined if such relations exist for involuntary memories more generally. The third question concerned the emotional tone of remembered public events. For memories of personal events, multiple studies have reported a so-called positivity bias; that is, positive memories are recalled with a higher probability than neutral or even negative memories (e.g., Berntsen, 1998; Walker, Skowronski, & Thompson, 2003). Yet, because most public events we learn about are negative (e.g., Soroka & McAdams, 2015; Trussler & Soroka, 2014), one might doubt that a corresponding positivity bias could also be found for public event memories. Fourth, if event memories arise reliably in daily life, we were interested in examining their characteristics. For instance, for autobiographical memories, remembering is associated with a sense of reliving, but since public events are usually not personally experienced and therefore less perceptual in nature (see Larsen & Plunkett, 1987), characteristics during remembering may differ greatly from memories of personal events. Fifth, autobiographical memories have been proposed to serve a set of distinct functions (e.g., a directive function, a self or identity function, and a social function; Bluck, Alea, Habermas, & Rubin, 2005). In principle, public event memories might serve the same functions, but this has not been examined to date.

In a first step, in Study 1, we conducted a survey involving participants recruited through Amazon's Mechanical Turk (MTurk) to find out

if people are at all familiar with the general phenomena of involuntary and deliberate memories for public events. To foreshadow, the results made us optimistic that most people are familiar with public event memories and that such memories can be reasonably studied. In a second step, we therefore followed up with two diary studies, in which students recorded memories of personal and public events as they occurred in daily life. In Study 2, we collected data on the frequency of memories for personal and public events, with participants recording all occurrences of involuntary and voluntary memories of personal and public events during a regular day in their lives. In addition, we also asked about the emotional tone of remembered events. In Study 3, we collected data on characteristics and functions of personal and public event memories. Participants again recorded involuntary event memories as they occurred during their regular lives, and additionally generated voluntary event memories. For all recorded memories, participants were asked to provide ratings on several scales that covered memory characteristics (e.g., vividness, sense of reliving, etc.) and functions (i.e., directive, self, social). Together, the three studies will provide first empirical data on involuntary and deliberate memories for public events. By comparing them directly to memories for personal events, they will be able to provide some first answers on a) the relative frequency of such memories, b) correlations with individual differences measures, c) the emotional tone of remembered public events, d) phenomenological characteristics associated with remembering, and e) functions of public event memories.

2. Study 1

Study 1 was conducted as an online survey in September 2016, with the goal to examine if, based on daily life experiences, people are at all familiar with involuntary and deliberate memories for public events. To do so, we applied a survey scale previously developed to obtain frequency estimates on the occurrence of involuntary memories for personal events in daily life, the *Involuntary Autobiographical Memory Inventory (IAMI*, see Berntsen et al., 2015). Because not all questions could be meaningfully applied to memories for public events, we shortened the scale, and also shortened a corresponding control scale for voluntary memories, and additionally created adapted versions of the scales to also collect frequency estimates for the occurrence of involuntary and voluntary memories of public events in daily life. This enabled us to directly compare participants' frequency estimates for voluntary and involuntary memories of personal and public events. Based on prior findings on the lower accessibility of reported events relative to directly experienced events in memory (Larsen, 1992; Larsen & Plunkett, 1987), we expected that memories of public events might be judged as occurring less frequently than memories of personal events. For personal events, we expected to replicate the previous finding that involuntary memories occur more frequently than their voluntary counterparts (see Berntsen et al., 2015), but it remains to be studied if similar differences arise for memories of public events.

2.1. Method

2.1.1. Participants

One hundred and sixty-three participants from the US were initially recruited on MTurk and received monetary reimbursement for participating. Twenty-three subjects failed built-in attention checks,[1] so their data were discarded. The data of 30 additional subjects had to be excluded from analysis for other reasons: twenty-five subjects put in nonsense responses; three participants reported a foreign citizenship and/or a different native language than English; and the comments of two further participants clearly indicated that they had not understood the instructions. This left us with a final sample of 110 participants. Mean reported age was 34.4 years (SD = 11.0; range: 19–70 years), mean reported duration of education was 15.8 years (SD = 2.5, range: 12–26 years). Fifty-two participants reported to be male, 57 participants reported to be female, and one participant chose the response option "other". All participants included in the final sample were US citizens and reported English as their native language.

2.1.2. Material

2.1.2.1. Memory scales. We chose six items from the *IAMI* (see Berntsen et al., 2015) plus the corresponding six control items to assess the frequency of involuntary and voluntary memories of personal events. In addition, we adapted these 12 items to compile new scales suitable for assessing the frequency of involuntary and voluntary memories of both public and autobiographical events. Each item describes a different situation in which memories of personal or public events might come to mind, either spontaneously and without any effort, or when thinking of them in a willful and deliberate manner (e.g., "*Memories of [personal/public] events pop into my mind by themselves – without me consciously trying to evoke them.*"; see Table 1 for all scale items). The voluntary control questions used the same basic structure, but with an emphasis on goal-directed, deliberate retrieval (Berntsen et al., 2015). For each item, subjects are asked to rate the perceived frequency of such occurrences of memories in their daily lives on a 5-point scale (response options: 0 = Never; 1 = Once a month or more; 2 = Once a week or more; 3 = Once a day or more; 4 = Once an hour or more). Cronbach's Alpha was calculated to examine internal consistency of these four memory scales (e.g., Kline, 2000): The internal consistency of the six-item version of the *IAMI* to assess the frequency of involuntary memories of personal events was good ($\alpha = 0.84$), and that of the corresponding control scale for assessing voluntary memories was excellent ($\alpha = 0.92$). Similar values were obtained for the six-item scale used to assess the frequency of involuntary memories of public events ($\alpha = 0.92$) and its counterpart for voluntary memories ($\alpha = 0.95$).

2.1.2.2. Other scales capturing individual differences. Following Berntsen et al. (2015), three further scales were applied in the present study to examine individual differences. We used the *Daydreaming Frequency Scale* (DDFS; Giambra, 1993, adapted from Singer & Antrobus, 1970) to assess the frequency of daydreaming in daily life. The scale provides 5 response options (from 0 to 4) for each of 12 items, corresponding to the frequency of described instances of daydreaming (for instance, the response options for the item "I lose myself in active daydreaming" range from 0 = Infrequently to 4 = Many different times through the day). The sum score of all items can range between 0 and 48. We also used the *PTSD Checklist for DSM-5* (PCL-5; Weathers et al., 2013), which consists of 20 items and assesses PTSD symptoms. Each item represents a symptom, and participants are asked to judge on a 5-point scale (ranging from 0 = Not at all to 4 = Extremely) how much they were bothered by it within the last month. Item scores are again summed up, with sum scores ranging between 0 and 80. Finally, we used the *Center for Epidemiologic Studies Depression Scale* (CES—D: Sawyer-Radloff, 1977), which also consists of 20 items and assesses symptoms of depression. Each item describes a symptom and subjects are asked to indicate on a 4-point scale how frequently such situations happened within the last week (ranging from 0 = Rarely or none of the time to 3 = All of the time). Sum scores can range between 0 and 60. Internal consistency of all three scales was excellent in the present study, with Cronbach's Alpha ranging between 0.95 and 0.97.

[1] Attention checks consisted of scale items with instructions to participants to provide a specific response on this scale. Three such scales were included; one in each part of the survey. If subjects entered a response on these scales that was different from the one specified in the instructions, this was taken as evidence that they did not consistently pay attention to the survey instructions and partly provided random responses; their data were thus excluded from analysis.

Table 1
Overview of the scale items used in Study 1 to assess the frequency of memories for personal and public events.

Original scale items for memories of personal events (taken from Berntsen et al., 2015)		Adapted scale items for memories of public events	
Involuntary memories	Voluntary memories	Involuntary memories	Voluntary memories
Memories of personal events pop into my mind by themselves – without me consciously trying to evoke them.	After an event has happened, I willfully and deliberately think back to it in my mind and try to remember it.	Memories of past public events pop into my mind by themselves – without me consciously trying to evoke them.	After a public event has happened, I willfully and deliberately think back to it in my mind and try to remember it.
After something surprising has happened, I spontaneously remember it, without consciously trying. It just comes to me.	After something surprising has happened, I willfully and deliberately think back to it in my mind and try to remember it.	After a surprising public event has happened, I spontaneously remember it, without consciously trying. It just comes to me.	After a surprising public event has happened, I willfully and deliberately think back to it in my mind and try to remember it.
Listening to some music or songs brings memories of past events to mind – without me consciously trying to remember them.	When I am listening to some music or songs, I willfully and deliberately think back to past experiences and try to remember them.	Listening to some music or songs brings memories of past public events to mind – without me consciously trying to remember them.	When I am listening to some music or songs, I willfully and deliberately think back to past public events and try to remember them.
When I am relaxing or doing routine work, memories of past events come to my mind by themselves – without me consciously trying to remember them.	When I am relaxing or doing routine work, I willfully and deliberately think back to past experiences and try to remember them.	When I am relaxing or doing routine work, memories of past public events come to my mind by themselves – without me consciously trying to remember them.	When I am relaxing or doing routine work, I willfully and deliberately think back to past public events and try to remember them.
After I have experienced something that made a strong impression, I spontaneously remember it, without consciously trying. It just comes to me.	After I have experienced something that made a strong impression, I willfully and deliberately think back to it in my mind and try to remember it.	After I have learned about a public event that left a strong impression, I spontaneously remember it, without consciously trying. It just comes to me.	After I have learned about a public event that left a strong impression, I willfully and deliberately think back to it in my mind and try to remember it.
Some locations or places bring memories of past events to mind – without me consciously trying to remember them.	At certain locations or places, I willfully and deliberately think back to past experiences and try to remember them.	Some locations or places bring memories of past public events to mind – without me consciously trying to remember them.	At certain locations or places, I willfully and deliberately think back to past public events and try to remember them.

The original scale items for memories of personal events were taken from *The Involuntary Autobiographic Memory Inventory* (see Berntsen et al., 2015) and adapted for the assessment of memories of public events.

2.1.3. Procedure

The task advertisement on MTurk briefly described the study, what participants would be asked to do, and the estimated time that it would take to complete the study. MTurkers interested in participating were directed to an external website (*Qualtrics*; Provo, Utah, USA). After providing informed consent and some demographic information, subjects started the study, which was divided into three parts.

In part 1, subjects were asked to complete the scale items on involuntary memories; first for memories of personal events, then for memories of public events. Personal events were defined as events relevant to one's own life, and as events that one experienced directly in one's past (e.g., family events, events in the working place, during a vacation, or other events relevant to one personally). After this definition, subjects were asked to read through the six scale items (Table 1) and to respond to each item by choosing the response option that best reflected their experience of the frequency of involuntary memories of personal events. The six scale items were presented in random sequence for each participant. Afterwards, subjects were asked to indicate on the basis of their own experience of such spontaneously arising memories of past personal events, in general how positive or negative such memories were (with response options ranging from −2 = Extremely negative to 2 = Extremely positive) and also in general how emotionally intense they were (with response options ranging from 0 = Not at all intense to 4 = Extremely intense). Next, subjects were asked to provide 3–5 examples for specific events from their own personal past that, at some point, had come to mind spontaneously. The following section on involuntary memories of public events started by providing a definition of public events. They were defined as events relevant to the general public, but that one mostly did not experience directly in one's personal life (e.g., political events, environmental events, sporting events, or other types of events relevant to the general public). Participants were then asked to respond to the six scale items adapted for involuntary memories of public events, and then completed the same questions on the valence of such memories and their emotional intensity as for memories of personal events. In addition, they were also asked to provide 3–5 examples for specific public events that, at some point, had come to mind spontaneously.

In part 2 of the study, participants were asked to complete the *DDFS* on daydreaming propensity (Giambra, 1993; Singer & Antrobus, 1970), the *CES-D* assessing depressive symptoms (Sawyer-Radloff, 1977), and the *PCL-5* assessing PTSD symptoms (Weathers et al., 2013). For all scales, subjects were asked to carefully read through the items and to make judgments corresponding to their own experiences.

In part 3, the last part of the study, participants were asked to complete the scale items on voluntary memories; first for memories of personal events, then for memories of public events. Part 3 was largely identical to part 1 of the study, the only difference being that participants were now asked to judge the frequency of voluntary (not involuntary) memories of personal and public events, to provide estimates for valence and intensity of such deliberate memories, and to also list 3–5 examples of personal and public events that they had previously tried to bring to mind deliberately.

Finally, participants were asked to indicate on a 7-point scale how difficult they found it to complete the survey (with response options ranging from −3 = Very difficult to 3 = Very easy). They were given the opportunity to provide any comments that they might have, thanked for their participation and received instructions on how to receive payment.

2.2. Results

2.2.1. Frequency of voluntary and involuntary memories of personal and public events

We first examined mean frequency ratings across the four different memory scales (see also Fig. 1; data files for all main analyses are available on the Open Science Framework: https://osf.io/c238k/). A 2 × 2 repeated-measures ANOVA showed significant main effects for type

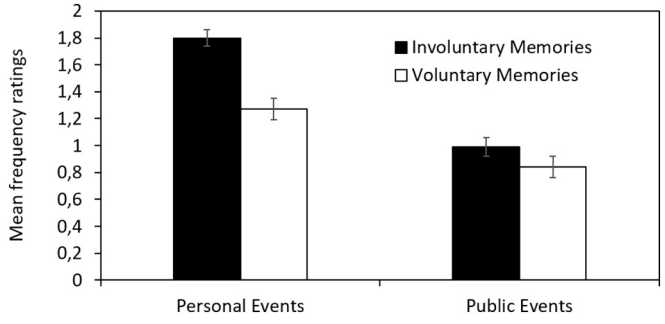

Fig. 1. Mean frequency ratings for involuntary and voluntary memories of personal and public events in Study 1. Error bars show ±1 standard errors.

of remembering (involuntary vs. voluntary), $F(1, 109) = 45.64$, $MSE = 0.28$, $p < .001$, $\eta^2 = 0.30$, and for type of remembered events (personal vs. public events), $F(1, 109) = 139.24$, $MSE = 0.31$, $p < .001$, $\eta^2 = 0.56$. Overall, mean frequency ratings across the six scale items were higher for involuntary than for voluntary memories ($M = 1.40$, $SD = 0.60$ vs. $M = 1.06$, $SD = 0.72$, respectively), and they were also higher for memories of personal compared to memories of public events ($M = 1.54$, $SD = 0.62$ vs. $M = 0.92$, $SD = 0.71$). In addition, the ANOVA showed a significant interaction effect, $F(1, 109) = 23.03$, $MSE = 0.17$, $p < .001$, $\eta^2 = 0.17$, suggesting that the difference in frequency ratings observed for involuntary and voluntary memories depended on the type of remembered event. Follow-up tests showed that involuntary memories were always rated as more frequent than voluntary memories, but this difference was more pronounced for memories of personal events ($M = 1.80$, $SD = 0.65$ vs. $M = 1.27$, $SD = 0.79$, $t(109) = 7.48$, $p < .001$, $d = 0.71$) than for memories of public events ($M = 0.99$, $SD = 0.73$ vs. $M = 0.84$, $SD = 0.81$, $t(109) = 2.65$, $p = .009$, $d = 0.25$).

2.2.2. Valence and intensity ratings

Two further repeated measures ANOVAs were conducted to examine valence and intensity ratings for the different types of memories. Concerning valence, rated on scales ranging from −2 (extremely negative) to +2 (extremely positive), the ANOVA showed significant main effects for type of event, $F(1, 109) = 15.68$, $MSE = 1.02$, $p < .001$, $\eta^2 = 0.13$, and type of remembering, $F(1, 109) = 6.61$, $MSE = 0.45$, $p = .011$, $\eta^2 = 0.06$. Memories of personal events were rated as more positive ($M = 0.49$, $SD = 0.84$) than memories of public events ($M = 0.11$, $SD = 0.77$). In addition, voluntary memories were rated as slightly more positive ($M = 0.38$, $SD = 0.65$) than involuntary memories ($M = 0.22$, $SD = 0.77$). There was no interaction between the two factors, $F(1, 109) < 1.00$, suggesting that voluntary memories were rated as more positive than involuntary memories for both personal ($M = 0.57$, $SD = 0.88$ vs. $M = 0.41$, $SD = 1.05$) and public events ($M = 0.19$, $SD = 0.88$ vs. $M = 0.03$, $SD = 0.89$). Concerning intensity, rated on scales ranging from 0 (not at all intense) to 4 (extremely intense), the ANOVA showed only a significant main effect for type of event, $F(1, 109) = 17.05$, $MSE = 0.88$, $p < .001$, $\eta^2 = 0.14$. Memories of personal events were rated as more intense ($M = 1.69$, $SD = 0.80$) than memories of public events ($M = 1.32$, $SD = 1.04$). The ANOVA showed no differences between voluntary and involuntary remembering (personal events: $M = 1.65$, $SD = 0.92$ vs. $M = 1.73$, $SD = 0.91$; public events: $M = 1.26$, $SD = 1.09$ vs. $M = 1.37$, $SD = 1.15$), all $Fs(1, 109) \leq 2.59$, $ps \geq 0.111$, $\eta^2 s \leq 0.02$.

2.2.3. Correlations between ratings on the memory scales and individual differences measures

Responses on the four memory scales were positively correlated (all $r_s \geq 0.35$, $ps < 0.001$; see Table 2 for an overview of all correlations), indicating that subjects who reported high frequency estimates on one scale also tended to report high frequency estimates on the other scales. Valence ratings did not generally correlate with responses on the memory scales, although there was a positive relationship between frequency estimates for voluntarily remembered public events and the corresponding valence ratings ($r_s = 0.28$, $p = .003$). Intensity ratings on the other hand all correlated positively with frequency estimates on the respective memory scales (all $r_s \geq 0.35$, $ps < 0.001$). Frequency estimates tended to be higher the more emotionally intense the remembered events were rated to be. Both findings are consistent with results reported by Berntsen et al. (2015) for memories of personal events.

Table 2
Correlation table for scale ratings in Study 1.

	Involuntary memories of personal events	Voluntary memories of personal events	Involuntary memories of public events	Voluntary memories of public events
Involuntary memories of personal events	–			
Voluntary memories of personal events	0.43 ***	–		
Involuntary memories of public events	0.45 ***	0.50 ***	–	
Voluntary memories of public events	0.35 ***	0.62 ***	0.68 ***	–
Valence	0.04	0.16	0.02	0.28 **
Intensity	0.37 ***	0.35 ***	0.40 ***	0.54 ***
Daydreaming (DDFS)	0.34 ***	0.33 ***	0.27 **	0.28 **
Depressive symptoms (CES-D)	0.17	0.08	0.24 *	0.16
PTSD symptoms (PCL-5)	0.22 *	0.12	0.21 *	0.13

$N = 110$. DDFS: Daydreaming Frequency Scale; CES—D: Center for Epidemiologic Studies Depression Scale; PCL-5: PTSD Checklist for DSM-5. * $p < .05$; ** $p < .01$; *** $p < .001$.

We also examined correlations between the four memory scales and the scales assessing frequency of daydreaming (mean sum score: $M = 21.59$, $SD = 12.07$), depressive symptoms ($M = 12.38$, $SD = 11.94$), and PTSD symptoms ($M = 13.46$, $SD = 13.94$). Higher sum scores on the Daydreaming Frequency Scale were related to higher frequency estimates on all four memory scales (all $r_s \geq 0.27$, $ps \leq 0.004$; see Table 2), whereas there was no such general correlational pattern with the other two scales assessing depressive and PTSD symptoms. Depressive symptoms only showed a modest positive correlation with frequency estimates of involuntary memories of public events ($r_s = 0.24$, $p = .013$). Similarly, PTSD symptoms also correlated with frequency estimates of involuntary memories, but for both public and personal events ($r_s \geq 0.21$, $ps \leq 0.030$). This pattern of correlations is also consistent with prior work by Berntsen et al. (2015), who found strong correlations between measures of daydreaming and the *IAMI*, but much weaker correlations with measures of depressive and PTSD symptoms.

2.2.4. Examples for memories of public events

Overall, summed up across voluntary and involuntary remembering, subjects listed 685 examples for previously remembered public events that could be clearly identified. All events were sorted into content categories by two independent coders (intercoder agreement: 84.5%). Importantly, because we used a different approach to sampling the memories, we chose to generate our own coding scheme in a bottom up fashion, allowing systematic patterns in these novel data to be identified. We chose this method over merely relying on already established schemes (e.g., Holmes & Conway, 1999; Liu et al., 2005; Topcu & Hirst,

2020). As a consequence, the criteria for differentiating between different content categories were established on the basis of the events listed by participants. For example, we differentiated between "Terrorist attacks" and other "Events involving death or violence", because terrorist attacks featured rather prominently in the data. Following definitions of terrorism which stress the use of violence in the pursuit of political, religious, or ideological objectives, events that did not satisfy this definition were not coded as terrorist attacks but sorted into the other category instead (e.g., the mass shootings at Columbine and Aurora movie theater). Borderline cases as well as inconsistencies in initial coding were resolved through discussions. In addition to being coded for content, the listed public events were also sorted into categories corresponding to their level of public importance (i.e., regionally vs. nationally vs. internationally relevant events; intercoder agreement of 82.0%). An example for a regionally relevant event might be the election of a new mayor in a specific town; an example for a nationally relevant event could be healthcare reform in a particular country; and an example for an internationally relevant event might be a conflict involving international actors (e.g., the currently still on-going war in Syria).

Table 3 summarizes content-coded examples of previously remembered public events. The same four content categories dominated the examples provided for both voluntarily and involuntarily remembered events, namely the content categories "Political events", "Terrorist attacks", "Art and entertainment events", and "Sports events". Although the exact frequencies differed slightly for voluntarily and involuntarily remembered events, these four categories made up roughly 65% of all listed events for both types of memories. Concerning the additional coding for level of public relevance, approximately 15% of the generated examples were either too vague to be classified or corresponded to personally relevant events in public (e.g., going out for dinner in a restaurant). Notably, however, roughly equal parts of the remaining events could be categorized as relevant to the regional, the national, and the international public (and this was the case for both voluntarily and involuntarily remembered events; see Table 4).

2.3. Discussion

Participants' frequency estimates for memories of personal events were higher for involuntary than for voluntary remembering, which replicates previous work using the full versions of the same scales (Berntsen et al., 2015). This is also consistent with prior experience sampling studies (e.g., Rasmussen et al., 2015; Rasmussen & Berntsen, 2011), indicating that, in daily life, involuntary memories of personal memories may be at least as frequent, if not more frequent, than voluntary memories. Most importantly, participants in Study 1 seemed to be familiar with the phenomena of deliberately retrieved and spontaneously arising memories of public events. Even though participants' frequency estimates for memories of public events were overall lower than those for personal events, the data indicated that involuntary memories of public events might be more frequent in daily life than voluntary memories of public events. Another novel finding was that, compared with memories for personal events, memories for public events were judged to be less positive and less emotionally intense, which suggests that the positivity bias typically observed for personally relevant memories might be reduced or even eliminated for public event memories. An inspection of the examples for memories of public events that participants provided showed that they considered a wide variety of events. Roughly equal parts of the nominated events referred to regionally, nationally, and internationally relevant public events. Despite methodological differences, some of the most frequent content categories in our data are consistent with those reported in other studies on voluntary memories of public events (e.g., Holmes & Conway, 1999; Liu et al., 2005; Topcu & Hirst, 2020).

Taken together, Study 1 provided some first data on involuntary and voluntary memories of public events that made it seem feasible to

Table 3
Content-coded examples of public events that were previously remembered voluntarily or involuntarily by participants in Study 1.

Content category	Involuntary memories		Voluntary memories		Examples
	n	%	n	%	
Terrorist attacks	77	20.1%	49	16.3%	"Paris attacks", "9/11 attacks", "Pulse nightclub", "Boston Marathon Bombing"
Political events	53	13.8%	67	22.3%	"Finding out Obama was elected", "Political debates", "Berlin Wall coming down"
Art and entertainment events	63	16.4%	55	18.3%	"County fair", "Watermelon Festival", "Britney Spears snake performance"
Sports events	56	14.6%	34	11.3%	"Arsenal Game", "Superbowl", "Olympics"
Holidays and celebrations	27	7.0%	13	4.3%	"4th of July Fireworks", "Memorial Day Parade", "The Bud Billiken Parade"
Environmental events	21	5.5%	7	2.3%	"Hurricane Katrina", "Loma prieta earthquake", "Tornado strike"
Events involving death or violence	26	6.8%	2	0.7%	"Columbine", "Aurora movie theater shooting", "Sexual assault at Stanford"
Personal events in public	12	3.1%	15	5.0%	"Helping at a fundraiser", "Speaking at church", "Visiting a favorite restaurant"
Professional or educational events	9	2.3%	16	5.3%	"Medical symposium downtown", "Going to a seminar", "Event Hall at law school"
Events concerning public figures	4	1.0%	12	4.0%	"Met president", "Celebrity death", "Death of Michael Jackson"
Accidents, traffic and fatalities	11	2.9%	4	1.3%	"Construction on roads", "Space Shuttle explosions"
Wars and international conflicts	1	0.3%	13	4.3%	"Iraq war", "VE Day", "Battle of Midway", "The middle East and their fighting"
Public protests	7	1.8%	7	2.3%	"Environmental protests","The protests in Venezuela", "Civil Rights movement"
Events at public sites	8	2.1%	2	0.7%	"Visiting the World Trade Center", "Going to an amusement park", "Zoo in Michigan"
Public ceremonies	7	1.8%	3	1.0%	"Police officers funeral", "Other people's wedding celebrations", "Church"
Science news	2	0.5%	2	0.7%	"Scientific Discoveries", "Zika virus"

Subjects originally generated 714 public events, but 29 events were either nonsense responses (e.g. N/A) or too vague to be IDed, so they were excluded from further analysis (corresponds to 4.1% of all 714 generated events). 384 examples of involuntary and 301 examples of voluntary memories remained.

Table 4
Public relevance of generated examples of remembered public events in Study 1 and of remembered events recorded in diaries in Study 3.

Event relevance	Voluntary memories	Involuntary memories
Study 1		
Too vague for a definite classification	9.6% (29)	11.5% (44)
Personally relevant events in public	6.0% (18)	5.7% (22)
Regionally relevant public events	32.9% (99)	29.7% (114)
Nationally relevant public events	23.6% (71)	28.9% (111)
Internationally relevant public events	27.9% (84)	24.2% (93)
Study 3		
Too vague for a definite classification	1.3% (5)	0.5% (2)
Regionally relevant public events	20.5% (79)	19.6% (76)
Nationally relevant public events	14.8% (57)	18.3% (71)
Internationally relevant public events	63.4% (244)	61.5% (238)

Values in parentheses represent absolute numbers of events.

conduct a more time-consuming, but better controlled experience sampling study on the frequency of such memories. Because participants in Study 1 were asked for their retrospective frequency estimates, it remains to be seen if the reported results hold up when memories are directly recorded in daily life and in close temporal proximity to their occurrence. To address the issue, we conducted Study 2, using a well-established structured diary method for studying the frequency of involuntary and voluntary autobiographical memories in daily life (e.g., Berntsen, 1996; Berntsen & Hall, 2004).

3. Study 2

Study 2 was conducted between October 2016 and April 2017. Participants recorded involuntary and voluntary memories right as they occurred in daily life, by means of two diaries; one for memories of personal events, the other for memories of public events. This again enabled us to directly compare frequencies across types of events and remembering. Based on the prior work by Larsen and Plunkett (1987) and results from Study 1, we expected that personal event memories should occur more frequently than public event memories. In addition, if the Study 1 pattern holds up, involuntary memories should generally be more frequent than voluntary memories, both for personal and public event memories.

3.1. Method

3.1.1. Participants

Sample size was determined based on prior work on autobiographical memories (e.g., Berntsen & Hall, 2004). A total of 32 students at Regensburg University (Germany) were recruited for the study and received partial course credit for participation. Mean age was 19.8 years (SD = 2.1; range: 18–28 years). 27 participants were female, 5 were male.

3.1.2. Material

Following Finnbogadóttir and Berntsen (2013), we created two small diary booklets, each for recording memories during an entire day (see below for details). Each booklet comprised two pages. One of them was used for recording voluntary memories, the other one was used for recording involuntary memories; the pages were labeled accordingly. Each page was further divided into different timeslots to assist subjects in recording their memories throughout an entire day. Additionally, each page had three different columns so that subjects could indicate whether the remembered event was positive, neutral or negative by placing their mark in the corresponding column.

3.1.3. Design

The study followed a 2 × 2 within-subject design with the two factors of type of event and type of remembering. Each participant completed two consecutive diaries: one for recording memories of personal events, the other one for recording memories of public events. Sequence of diaries was counterbalanced across subjects; that is, one half of participants started with recording personal event memories and then moved on to recording public event memories, whereas the sequence was reversed for the other half of participants.[2] When working on each diary, subjects were asked to record both involuntary and voluntary memories that occurred during an entire day. This is different from procedures used in the past (e.g., Rasmussen & Berntsen, 2011) where this manipulation was done between subjects.

3.1.4. Procedure

The experimenter met with each participant individually, all in all three times. During the first meeting, subjects received extensive information about the general topic of the study and what it would require to take part. All recruited subjects agreed to participate and provided written informed consent. After subjects had filled out a demographic questionnaire, the experimenter began instructing them specifically for the first of two conditions, depending on which they were scheduled to start with (i.e., whether they first recorded memories of personal or public events). The experimenter carefully defined personal events versus public events and explained the difference between voluntary and involuntary memories. This critical information was also summarized in written form so that subjects could re-read it later in case of doubt. In each condition, subjects were asked to monitor their own memories for 24 h and to record all occurrences of voluntary and involuntary memories (of either personal or public events) by putting a mark in a small two-page booklet. The study focused on memory frequency. Due to potentially high numbers of memories and in order to gain unbiased frequency data, participants were not required to record the contents of each memory (see Finnbogadóttir & Berntsen, 2013; Rasmussen & Berntsen, 2011, for a similar procedure). The diaries were the same in both event conditions, the only difference being that subjects were carefully instructed to monitor and record their memories of either personal or public events. The experimenter scheduled a second meeting with each participant to collect the first diary, to hand out the second diary and to provide instructions for completing the new diary. In a last meeting, the participants handed in the second diary, and they were debriefed and thanked for their participation. None of the participants reported any issues with following the instructions, or more generally with completing the two diaries.

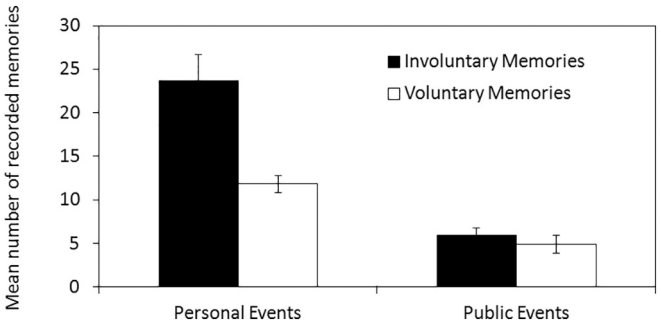

Fig. 2. Mean number of involuntary and voluntary memories of personal and public events recorded in Study 2. Error bars show ±1 standard errors.

[2] Sequence of diaries did not affect the results.

3.2. Results

3.2.1. Frequency of voluntary and involuntary memories of personal and public events

Fig. 2 shows mean numbers of voluntary and involuntary memories, separately for personal and public events. Frequency data have no upper bound and can vary greatly across participants. As a consequence, data may not be normally distributed, which was also the case in the present study. Therefore, we subjected the data to a square-root transformation. All statistical tests were conducted on these transformed frequency data only, but the untransformed frequency data are used for providing descriptive statistics to characterize the underlying pattern of results in an accessible manner. A 2 × 2 repeated-measures ANOVA showed a significant main effect of type of remembering (involuntary vs. voluntary), $F(1,31) = 18.51$, $MSE = 1.28$, $p < .001$, $\eta^2 = 0.37$, and a significant main effect of type of remembered event (personal vs. public event), $F(1, 31) = 62.71$, $MSE = 1.59$, $p < .001$, $\eta^2 = 0.67$. Overall, the mean number of recorded memories was higher for involuntary than for voluntary memories ($M = 14.86$, $SD = 8.99$ vs. $M = 8.38$, $SD = 6.20$, respectively), and for memories of personal compared to memories of public events ($M = 17.78$, $SD = 11.61$ vs. $M = 5.45$, $SD = 3.90$). The ANOVA also showed a significant interaction of the two factors, $F(1, 31) = 18.72$, $MSE = 0.51$, $p < .001$, $\eta^2 = 0.38$, suggesting that the difference in frequencies observed for involuntary and voluntary memories depended on the type of remembered event. Follow-up tests showed that involuntary memories were more frequent than voluntary memories only for personal events ($M = 23.72$, $SD = 16.91$ vs. $M = 11.84$, $SD = 10.01$, $t(31) = 4.97$, $p < .001$, $d = 0.88$), but not significantly so for public events ($M = 6.00$, $SD = 4.32$ vs. $M = 4.91$, $SD = 4.47$, $t(31) = 1.77$, $p = .087$, $d = 0.31$).

3.2.2. Differences in emotional valence

For each recorded memory, subjects also indicated if the remembered event was positive, neutral, or negative. For memories of personal events, a 2 × 3 repeated-measures ANOVA revealed significant main effects of type of remembering (involuntary vs. voluntary), $F(1, 31) = 22.72$, $MSE = 1.41$, $p < .001$, $\eta^2 = 0.42$, and of valence (positive, neutral, negative), $F(2, 62) = 44.21$, $MSE = 0.45$, $p < .001$, $\eta^2 = 0.59$, but no significant interaction between the two factors, $F(2, 62) = 2.12$, $MSE = 0.37$, $p = .128$, $\eta^2 = 0.06$. In general, positive memories were more frequent than neutral and negative memories ($M = 8.52$, $SD = 5.16$ vs. $M = 6.02$, $SD = 4.68$ vs. $M = 3.25$, $SD = 2.76$). Consistent with past research (e.g., Berntsen, 2010, for review), this positivity bias was evident for both voluntarily ($M = 5.91$, $SD = 5.03$ vs. $M = 3.56$, $SD = 3.46$ vs. $M = 2.38$, $SD = 2.81$; $ts(31) \geq 2.79$, $ps \leq 0.009$, $ds \geq 0.49$) and involuntarily remembered personal events ($M = 11.13$, $SD = 7.69$ vs. $M = 8.47$, $SD = 7.21$ vs. $M = 4.13$, $SD = 3.61$; $ts(31) \geq 3.38$, $ps \leq 0.002$, $ds \geq 0.60$). In contrast, for memories of public events, a corresponding ANOVA found no significant main effect of type of remembering (involuntary vs. voluntary), $F(1, 31) = 2.80$, $MSE = 0.64$, $p = .104$, $\eta^2 = 0.08$, no significant main effect of valence (positive, neutral, negative), $F(2, 62) < 1.00$, $MSE = 0.48$, $p = .449$, $\eta^2 = 0.03$, and also no significant interaction between the two factors, $F(2, 62) < 1.00$, $MSE = 0.46$, $p = .783$, $\eta^2 = 0.01$. Positive, neutral and negative events were remembered at a similar, but rather low rate ($M = 2.00$, $SD = 1.99$ vs. $M = 1.53$, $SD = 1.00$ vs. $M = 1.92$, $SD = 1.75$), and this was independent of whether events were remembered involuntarily ($M = 2.28$, $SD = 2.28$ vs. $M = 1.59$, $SD = 1.58$ vs. $M = 2.13$, $SD = 2.00$) or voluntarily ($M = 1.72$, $SD = 2.19$ vs. $M = 1.47$, $SD = 1.50$ vs. $M = 1.72$, $SD = 1.94$; $ts(31) \leq 1.35$, $ps \geq 0.188$, $ds \leq 0.24$). When we entered type of event as an additional factor in a 2 × 2 × 3 ANOVA, the difference in valence of memories between personal and public events was also expressed in a significant two-way interaction (type of event x valence), $F(2, 62) = 34.59$, $MSE = 0.29$, $p < .001$, $\eta^2 = 0.53$. The three-way interaction did not reach significance, $F(2, 62) = 1.75$, $MSE = 0.33$, $p = .182$, $\eta^2 = 0.05$.

3.3. Discussion

The results of Study 2 confirmed that memories of public memories occur both deliberately and spontaneously in daily life and can be reliably measured, even within a rather brief 24-h window. Consistent with Larsen and Plunkett (1987), memories of public events seem to be less frequent than memories of personal events; in the present study, they were 2–4 times less likely to occur than memories of personal events. Moreover, for personal events, more involuntary than voluntary memories were recorded, which replicates Study 1 as well as prior experience sampling studies on autobiographical memories, even though a different recording methodology was used (e.g., Rasmussen et al., 2015; Rasmussen & Berntsen, 2011). For public events, however, involuntary and voluntary memories were recorded equally often in the present study, in contrast to Study 1, where we found more involuntary memories also for public events. Roediger III et al. (2009) suggested that memory retrieval might constitute a mechanism for creating and maintaining collective memories. The present data indicate that public event memories may indeed be recalled rather regularly in daily life, both deliberately and spontaneously. In addition, remembered personal events tend to be predominantly positive, replicating previous work (e.g., Walker et al., 2003), whereas no such positivity bias was evident for public events sampled in daily life.

Studies 1 and 2 provide a first impression of public event memories as they are experienced in daily life, but there are many questions that so far are unanswered. First, what characterizes involuntary and voluntary memories of public events? Does their experience "feel" the same as the experience of memories of personal events? Because the majority of public events are not directly experienced and, thus, encoded differently than personal events, which by definition are directly experienced, the characteristics that frequently accompany remembering may differ (e.g., the vividness of memories, a sense of reliving the remembered events, physical reactions and feelings evoked by memories, etc.; see also Larsen & Plunkett, 1987). Second, involuntary memories of personal events often arise when attention is unfocused, and when retrieval cues that overlap with the remembered events are present in an individual's (internal or external) surroundings (e.g., Berntsen, 1996, 1998; Schlagman, Kliegel, Schulz, & Kvavilashvili, 2009). If involuntary remembering always operates in similar ways, then the influence of situational retrieval cues should be similar across the two event types. Third, can specific functions be attributed to involuntary and voluntary memories of public events? Autobiographical memories have been suggested to serve a directive function, a self or identity function, and a social function (e.g., Bluck et al., 2005; Pillemer, 1992). So far, it is unclear if public event memories serve the same three functions, and if they do so to the same degree. Regarding the directive function, at least potentially, memories of public events could prompt social action (e.g., remembering prominent cases of police brutality could prompt personal participation in a protest). Likewise, public event memories could hold relevance for individual identities, for example by supporting identification with specific societal values (e.g., I am against discrimination), and it is also easy to see connections between public event memories and social identities (i.e., perceived membership to social groups, like being a citizen of a specific country or region; see Tajfel, 1982). When such connection exists, public event memories could serve a social function and potentially prompt social sharing and exchange with other group members. Fourth, we currently know very little about the content of public events that are remembered in daily life. For example, do they mostly comprise memories of specific events or of a mix of similar events that happened across longer time periods? Survey participants in Study 1 retrospectively provided some examples of public event memories that they had previously experienced, but no study so far has examined the contents of public event memories when they are recorded immediately, as they occur in daily life. We undertook comprehensive experience sampling in Study 3 to address these questions.

4. Study 3

Study 3 was conducted between April 2018 and February 2019. Participants were asked to report on the situation surrounding the occurrence of involuntary memories as well as on the phenomenological and functional characteristics of involuntary and voluntary memories. There were two event conditions, administered between subjects, with one half of participants capturing memories for personal events, and the other half capturing memories for public events. Involuntary memories were recorded as they occurred in daily life by means of diary booklets; voluntary memories were elicited by means of cue words. Following considerations by Larsen and Plunkett (1987), we expected that memories of personal and public events should differ regarding the phenomenological characteristics that accompany them (e.g., sense of reliving, vividness). In addition, if involuntary memories constitute a rather basic form of remembering (e.g., Berntsen, 2010), such memories may be elicited in similar manners, irrespective of whether personal or public events are remembered. Moreover, involuntary relative to voluntary memories might also show similar differences in qualities for both types of events (e.g., with involuntary memories comprising a higher sense of reliving and greater vividness).

4.1. Method

4.1.1. Participants

A total of 100 students at Regensburg University (Germany) completed the study. Six additional subjects participated, but either chose not to complete the study ($n = 4$; two in each event condition) or recorded exclusively personal events when asked to record public events, resulting in the exclusion of their data ($n = 2$). For the final sample, mean age was 21.7 years ($SD = 5.3$; range: 18–47 years). Eighty-six participants were female, 14 were male. Subjects received partial course credit for participation.

4.1.2. Material

Following previous work on autobiographical remembering (e.g., Berntsen & Hall, 2004; Rasmussen et al., 2015; Rasmussen & Berntsen, 2011), we created small diary booklets for capturing eight involuntary memories as they occur in daily life, plus more extensive questionnaires on the same memories that were also used to capture eight voluntary memories (see below for further details). To generate voluntary memories, we applied the Galton-Crovitz word cuing technique (Crovitz & Schiffman, 1974; Galton, 1879). Following Berntsen and Hall (2004), we aimed to use cue words that fit into specific categories that often are found to trigger involuntary memories (i.e., the categories relationship, object, activity, emotion, and location) and, after some deliberation, decided to use the following words as cues: group, photograph, city, surprise, sports, stage, family, and television. These specific words were chosen to have a selection of words that were suitable for evoking both personal and public event memories (e.g., Koppel & Berntsen, 2016, for similar considerations). Moreover, all cue words were chosen to be more or less neutral, and to not imply a specific valence. In both diary booklets and questionnaires, to capture the characteristics and functions of involuntary and voluntary memories, subjects were asked to answer questions that were used in previous work on autobiographical memories (e.g., Berntsen & Hall, 2004; Rasmussen & Berntsen, 2011; Rasmussen, Johannessen, & Berntsen, 2014). Table 5 shows all questions and their response options.

Table 5
All questions used in Study 3, grouped by whether they examined the situation surrounding involuntary memories, memory characteristics, memory functions, or were asked for voluntary memories or public events only.

Question	Response options
For voluntary memories only	
Difficulty of retrieval: How difficult was it to bring the memory to mind in response to the cue word?	Scale from −2 to 2: −2 = Very difficult; 2 = Very easy
The situation surrounding involuntary memories	
Attention: Was your attention focused on specific thoughts or activities?	Scale from −2 to 2: −2 = Very unfocused; 2 = Very focused
Overlap: Was there any overlap between your memory and the situation, your thoughts or activities?	With my external environment; With my internal thoughts or feelings; Both (external and internal); No overlap
Memory qualities	
Vividness: The memory appears vivid and clear	Scale from 0 to 4: 0 = Not at all; 4 = Absolutely
Reliving: While remembering the event, it feels like reliving it in my mind	Scale from 0 to 4: 0 = Not at all; 4 = Absolutely
Physical: The memory triggered a physical reaction (e.g., palpitations, feeling restless, tense, laughter, etc.)	Scale from 0 to 4: 0 = Not at all; 4 = Absolutely
Valence: The feelings I experience as I recall the event are…	Scale from −2 to 2: −2 = Very negative; 2 = Very positive
Intensity: The feelings I experience as I recall the event are intense	Scale from 0 to 4: 0 = Not at all; 4 = Absolutely
Memory functions	
Directive: The memory helps me to deal with situations in the present or future	Scale from 0 to 4: 0 = Not at all; 4 = Absolutely
Self: The memory is connected to my own identity	Scale from 0 to 4: 0 = Not at all; 4 = Absolutely
Social: I have discussed and shared the memory with other people	Scale from 0 to 4: 0 = Never; 4 = Very frequently
For public events only	
Experience: How did you learn about the event?	I directly experienced it; I learnt about it in a different way (please specify: via the media; via others; via school/educ.)

4.1.3. Design

The procedure for recording the memories derived from earlier studies (e.g., Berntsen & Hall, 2004), adapted to the present context. The study followed a 2 × 2 mixed-factorial design with the two factors of type of event and type of remembering. Subjects were asked to complete one diary, with half of the sample recording memories of personal events and the other half recording memories of public events.[3] All subjects were asked to capture both involuntary and voluntary memories.

4.1.4. Procedure

The experimenters met each individual participant two times. During the first meeting, all subjects provided written informed consent and completed a brief demographic questionnaire. Next, they were carefully instructed and received extensive information on how to record

[3] In an initial pilot data collection not reported here, we had asked all subjects to complete two diaries, one for memories of public events, the other for memories of personal events (similar to the within-subject design that we used in Study 2). However, it took subjects a long time to complete both diaries, which affected overall motivation to complete the study. For this reason, we decided to switch to a more feasible between-subjects approach, resulting in Study 3.

memories of personal or public events. Subjects were asked to record eight involuntary memories, and to complete the questions and scales in the small diary booklets right after the memories had occurred. In addition, subjects were asked to respond to some further questions and scales in a more extensive questionnaire, which could be filled out during a later point in time on the same day. This questionnaire was also used to capture voluntary memories and contained cue words and largely the same questions and scales that were also used to capture involuntary memories. The experimenters went through all materials with each subject and explained all scales and questions that subjects were asked to complete for each memory. Subjects additionally received instructions in written form so that they could look up details later.

Subjects then started recording their memories. By means of the small diary booklets, they recorded involuntary memories as they occurred in daily life. Following previous work (e.g., Berntsen & Hall, 2004) and to prevent participants from actively generating "involuntary" memories rather than reporting what spontaneously came to their mind, subjects were instructed to record a maximum of two such memories per day. For each memory, subjects provided brief descriptions of the situation they were in when the memory occurred and of the content of the memory. In addition, they responded to several rating scale questions (see Table 5 for an overview of all included questions). These questions were similar to those used in previous involuntary memory diary studies (e.g., Berntsen & Hall, 2004). For instance, they indicated the degree to which their attention was focused or unfocused when the memory occurred, how vivid the memory was, to what degree they had a sense of reliving the event when having the memory, and whether there was any overlap between the memory and the subjects' external environments or mental states when the memory occurred. Subjects also recorded whether the memory evoked a bodily response and their feelings and the intensity of their feelings while remembering the event. The diary booklets were identical for memories of personal and public events, and subjects were instructed to record their memories immediately when they occurred. For each recorded memory, subjects completed further rating scales and questions at a later (more convenient) point of time on the same day that the memory was recorded in a more extensive questionnaire. Here, subjects were asked about the function of the recorded memories and indicated to which degree the event helped them think about the present or future, spoke to their own identity, and was shared with others. The questions were identical for personal and public events, but when recording public events, subjects were additionally asked to indicate if they had personally experienced the events or how else they had learnt about them.

When subjects had responded to all scales and questions covering an involuntary memory, they next generated a voluntary memory. For this purpose, they turned to the next page of the questionnaire and tore off a post-it that hid one of the cue words, and then voluntarily generated a memory of a personal or public event that was in one way or another related to the cue word. Subjects again recorded a brief description of the contents of the memory and indicated how easy/ difficult it was to bring it to mind. Next, participants completed the same scales and questions as for involuntary memories. The only exception was that subjects were not asked to provide details about the retrieval context, because these were only of interest for the emergence of involuntary memories.

When subjects had recorded the full set of eight involuntary and voluntary memories in this manner, they scheduled the second meeting with the experimenter to hand in all materials. The experimenter noted how many days it had taken subjects to complete the study, debriefed them and thanked them for their participation. Again, none of the participants who completed the study reported any issues with following our careful instructions, or more generally with recording involuntary and voluntary memories.

4.1.5. Data processing, coding, and analysis

A total of 1600 memories was recorded. An initial transfer of the data for all memory questions from paper materials into electronic format showed that there were hardly any missing values (8 instances in total, in which subjects had overlooked and not answered a specific question for a single memory; 3 instances concerned the vividness question, 1 the reliving question, 3 the intensity question, and 1 the social function question). Next, all events were content coded by two independent coders (see the Results section for further details) and a check was carried out to ensure that the recorded events did indeed exclusively reflect personal events in the personal events condition and public events in the public events condition. Out of the 800 recorded memories of personal events, 55 memories were excluded prior to analysis, because there was a chance of overlap with memories for public events (e.g., memories of personally attending a public protest, or a different type of public event; 17 of these memories were involuntary, 38 were voluntary). Out of the full 800 recorded memories of public events, 28 memories were excluded, because they referred to purely personal events that were experienced in public (e.g., sitting around a campfire with others; 13 of these memories were involuntary, 15 were voluntary). The remaining memories were additionally coded for event specificity by the two independent coders (i.e., for whether they referred to unique events that occurred within a 24-h window, or alternatively to less specific, more extended or summarized events). All statistical analyses were carried out in SPSS. Our main focus was on analyzing differences between types of events and types of remembering. Mean ratings on Likert scales were examined by means of ANOVAs and *t*-tests. Frequency distributions of categorical response options were analyzed by means of Generalized Estimating Equations (GEE; Liang & Zeger, 1986; see also Pekar & Brabec, 2018). GEEs are precursors to mixed-effect models and slightly easier to handle. They allow comparisons across within-subject measures; interpretation of the resulting betas (*B*) is similar as in regression models. All GEE models were run with an exchangeable correlation structure.

4.2. Results

4.2.1. Recording and generating memories

On average, subjects who recorded memories of personal events took 17.30 days ($SD = 8.24$) to complete the study, whereas subjects who recorded memories of public events took significantly longer ($M = 24.28$ days; $SD = 18.82$), $t(98) = 2.40$, $p = .019$, $d = 0.48$. This finding seems consistent with the findings in Studies 1 and 2 that public event memories are experienced less frequently than memories of personal events. Moreover, when asked to rate how difficult it was to bring voluntary memories to mind in response to cue words (5-point scale; range: −2 = very difficult; 2 = very easy), subjects who generated memories of personal events on average indicated that the task was easier for them ($M = 1.00$; $SD = 0.50$) than participants who generated memories of public events ($M = 0.38$; $SD = 0.47$), $t(98) = 6.37$, $p < .001$, $d = 1.27$. Consistent with previous work (Larsen, 1992; Larsen & Plunkett, 1987) these findings suggest that public events may be less easily accessible in memory than personal events.

4.2.2. The situation surrounding the emergence of involuntary memories

Attention. When involuntary memories were recorded, participants rated whether their attention was focused on specific thoughts or activities (5-point scale; range from −2 = very unfocused to 2 = very focused). Attention was not particularly focused in either event condition, and ratings did not differ across involuntary memories of personal (M = -0.18; SD = 0.63) or public events (M = -0.12; SD = 0.56), $t(98) < 1.00$, $p = .602$, $d = 0.10$.

Overlap and Cuing. For the majority of recorded involuntary memories, there was an overlap between the contents of the memories and participants' surroundings. For 40.2% of all involuntary memories ($n = 309$), the overlap indicated external cues, for 23.7% ($n = 182$) it indicated internal cues, and for 16.3% ($n = 125$) there was a mix of external and internal cues. Participants recorded no overlap between their

Table 6
Means (plus standard deviations) for all variables capturing qualities and functions of involuntary and voluntary memories of personal and public events in Study 3, plus results of 2 × 2 ANOVAs.

	Personal events		Public events		ANOVA results		
Scale/ variable	Involuntary memories	Voluntary memories	Involuntary memories	Voluntary memories	Main effect: type of event	Main effect: type of remembering	Interaction effect
Memory qualities							
Vividness	2.63 (0.51)	2.70 (0.62)	2.18 (0.57)	2.12 (0.58)	$F = 27.00$, $MSE = 0.50$, $p < .001$, $\eta^2 = 0.22$	$F = 0.03$, $MSE = 0.15$, $p = .855$, $\eta^2 < 0.001$	$F = 1.29$, $MSE = 0.15$, $p = .260$, $\eta^2 = 0.01$
Reliving	2.17 (0.74)	1.85 (0.84)	1.46 (0.74)	1.35 (0.66)	$F = 19.14$, $MSE = 0.94$, $p < .001$, $\eta^2 = 0.16$	$F = 12.36$, $MSE = 0.18$, $p = .001$, $\eta^2 = 0.11$	$F = 2.85$, $MSE = 0.18$, $p = .094$, $\eta^2 = 0.03$
Physical	1.58 (0.70)	1.54 (0.80)	1.07 (0.58)	0.97 (0.63)	$F = 19.05$, $MSE = 0.75$, $p < .001$, $\eta^2 = 0.16$	$F = 1.30$, $MSE = 0.17$, $p = .257$, $\eta^2 = 0.01$	$F = 0.28$, $MSE = 0.17$, $p = .600$, $\eta^2 = 0.003$
Valence	0.72 (0.53)	1.15 (0.58)	−0.34 (0.54)	−0.13 (0.49)	$F = 204.93$, $MSE = 0.33$, $p < .001$, $\eta^2 = 0.68$	$F = 20.97$, $MSE = 0.25$, $p < .001$, $\eta^2 = 0.18$	$F = 2.67$, $MSE = 0.25$, $p = .105$, $\eta^2 = 0.03$
Intensity	1.98 (0.61)	1.76 (0.66)	1.48 (0.56)	1.14 (0.53)	$F = 28.20$, $MSE = 0.56$, $p < .001$, $\eta^2 = 0.22$	$F = 27.68$, $MSE = 0.14$, $p < .001$, $\eta^2 = 0.22$	$F = 1.18$, $MSE = 0.14$, $p = .279$, $\eta^2 = 0.01$
Memory functions							
Directive	1.19 (0.60)	1.27 (0.61)	0.89 (0.66)	0.71 (0.57)	$F = 15.30$, $MSE = 0.61$, $p < .001$, $\eta^2 = 0.14$	$F = 0.72$, $MSE = 0.14$, $p = .398$, $\eta^2 = 0.01$	$F = 6.37$, $MSE = 0.14$, $p = .013$, $\eta^2 = 0.06$
Self	2.02 (0.60)	2.45 (0.61)	1.13 (0.69)	0.99 (0.67)	$F = 103.13$, $MSE = 0.67$, $p < .001$, $\eta^2 = 0.51$	$F = 6.55$, $MSE = 0.16$, $p = .012$, $\eta^2 = 0.06$	$F = 25.56$, $MSE = 0.16$, $p < .001$, $\eta^2 = 0.21$
Social	1.61 (0.61)	1.75 (0.58)	1.92 (0.62)	1.69 (0.57)	$F = 1.47$, $MSE = 0.54$, $p = .228$, $\eta^2 = 0.02$	$F = 0.78$, $MSE = 0.17$, $p = .381$, $\eta^2 = 0.01$	$F = 9.99$, $MSE = 0.17$, $p = .002$, $\eta^2 = 0.09$

surroundings and the contents of their memories for only 19.9% (n = 153) of all memories. Importantly, an analysis of the data by means of a GEE model showed a nonsignificant slope for event type, B = 0.01 (0.06), p = .858, suggesting that the pattern was similar for memories of personal and public events.

4.2.3. Memory qualities

In the following, we report findings addressing the memory qualities that were rated for all four kinds of memories. ANOVA results as well as descriptive statistics for each variable are summarized in the upper part of Table 6.

4.2.3.1. Vividness (5-point scale; range from 0 = not at all to 4 = absolutely). Memories of personal events were rated to be more vivid and clear than memories of public events, and this difference was present for both voluntary and involuntary memories, $ts(98) \geq 4.23$, $ps < 0.001$, $ds \geq 0.85$. Voluntary and involuntary memories did not differ in terms of rated vividness.

4.2.3.2. Reliving (5-point scale; range from 0 = not at all to 4 = absolutely). Memories of personal events were on average also judged to be associated with a higher sense of reliving than memories of public events, both for voluntary and involuntary memories, $ts(98) \geq 3.29$, $ps \leq 0.001$, $ds \geq 0.66$. Involuntary memories also generally resulted in higher ratings of reliving than voluntary memories, but there was no significant interaction between type of event and type of remembering.

4.2.3.3. Physical reactions (5-point scale; range from 0 = not at all to 4 = absolutely). Memories of personal events were rated higher in triggering a physical reaction than memories of public events. Again, this difference was present for both voluntary and involuntary memories, $ts(98) \geq 3.93$, $ps < 0.001$, $ds = 0.79$. Voluntary and involuntary memories did not differ in terms of rated physical reactions.

4.2.3.4. Valence of feelings (5-point scale; range from − 2 = very negative to 2 = very positive). The feelings that subjects had during remembering were judged to be more positive for personal than for public events. Again, this was the case for both voluntary and involuntary memories, $ts(98) \geq 9.77$, $ps < 0.001$, $ds \geq 1.96$. In fact, the mean ratings indicate that feelings during recall of personal events were positive, whereas feelings during recall of public events were slightly negative. Feelings were also judged to be more positive for voluntary vs. involuntary memories, and this difference was not moderated by type of event.

4.2.3.5. Intensity of feelings (5-point scale; range from 0 = not at all to 4 = absolutely). In addition, feelings were rated as more intense for memories of personal vs. public events, and this was the case for both voluntary and involuntary memories, $ts(98) \geq 4.34$, $ps < 0.001$, $ds \geq 0.87$. Feelings were also judged as more intense for involuntary vs. voluntary remembering.

4.2.4. Memory functions

Next, we report findings on participants' judgments of functions, which were again compared across the four kinds of memories. ANOVA results as well as descriptive statistics for each variable are summarized in the lower part of Table 6.

4.2.4.1. Directive function (5-point scale; range from 0 = not at all to 4 = absolutely). Memories of personal and public events were both judged to be somewhat helpful for dealing with situations in the present or future, but ratings for this directive function were higher for memories of personal events than for memories of public events. There was no general difference between voluntary and involuntary memories, but the difference between memories for personal and public events was moderated by type of remembering and was larger for voluntary memories, $t(98) = 4.77$, $p < .001$, $d = 0.95$, than for involuntary memories, $t(98) = 2.39$, $p = .019$, $d = 0.48$. On the flipside, there was no difference between voluntary and involuntary memories for personal events, $t(49) = 1.04$, $p = .306$, $d = 0.15$, but involuntary memories of public events were rated to be slightly more helpful for dealing with situations in the present or future than voluntary memories, $t(49) = 2.87$, $p = .006$, $d = 0.41$.

4.2.4.2. Self function (5-point scale; range from 0 = not at all to 4 = absolutely). Memories of personal events were rated to be more connected to participants' identities than memories of public events. There was also a difference between voluntary and involuntary memories, which was moderated by type of event. For personal events, voluntary memories were rated as more relevant for the self than involuntary memories, $t(49) = 4.66$, $p < .001$, $d = 0.66$. For public events, however, involuntary memories were rated as more relevant for the self than voluntary memories, $t(49) = 2.16$, $p = .035$, $d = 0.31$.

4.2.4.3. Social function (5-point scale; range from 0 = not at all to 4 = absolutely). Finally, to assess the social function of memories, subjects

indicated the degree to which they discussed and shared the memory with others. Although no main effects were significant for this variable, a significant interaction effect emerged, suggesting that differences between type of event depended on type of remembering. For voluntary memories, ratings of social sharing did not differ depending on whether personal and public events were remembered, $t(98) < 1.00$, $p = .631$, $d = 0.10$. For involuntary memories, however, mean ratings showed that memories of public events were more frequently socially shared than memories of personal events, $t(98) = 2.52$, $p = .013$, $d = 0.50$. In turn, there was no difference between voluntary and involuntary memories for personal events, $t(49) = 1.44$, $p = .158$, $d = 0.20$, but involuntary memories of public events were rated to have been discussed and shared more with others than voluntary memories, $t(49) = 3.33$, $p = .002$, $d = 0.47$.

4.2.5. Event details

4.2.5.1. Specificity. The data were additionally coded for specificity by two independent coders (intercoder agreement: 83.9%), which revealed that 70.6% ($n = 1071$) of all recorded events referred to specific events, i.e., to singular events that occurred within a 24-h time window. The remaining memories, that is 29.4% ($n = 446$), referred to unspecific events, which might consist of a mix of similar events, spread out across a longer time period. The data were analyzed by means of a GEE model, which showed a significant slope for event type, $B = 0.64$ (0.20), $p = .001$, with remembered personal events comprising a somewhat higher proportion of specific events (73.6%) than remembered public events (67.7%). Yet, the GEE model also showed a significant negative slope for the interaction between event type and type of remembering, $B = -0.73$ (0.23), $p = .002$. For personal events, involuntary relative to voluntary memories more frequently referred to specific events (77.7% vs. 69.1%, respectively), $B = -0.44$ (0.17), $p = .012$, whereas a corresponding contrast was not significant for memories of public events (64.6% vs. 70.9%), $B = 0.29$ (0.15), $p = .054$.

Table 7
Means (plus standard deviations) for all variables capturing qualities and functions of memories of public events recorded in Study 3, broken down by whether the remembered events were directly experienced or not, plus results of GEE models (with the single predictor of event experience). Descriptive statistics for memories of personal events are provided on the left-hand side to facilitate direct comparisons.

	Personal events	Public events: Experienced	Public events: Not experienced	GEE model results
Memory qualities				
Vividness	2.65 (0.94)	2.72 (0.88)	1.99 (1.00)	$B = 0.31$ (0.04), $p <$ .001
Reliving	2.00 (1.13)	2.21 (1.03)	1.19 (1.06)	$B = 0.58$ (0.06), $p <$ .001
Physical	1.56 (1.19)	1.28 (0.99)	0.97 (1.01)	$B = 0.17$ (0.09), $p =$ .066
Valence	0.93 (1.15)	0.55 (1.21)	−0.47 (1.17)	$B = 0.53$ (0.10), $p <$ .001
Intensity	1.87(1.05)	1.54 (0.95)	1.25 (0.99)	$B = 0.20$ (0.07), $p =$ .002
Memory functions				
Directive	1.22 (1.10)	0.84 (1.00)	0.80 (1.01)	$B = 0.01$ (0.13), $p =$ .921
Self	2.23 (1.16)	1.44 (1.04)	0.93 (1.03)	$B = 0.51$ (0.07), $p <$ .001
Social	1.68 (1.14)	2.17 (1.06)	1.71 (1.08)	$B = 0.22$ (0.04), $p <$ .001

4.2.5.2. Personal experience of public events. Subjects reported that they had learnt about 22.0% ($n = 170$) of all remembered public events by personally experiencing them, and about 78.0% ($n = 602$) of the events in other ways. The GEE model showed a nonsignificant slope for type of remembering, $B = 0.21$ (0.15), $p = .164$, suggesting a similar pattern for voluntary and involuntary memories (20.3% vs. 23.8% personally experienced). For events that were not personally experienced, we also asked subjects to indicate how they learnt about the event. Predominantly, participants listed the media ($n = 528$; 87.7% of all cases). Other people, like friends and family, were another source for learning about public events ($n = 39$; 6.5%), as were educational contexts, such as school or university ($n = 29$; 4.8%). For six events (1%), other sources were listed that did not clearly fall into one of the above categories (e.g., visiting a museum exhibition; interpreting the audible elation from a close-by public viewing of a sports event).

Table 7 shows descriptive statistics as well as GEE model results for all main variables collected in Study 3, focusing exclusively on the differentiation of public events that were vs. were not directly experienced. For 6 out of the 8 variables, GEE models showed significant slopes for event experience; non-significant slopes were only found for the two variables of physical reactions and directive function. These findings are consistent with Larsen and Plunkett's (1987) proposal and confirm that the distinction is important and should be systematically explored in future work. For some variables (e.g., vividness and reliving), the descriptive statistics for memories of directly experienced public events were almost indistinguishable from those for memories of personal events and differed greatly from memories of public events that were not directly experienced. For most variables (e.g., valence and intensity of feelings, self function), memories of directly experienced public events fell somewhere between memories for personal events and memories for public events that were not directly experienced.

Based on these findings, it might be suggested that all main analyses involving public event memories in Study 3 should be repeated after excluding memories of personally experienced events (n = 170). Inasmuch as memories of personally experienced public events seem similar to memories of autobiographical events, they may not capture genuine public event memories. To address this concern, we redid all analyses after excluding memories of personally experienced public events; detailed statistics on these additional analyses are provided in are provided in Appendix A: Supplementary Data. To briefly summarize, all findings regarding differences between personal and public event memories reported in the main text were replicated in these analyses. Only two analyses deviated. For directive function, the interaction term was no longer significant; for social function, single comparisons no longer showed significant differences (despite a significant interaction effect; see Appendix A for details).

4.2.6. The contents of memories of public events

Overall, subjects recorded 772 memories of public events. For instance, capturing an involuntary memory, one participant wrote: "*I had an errand to run at the citizens' center, and saw a family that had fled from the Middle East. I was immediately reminded of all those pictures on the news, showing large crowds of people at the borders and in boats.*". Another participant recorded the following involuntary memory: "*Boarding the train back home, I suddenly remembered the recent train crash in Aichach. Two people had died in this accident.*". Capturing a voluntary memory in response to the cue word "surprise", one participant recorded: "*The EU referendum and how England voted for Brexit.*" When prompted with the cue word "stage", another participant remembered how "*Ariana Grande performed on a stage in Manchester, and then a terror attack happened*".

These examples may help to illustrate how memories were recorded, but to provide more systematic analyses, all recorded events were sorted into the same content categories as in Study 1 by two independent coders (intercoder agreement: 72.8%). Borderline cases and inconsistencies in coding were again resolved through discussion. Additionally, the events were also again categorized according to their level

Table 8
Content-coded examples of involuntary and voluntary memories of public events recorded by participants in Study 3.

Content category	Involuntary memories		Voluntary memories		Examples (roughly translated from German)
	n	%	n	%	
Political events	71	18.3%	80	20.8%	"The AFD is elected into the Bundestag", "Brexit and Theresa May", "Refugee deal with Turkey"
Sports events	40	10.3%	66	17.1%	"Soccer world championship 2014", "Usain Bolt at the Olympics", "Russia's exclusion due to doping"
Art and entertainment events	36	9.3%	59	15.3%	"Winning the Eurovision song contest", "Premiere of the new Star Wars movie", "Beyonce's performance at Coachella"
Events concerning public figures	32	8.3%	33	8.6%	"When William and Kate had their first baby", "Pope Benedict stepping back", "Death of Chester Bennington"
Terrorist attacks	29	7.5%	31	8.1%	"Terror attack in Paris", "Terror attack on Berlin Christmas market", "Massacre on Norwegian island"
Accidents, traffic and fatalities	42	10.9%	17	4.4%	"Old aerial bomb discovered, parts of city evacuated", "Loveparade in Duisburg, mass panic", "Bus accident in Italy, involving a German school class"
Events involving death or violence	28	7.2%	15	3.9%	"The picture of a drowned refugee child at a Greek beach", "Winnenden school shooting", "Me Too, Harvey Weinstein, etc.", "Holocaust"
Environmental events	35	9.0%	6	1.6%	"Discussions about banning glyphosate", "Volkswagen emissions scandal", "Hurricane Katrina in the US"
Public protests	18	4.7%	22	5.7%	"Demonstrations against the AFD", "Peaceful revolution in 1989", "Demonstrations against new police law"
Public ceremonies	16	4.1%	17	4.4%	"Wedding Harry & Meghan Markle", "Royal Wedding Kate & William", "Pilgrimage to Altötting"
Wars and international conflicts	15	3.9%	17	4.4%	"Crimea crisis", "Picture of girl fleeing during the Vietnam War", "USA's first atomic bomb"
Holidays and celebrations	12	3.1%	10	2.6%	„Oktoberfest in Munich", "Landshuter Hochzeit", „Mother's Day"
Science news	7	1.8%	7	1.8%	"Ebola spread in Africa", "The first moon landing", "Discovery of antibiotics"
Events at public sites	3	0.8%	4	1.0%	"Flashmob at Grand Central Terminal", "Surprising death of tiger babies at a local zoo", "Visiting concentration camp Dachau"
Professional or educational events	3	0.8%	1	0.3%	"The Spiegel's Claas Relotius", "Cleaning staff ruining expensive painting in a museum"

of public importance (i.e., regionally vs. nationally vs. internationally relevant events; intercoder agreement of 75.3%). Table 8 shows some content-coded examples of recorded public events. The most dominant content categories were "Political events", "Sports events", "Art and entertainment events", "Events concerning public figures", and "Terrorist attacks", with frequencies differing slightly for voluntarily and involuntarily remembered events. Concerning level of public relevance, only few recorded events were too vague to be classified, and frequencies were similar across voluntary and involuntary memories (see Table 4). In total, 62.4% of the public events were of international relevance. Approximately similar shares of the remaining events were relevant to the regional (20.1%) and the national public (16.6%).

4.3. Discussion

For personal events, most results reported in Study 3 replicate prior work on autobiographical memories. Involuntary memories of personal events predominantly arose in response to situational cues and when attention was not focused on specific activities, and memory contents frequently showed clear connections to subjects' surroundings (e.g., Ball & Little, 2006; Berntsen, 1996, 1998; Berntsen & Hall, 2004; Mace, 2004; Schlagman et al., 2009). Moreover, such memories were judged as vivid (e.g., Berntsen & Hall, 2004; Schlagman & Kvavilashvili, 2008), with involuntary memories evoking a higher sense of reliving than voluntary memories (e.g., Finnbogadóttir & Berntsen, 2011). The memories elicited positive feelings, even more so when they were recalled deliberately, with a higher intensity for involuntary than voluntary memories (e.g., Rasmussen & Berntsen, 2011). Involuntary memories of personal events more frequently referred to specific events than voluntary memories (e.g., Ball & Little, 2006; Berntsen, 1998; Berntsen & Hall, 2004; Schlagman et al., 2009). Importantly, the observed differences between involuntary and voluntary autobiographical memories on these measures were also seen for memories of public events (see below). Concerning functions, personal event memories scored highest for self function, intermediate for social function, and lowest for directive function, a pattern that has been observed previously (e.g., Rasmussen & Berntsen, 2009, 2011). Consistent with some prior work, voluntary memories were also rated as more important for self function than their involuntary counterparts (e.g., Johannessen & Berntsen, 2010; Kamiya, 2014; Rasmussen et al., 2014). The only data point in Study 3 that does not fully fit with prior work concerns physical reactions to the recorded memories. Most prior work found that involuntary memories triggered a higher degree of physical reactions (e.g., Berntsen & Hall, 2004; Johannessen & Berntsen, 2010; Rubin, Boals, & Berntsen, 2008). In the present study, we found no corresponding difference (but see Berntsen & Jacobsen, 2008, and Rasmussen et al., 2014, who also failed to observe this difference).

Building upon this basis, the data on public event memories provide a series of novel findings. Recording public event memories took more time and was rated as more difficult than recording personal event memories, which is consistent with prior findings by Larsen and Plunkett (1987) and suggests that public event memories arise less frequently and may overall be less easily accessible in memory than personal events. Yet, similar to personal memories, involuntary memories of public events were evoked in states of unfocused attention, and their contents were related to the situation present at retrieval. This suggests that involuntary memories are elicited in the same manner, irrespective of whether they comprise public or personal events (for a similar proposal, see also Kvavilashvili & Mandler, 2004). Involuntary memories may thus constitute a basic mode of remembering, as has been suggested previously (see Berntsen, 2010).

The phenomenological characteristics of remembering examined in Study 3 showed large differences between public and personal event memories. Public event memories were not as vivid as personal event memories and were experienced with a lower sense of reliving as well as a lower degree of physical reactions in response to the memories. In

addition, the feelings evoked by the memories were less positive – even slightly negative – and less intense. A rough data split suggests that these large differences between public and personal event memories in terms of phenomenological qualities might be mainly driven by the fact that the majority of public events is not directly experienced, like personal events are. This conclusion is quite consistent with ideas by Larsen and Plunkett (1987), who expected differences between experienced and reported events. The distinction should be examined more thoroughly in future work, potentially by adapting instructions for participants so that similar numbers of different types of public events (directly experienced vs. not directly experienced) are recorded, or with an exclusive focus on public events that were not directly experienced. Moreover, public event memories in the present study were also less likely to refer to specific events than personal event memories, and frequency distributions for specificity did not differ significantly across voluntary and involuntary memories of public events. Because event specificity has sometimes been shown to affect ratings on other variables (e.g., Berntsen & Hall, 2004; Del Palacio-Gonzalez, Berntsen, & Watson, 2017), this might also be a critical aspect to consider in future work on public event memories.

Concerning functions, public event memories scored lower than personal event memories on scales capturing directive and self functions. Memories of public events may less often solve problems or guide actions in a person's present or future, and may also less often speak to their individual identities. Importantly, however, public event memories were judged as having been shared and discussed with others more frequently, and indeed scored highest on this social function relative to the other function scales. This finding supports the proposal that public events may be central to collective memories. Social sharing between individuals has been suggested to contribute to the development of memories that are held across individuals and whole groups (e.g., Barber, Rajaram, & Fox, 2012; Cuc, Ozuru, Manier, & Hirst, 2006; Harris, Paterson, & Kemp, 2008; Hirst & Echterhoff, 2012). In the present study, public event memories received relatively high ratings for social sharing. In fact, the ratings were even higher for involuntary relative to voluntary memories of public events. Involuntary memories of public events thus may not only contribute to the establishment and maintenance of collective memories by their mere existence but may additionally also prompt conversations with others about the remembered events, resulting in shared and potentially collectively held memories. Future work may more specifically examine the role of social identity in the social sharing and rehearsal of public event memories. At least potentially, social identity and perceived social group memberships could affect which specific events are remembered, and it could potentially also be decisive for when, how, and with whom such memories are shared (for a related discussion of the relevance of social identity to flashbulb memories, see Berntsen, 2009b).

One might suspect that differences between voluntary memories of personal and public events could be influenced by the words that are used to cue them. In Study 3, we used cue words that were specifically chosen to be suitable to prompt both types of event memories, and that additionally were rather neutral and not tied to a specific valence. A rough comparison of the patterns of results across the eight cues that were used showed no evidence of any substantial variability. Nevertheless, future studies might use a greater pool of cue words and randomly draw cues from this larger pool. First, this would eliminate concerns that results might be driven by the use of specific cues and not generalize to other cues. Second, if this larger pool of cue words were built to systematically vary along a number of dimensions (e.g., how the cues relate to certain semantic categories, or which valences they imply), the resulting data could shed further light on the role of cue words for differences in voluntary remembering of personal and public events.

5. General discussion

Public events provide the socio-cultural context for our lives and have the power to affect our (social) identities, perceptions of reality, political attitudes, and ultimately our behavior. Gaining a better understanding of how public events are remembered is thus of critical importance, but so far surprisingly little work has been carried out on this topic. The present study examined how public events are remembered in daily life. Directly comparing memories of public events with memories of personal events, the study provides several new findings. First and foremost, memories of public events do occur in daily life, and similarly to personal events, public events are not only remembered in a planned, deliberate manner, but also spontaneously, without conscious attempts to recall them. Having such memories of public events seems to be a familiar experience for most people that can be reliably measured. However, public event memories appear less frequent than memories of personal events. In addition, the emotional tone of remembered public events was less positive than for remembered personal events in the present studies, and there were large differences between the two types of events with regard to phenomenological characteristics (e.g., vividness, sense of reliving, physical reactions), where public event memories scored systematically lower. Finally, public event memories may predominantly serve a social function, and less so directive and identity functions. Given the broad and general importance of public events, these results may not only be relevant to memory researchers, but also to scholars from other disciplines – such as journalism, political science, media and communication studies, public policy or history.

5.1. Detailed consideration of the present findings

The lower frequency observed for memories of public (versus personal) events could be attributed to differences in base rates between the two types of events. Relative to personal events, which we experience constantly, public events may simply be experienced, and thus encoded, less often, which may be part of why such memories are also less likely to occur (see also Larsen & Plunkett, 1987). An important caveat here is that exposure to public events was not controlled in the present work and may be hard to fully control in general. One approach might be to measure (and potentially control) media use as a proxy of public event exposure. Thus, a key question for future research is whether public event memories arise less frequently simply because they are also encountered less frequently – or whether there is evidence that they are less accessible in memory, for instance because they are not as relevant to people's personal lives, or because they are not as easily prompted by situational cues. The data collected so far are not able to provide a straight answer to this question.

For memories of personal events, involuntary memories were more frequent than deliberate ones, consistent with previous work (e.g., Rasmussen et al., 2015; Rasmussen & Berntsen, 2011), but the same does not seem to apply to memories of public events when sampled in everyday life. In Study 2, involuntary and deliberate public event memories appeared to be equally likely to occur, but overall less frequent compared to memories of personal events. However, in Study 1, when a larger sample of people were asked to rate their perceived frequency of having memories of personal and public events, involuntary memories of both categories of events were more common than their voluntary counterparts. Most likely, these inconsistencies are due to differences in the methods used in the two studies, that is, retrospective recording in Study 1 versus immediate diary recording in Study 2. It should also be mentioned that participants in Study 1 were MTurk workers, mostly residing in the USA, with a mean age of 34 years – whereas participants in Studies 2 and 3 were German students. The fact that the key findings replicate across diverse populations and methodologies underscores their robustness, but future work should nevertheless examine if demographic and other factors (such as age, personal as well as social identity, and potential exposure to different amounts and types of public events) influence the patterns observed here.

Another main difference to memories of personal events is that public event memories were not predominantly positive. Such a

positivity bias is robustly found for autobiographical memories (e.g., Walker et al., 2003), which is consistent with the view that memories can help to maintain a positive image of the self. In contrast, the data reported in Study 2 indicated that public event memories may comprise a mix made up of roughly equal parts of positive, neutral, and negative memories. Given that most public events portrayed in the news are negative and that news consumers do not only pay more attention to negative news events, but also react more strongly to such news (e.g., Soroka & McAdams, 2015; Trussler & Soroka, 2014), one could even have expected the positivity bias evident for personal event memories to transform into a negativity bias for public event memories, simply based on the emotional tone of news events that people may be regularly exposed to. Indeed, in a recent study, Shrikanth and Szpunar (in press) asked participants to generate public events from their country's past as well as personal events from their individual past, and found a positivity bias for personal event memories, but a negativity bias for public event memories. This latter finding is also consistent with other previous work, reporting that participants mostly listed and agreed on negative events when asked to generate public events (e.g., Choi, Abel, Siqi-Liu, & Umanath, in press; Liu et al., 2005, 2009; Topcu & Hirst, 2020; see also Schuman & Scott, 1989). However, none of these studies examined public event memories when they arise involuntarily or in response to cue words. In our project, participants in Study 3 indicated that the feelings evoked by public event memories were indeed less positive than for personal memories, and even slightly negative. However, the public event memories that were recorded by participants in Studies 1 and 3 suggested that people did not exclusively focus on negative news events when reporting on their memories, but considered a wide variety of events, some of which they may have experienced themselves (e.g., art fairs and other public events happening in their regions). Future studies may try to collect more comprehensive data (i.e., more detailed memory descriptions as well as even larger pools of event memories) that allow examining the relationship between different types of remembered public events and valence unambiguously.

Large differences between personal and public event memories were observed in Study 3 when examining phenomenological characteristics. Relative to personal event memories, public event memories were experienced as less vivid, prompted a lower sense of reliving and a lower degree of physical reactions in response to the memories. These findings are very well in line with Larsen and Plunkett's (1987) reasoning on what distinguishes memories for directly experienced personal events and memories for so-called "reported" events, that one only heard or read about. In particular, these authors already argued decades ago that such reported events should be less perceptual in nature, with fewer representations of bodily sensations, and they even directly suggested that memories of such events should be remembered less vividly. To our knowledge, the present study is the first to directly address these questions and to provide evidence in support of these hypotheses. Indeed, descriptive statistics in Study 3 showed that even within the category of public event memories it is important to unequivocally distinguish between directly experienced public events and "reported" public events that were exclusively encoded via the news or other types of reports in social communities. The memory characteristics of directly experienced public events were very similar to memories of personal events but differed from memories of reported public events. In Study 3, public event memories less frequently than personal event memories referred to specific events. This is an important issue to examine in future work, because event specificity may affect phenomenological characteristics during remembering (e.g., Berntsen & Hall, 2004; Del Palacio-Gonzalez et al., 2017). Potentially, even within the category of public event memories, memories for more specific events (e.g., Donald Trump's inauguration as the 45th president of the United States) might be more vivid or intense than memories for more extended events (e.g., the Volkswagen emissions scandal). Moreover, future work could also look into when the remembered public events took place, thus differentiating between lived versus distant events (e.g., Manier & Hirst, 2008; see also Choi et al., in press).

In Study 1, we found that the estimated frequencies for all types of memories were positively related to the propensity for engaging in daydreaming, but not to depressive or PTSD symptoms. The finding of positive correlations between daydreaming propensity and all four applied memory scales is in line with prior work by Berntsen et al. (2015) who argued that such general connections between different types of memories (e.g., spontaneous vs. deliberate memories) and individual dispositions could indicate that they are supported by the same mental structures. The present data show that it may be possible to apply the same reasoning to memories of personal vs. public events; the relationship between estimated frequency of daydreaming and estimated frequency of remembering could be rather general and not limited to certain types of memories.

5.2. Relation to previous work on public event memories and autobiographical memories

As reviewed in the introduction, largely unconnected lines of previous work had indicated that public event memories can be subject to the same principles and regularities as other types of memories, such as time-dependent forgetting (e.g., Meeter et al., 2005), proactive interference (e.g., Gunter et al., 1980), serial position effects (e.g., Tannenbaum, 1954), and contiguity effects (e.g., Uitvlugt & Healey, 2019). Further findings from the autobiographical memory literature moreover suggest that reminiscence bumps and increased retrospective recall of events encoded during adolescence and young adulthood may not only be observed for personal events, but, to some degree, also for public events (e.g., Koppel, 2013; Koppel & Berntsen, 2016; Tekcan et al., 2017). The present findings are consistent with this prior work by showing that memories of public events, just like autobiographical memories of personal events, are remembered both deliberately and spontaneously in daily life, which may point to further parallels. Involuntary memories in Study 3 arose in states of unfocused attention, and the remembered contents frequently showed overlap with the situation present at retrieval. Because these patterns were the same for personal and public event memories, the present data support the conclusion that involuntary memories may constitute a rather basic form of remembering (e.g., Berntsen, 2010) that works similarly irrespective of which types of events are remembered.

More broadly, the present findings are not only consistent with earlier work suggesting critical differences between memories for directly experienced and reported events (Larsen, 1992; Larsen & Plunkett, 1987), they also connect to other findings from the autobiographical memory literature. For instance, regarding the "living in history" framework, Brown and colleagues (e.g., Brown et al., 2009; Brown & Lee, 2010) have argued that public events may only deeply affect and structure autobiographical memory if they were personally experienced and influenced daily life. Considering the events that subjects recorded in the present studies, it is unlikely that they remembered public events that were deeply fateful for their own personal lives. Yet, the present data might suggest that directly experienced public events are in fact autobiographical in nature; at the very least, people may experience them in manners that are very similar to regular personal events.

A further connection may be possible considering prior work on vicarious memories. This prior work has shown that we can hold memories of personal events that did not happen to us, but to somebody else instead, and that the phenomenological and functional characteristics of such vicarious memories can be like our own personal memories (see Pillemer, Steiner, Kuwabara, Thomsen, & Svob, 2015). For public events, it could be argued that the type of report we are exposed to might also affect the phenomenological and functional characteristics that accompany it. For instance, if we listen to a first-person account of a tragic public event (e.g., the 2004 Indian ocean earthquake and tsunami) we might come to hold a rather vivid, potentially vicarious memory of the event – whereas the same may not be true if we read

through a more or less factual news report covering the same event. Future work is necessary to examine this idea.

5.3. Relation to collective memory

One of our main motivations for examining public event memories is their relevance to collective memories. At least for larger social groups, public events may constitute the fabric of such collective memories, because memories of public events are what makes up larger groups' shared representations of their pasts. The present findings indicate that public events often are recalled in daily life, both deliberately and spontaneously. Importantly, this provides direct support for Roediger III et al.'s (2009) proposal that memory retrieval, that is, the act of recalling information from memory, might constitute a mechanism for creating and maintaining collective memories. Roediger et al. suggested that covert retrieval in the form of rumination and overt retrieval in social interactions might enhance memory for events central to members of a certain group and thus shape collective memory. The latter has also been proposed by researchers examining social remembering in small-group conversations (e.g., Hirst & Coman, 2018; Rajaram & Pereira-Pasarin, 2010), suggesting that such retrieval might reinforce some, but cause forgetting of other memories, and support the emergence of overlapping and shared memories. The present data add to this perspective and suggest that memory retrieval of public events does not only occur in a deliberate and willful manner, but is equally likely to occur spontaneously, without any conscious attempts to recall the corresponding event, usually in response to cues in the ongoing situation. Both types of remembering therefore may contribute to the effective rehearsal of public event memories, which may support the formation and maintenance of collective memories, although there is some evidence that incidental retrieval might be less beneficial than intentional retrieval (Karpicke & Zaromb, 2010; Pu & Tse, 2014). Moreover, consistent with prior work on memory retrieval in social settings, if remembering occurs in an incomplete and selective manner, it may very well also prompt forgetting of related, but nonretrieved details (e.g., Abel & Bäuml, 2020; Cuc, Koppel, & Hirst, 2007; Hirst & Coman, 2018). Providing even tighter links with the previous work on the role of conversational remembering for collective memory, the ratings of participants in Study 3 indicated that public event memories may predominantly serve a social function. In particular, these ratings were slightly higher for involuntary relative to voluntary memories of public events and suggested that such memories may be particularly suited to prompt conversations with others about the recollected events, thus additionally supporting the development of shared memories.

The present study drew heavily on prior work on autobiographical memories, regarding both the applied methods and the research questions asked. Future studies on public event memories might continue to benefit from such inspiration, because the large literature on autobiographical remembering can point to further ways of examining public event memories. For instance, involuntary memories of personal events seem to be primarily cue-driven (e.g., Berntsen, 1996; Berntsen & Hall, 2004); that is, to a large degree, stimuli in our environment can elicit and constrain them. The present data suggest that the same is true for memories of public events. Importantly, this could offer a perspective on how our general surroundings (including social surroundings) may shape and maintain collective memories. By focusing in on precisely which cues are successful in evoking memories of public events, it might be possible to identify how to design environments that are conducive to prompting similar event memories in people, which may be helpful for holding consistent memories of one's shared past and enhance group cohesion. This would also make contact to a large part of the collective memory literature, in which examining the degree of overlap in recall of specific historic and public events within and across different social groups and subject populations is a common focus of analysis (e.g., Abel et al., 2019; Choi et al., in press; Liu et al., 2005, 2009; Zaromb, Butler, Agarwal, & Roediger, 2014).

Another open question that may be particularly important to consider from a collective memory perspective concerns individual differences in media engagement and exposure. People doubtlessly differ in how frequently they check the news (e.g., several times a day vs. once a week), which news formats and sources they prefer (e.g., global vs. more local newspapers, tv vs. social media, etc.), and also which news topics they pay most attention to (e.g., politics vs. sports). These differences may critically affect the frequency, phenomenology, and contents of public event memories, and thus potentially also collective memories. Gaining a basic understanding of how individual differences in media use affect public event memories may also be critical for understanding their role for the development of collective memories in larger communities.

In Study 3, participants were asked to indicate whether they experienced the events directly in their personal lives or learnt about them in different ways (e.g., via the news). A more fine-grained distinction might however further distinguish between reported events that were encoded via regular news reports and so-called media events, which may be experienced more immediately via continuous live coverage (see Dayan & Katz, 1992). For instance, the moon landing in 1969 was broadcast live and watched by millions of people. Other examples of public events with live coverage might include royal weddings, inaugurations, and sporting events (e.g., Merck, Yamashiro, & Hirst, 2020). How different forms of reporting affect later memories for the reported events may thus be another interesting question for future research.

6. Conclusions

The present study took a first step in examining public event memories as they occur in daily life. Memories of public events are less frequent than memories of personal events, but, like them, they arise both spontaneously and deliberately, and can be studied in a systematic and reliable fashion. We observed striking differences in the phenomenological characteristics that accompany personal and public event memories, but more research is needed to better understand contents, characteristics, and functions of public event memories. The view that public event memories form the backbone of collective memory offers new ways to generate knowledge on how larger social groups may come to reach a shared representation of the past.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.cognition.2021.104745.

References

Abel, M., & Bäuml, K.-H. T. (2020). Retrieval-induced forgetting in a social context: Do the same mechanism underlie forgetting in speakers and listeners? *Memory & Cognition, 48*, 1–15. https://doi.org/10.3758/s13421-019-00957-x.

Abel, M., Umanath, S., Fairfield, B., Takahashi, M., Roediger, H. L., & Wertsch, J. V. (2019). Collective memories across 11 nations for world war II: Similarities and differences regarding the most important events. *Journal of Applied Research in Memory and Cognition, 8*, 178–188. https://doi.org/10.1016/j.jarmac.2019.02.001.

Bahrick, H. P. (1984). Semantic memory content in permastore: Fifty years of memory for Spanish learning in school. *Journal of Experimental Psychology: General, 113*, 1–29. https://doi.org/10.1037/0096-3445.113.1.1.

Ball, C. T., & Little, J. R. (2006). A comparison of involuntary memory retrievals. *Applied Cognitive Psychology, 20*, 1167–1179. https://doi.org/10.1002/acp.1264.

Barber, S. J., Rajaram, S., & Fox, E. B. (2012). Learning and remembering with others: The key role of retrieval in shaping group recall and collective memory. *Social Cognition, 30*, 121–132. https://doi.org/10.1521/soco.2012.30.1.121.
Berntsen, D. (1996). Involuntary autobiographical memories. *Applied Cognitive Psychology, 10*, 435–454. https://doi.org/10.1002/(SICI)1099-0720(199610)10:5<435::AID-ACP408>3.0.CO;2-L.
Berntsen, D. (1998). Voluntary and involuntary access to autobiographical memory. *Memory, 6*, 113–141. https://doi.org/10.1080/741942071.
Berntsen, D. (2009a). *Involuntary autobiographical memories. An introduction to the unbidden past*. Cambridge: Cambridge University Press. https://doi.org/10.1017/CBO9780511575921.
Berntsen, D. (2009b). Flashbulb memories and social identity. In O. Luminet, & A. Curci (Eds.), *Flashbulb memories: New issues and perspectives* (pp. 187–206). Psychology Press.
Berntsen, D. (2010). The unbidden past: Involuntary autobiographical memories as a basic mode of remembering. *Current Directions in Psychological Science, 19*, 138–142. https://doi.org/10.1177/0963721410370301.
Berntsen, D. (2021). Involuntary autobiographical memories and their relation to other forms of spontaneous thoughts. *Philosophical Transactions of the Royal Society B, 376*, 20190693. https://doi.org/10.1098/rstb.2019.0693.
Berntsen, D., & Hall, N. M. (2004). The episodic nature of involuntary autobiographical memories. *Memory & Cognition, 32*, 789–803. https://doi.org/10.3758/BF03195869.
Berntsen, D., & Jacobsen, A. S. (2008). Involuntary (spontaneous) mental time travel into the past and future. *Consciousness and Cognition, 17*, 1093–1104. https://doi.org/10.1016/j.concog.2008.03.001.
Berntsen, D., Rubin, D. C., & Salgado, S. (2015). The frequency of involuntary autobiographical memories and future thoughts in relation to daydreaming, emotional distress, and age. *Consciousness and Cognition, 36*, 352–372.
Berry, C., Gunter, B., & Clifford, B. (1981). Memory for televised information: A problem for applied and theoretical psychology. *Current Psychological Reviews, 1*, 171–192. https://doi.org/10.1007/BF02979263.
Bluck, S., Alea, N., Habermas, T., & Rubin, D. C. (2005). A tale of three functions: The self-reported uses of autobiographical memory. *Social Cognition, 23*, 91–117. https://doi.org/10.1521/soco.23.1.91.59198.
Booth, A. (1970). The recall of news items. *Public Opinion Quarterly, 34*, 604–610. https://doi.org/10.1086/267845.
Brashier, N. M., & Marsh, E. J. (2020). Judging truth. *Annual Review of Psychology, 71*, 499–515. https://doi.org/10.1146/annurev-psych-010419-050807.
Brown, N. R., & Lee, P. J. (2010). Public events and the organization of autobiographical memory: An overview of the living- in history project. *Behavioral Sciences of Terrorism and Political Aggression, 2*, 133–149. https://doi.org/10.1080/19434471003597431.
Brown, N. R., Lee, P. J., Krslak, M., Conrad, F. G., Hansen, T. G. B., Havelka, J., & Reddon, J. R. (2009). Living in history – How war, terrorism, and natural disaster affect the organization of autobiographical memory. *Psychological Science, 20*, 399–405. https://doi.org/10.1111/j.1467-9280.2009.02307.x.
Brown, N. R., Schweickart, O., & Svob, C. (2016). The effect of collective transitions on the organization and contents of autobiographical memory: A transition theory perspective. *The American Journal of Psychology, 129*, 259–282. https://doi.org/10.5406/amerjpsyc.129.3.0259.
Brown, R., & Kulik, J. (1977). Flashbulb memories. *Cognition, 5*, 73–99. https://doi.org/10.1016/0010-0277(77)90018-X.
Camia, C., Menzel, C., & Bohn, A. (2019). A positive living-in-history effect: The case of the fall of the Berlin wall. *Memory, 27*, 1381–1389. https://doi.org/10.1080/09658211.2019.1661494.
Choi, S. Y., Abel, M., Siqi-Liu, A., & Umanath, S. (in press). National identity can be comprised of more than pride: Evidence from collective memories of Americans and Germans. Journal of Applied Research in Memory and Cognition. https://doi.org/10.1016/j.jarmac.2020.09.004.
Corning, A., & Schuman, H. (2012). Generational memory and the critical period: Evidence for national and world events. *Public Opinion Quarterly, 76*, 1–31. https://doi.org/10.1093/poq/nfr037.
Corning, A., & Schuman, H. (2015). *Generations and collective memory*. The University of Chicago Press. https://doi.org/10.7208/chicago/9780226282831.001.0001.
Craik, F. I., & Lockhart, R. S. (1972). Levels of processing: A framework for memory research. *Journal of Verbal Learning and Verbal Behavior, 11*, 671–684. https://doi.org/10.1016/S0022-5371(72)80001-X.
Crovitz, H. F., & Schiffman, H. (1974). Frequency of episodic memories as a function of their age. *Bulletin of the Psychonomic Society, 4*, 517–518. https://doi.org/10.3758/BF03334277.
Cuc, A., Koppel, J., & Hirst, W. (2007). Silence is not golden: A case for socially shared retrieval-induced forgetting. *Psychological Science, 18*, 727–733. https://doi.org/10.1111/j.1467-9280.2007.01967.x.
Cuc, A., Ozuru, Y., Manier, D., & Hirst, W. (2006). On the formation of collective memories: The role of a dominant narrator. *Memory & Cognition, 34*, 752–762. https://doi.org/10.3758/BF03193423.
Curci, A., Luminet, O., Finkenauer, C., & Gisle, L. (2001). Flashbulb memories in social groups: A comparative test–retest study of the memory of French president Mitterrand's death in a French and a Belgian group. *Memory, 9*, 81–101. https://doi.org/10.1080/09658210042000120.
Dayan, D., & Katz, E. (1992). *Media events: The live broadcasting of history*. Harvard University Press.
Del Palacio-Gonzalez, A., Berntsen, D., & Watson, L. A. (2017). Emotional intensity and emotion regulation in response to autobiographical memories during dysphoria. *Cognitive Therapy and Research, 41*, 530–542. https://doi.org/10.1007/s10608-017-9841-1.
Eveland, W. P. (2001). The cognitive mediation model of learning from the news – Evidence from nonelection, off-year election, and presidential election contexts. *Communication Research, 28*, 571–601. https://doi.org/10.1177/009365001028005001.
Finnbogadóttir, H., & Berntsen, D. (2011). Involuntary and voluntary mental time travel in high and low worriers. *Memory, 19*, 625–640. https://doi.org/10.1080/09658211.2011.595722.
Finnbogadóttir, H., & Berntsen, D. (2013). Involuntary future projections are as frequent as involuntary memories, but more positive. *Consciousness and Cognition, 22*, 272–280. https://doi.org/10.1016/j.concog.2012.06.014.
Galton, F. (1879). Psychometric experiments. *Brain, 2*, 149–162. https://doi.org/10.1093/brain/2.2.149.
Giambra, L. M. (1993). The influence of aging on spontaneous shifts of attention from external stimuli to the contents of consciousness. *Experimental Gerontologist, 28*, 485–492. https://doi.org/10.1016/0531-5565(93)90073-M.
Gunter, B. (1979). Recall of brief television news items: Effects of presentation mode, picture content and serial position. *Journal of Educational Television and other Media, 5*, 57–61. https://doi.org/10.1080/0260741790050207.
Gunter, B., Berry, C., & Clifford, B. R. (1981). Proactive interference effects with television new items: Further evidence. *Journal of Experimental Psychology: Human Learning and Memory, 7*, 480–487. https://doi.org/10.1037/0278-7393.7.6.480.
Gunter, B., Clifford, B. R., & Berry, C. (1980). Release from proactive interference with television news items: Evidence for encoding dimensions within televised news. *Journal of Experimental Psychology: Human Learning and Memory, 6*, 216–223. https://doi.org/10.1037/0278-7393.6.2.216.
Harris, C. B., Paterson, H., & Kemp, R. I. (2008). Collaborative recall and collective memory: What happens when we remember together? *Memory, 16*, 213–230. https://doi.org/10.1080/09658210701811862.
Hirst, W., & Coman, A. (2018). Building a collective memory: The case for collective forgetting. *Current Opinion in Psychology, 23*, 88–92. https://doi.org/10.1016/j.copsyc.2018.02.002.
Hirst, W., & Echterhoff, G. (2012). Remembering in conversations: The social shaping and reshaping of memories. *Annual Review of Psychology, 63*, 55–79. https://doi.org/10.1146/annurev-psych-120710-100340.
Hirst, W., & Manier, D. (2008). Towards a psychology of collective memory. *Memory, 16*, 183–200. https://doi.org/10.1080/09658210701811912.
Hirst, W., & Phelps, E. A. (2016). Flashbulb memories. *Current Directions in Psychological Science, 25*, 36–41. https://doi.org/10.1177/0963721415622487.
Hirst, W., Phelps, E. A., Meksin, R., Vaidya, C. J., Johnson, M. K., Mitchell, K. J., … Olsson, A. (2015). A ten-year follow-up of a study of memory for the attack of September 11, 2001: Flashbulb memories and memories for flashbulb events. *Journal of Experimental Psychology: General, 144*, 604–623. https://doi.org/10.1037/xge0000055.
Holmes, A., & Conway, M. A. (1999). Generation identity and the reminiscence bump: Memory for public and private events. *Journal of Adult Development, 6*, 21–34. https://doi.org/10.1023/A:1021620224085.
Howes, J. L., & Katz, A. N. (1988). Assessing remote memory with an improved public events questionnaire. *Psychology and Aging, 3*, 142–150. https://doi.org/10.1037/0882-7974.3.2.142.
Howes, J. L., & Katz, A. N. (1992). Remote memory: Recalling autobiographical and public events across the lifespan. *Canadian Journal of Psychology, 46*, 92–116. https://doi.org/10.1037/h0084311.
Johannessen, K. B., & Berntsen, D. (2010). Current concerns in involuntary and voluntary autobiographical memory. *Consciousness and Cognition, 19*, 847–860. https://doi.org/10.1016/j.concog.2010.01.009.
Kamiya, S. (2014). Relationship between frequency of involuntary autobiographical memories and cognitive failure. *Memory, 22*, 839–851. https://doi.org/10.1080/09658211.2013.838630.
Karpicke, J. D., & Zaromb, F. M. (2010). Retrieval mode distinguishes the testing effect from the generation effect. *Journal of Memory and Language, 62*, 227–239. https://doi.org/10.1016/j.jml.2009.11.010.
Katz, E., Adoni, H., & Parness, P. (1977). Remembering the news: What the picture adds to recall. *Journalism Quarterly, 54*, 231–239. https://doi.org/10.1177/107769907705400201.
Kline, P. (2000). *The handbook of psychological testing*. London: Routledge.
Koppel, J. (2013). The reminiscence bump for public events: A review of its prevalence and taxonomy of alternative age distributions. *Applied Cognitive Psychology, 27*, 12–32. https://doi.org/10.1002/acp.2865.
Koppel, J., & Berntsen, D. (2016). The reminiscence bump in autobiographical memory and for public events: A comparison across different cueing methods. *Memory, 24*, 44–62. https://doi.org/10.1080/09658211.2014.985233.
Kvavilashvili, L., & Mandler, G. (2004). Out of one's mind: A study of involuntary semantic memories. *Cognitive Psychology, 48*, 47–94. https://doi.org/10.1016/S0010-0285(03)00115-4.
Larsen, S. F. (1983). Text processing and knowledge updating in memory for radio news. *Discourse Processes, 6*, 21–38. https://doi.org/10.1080/01638538309544552.
Larsen, S. F. (1988). Remembering without experiencing: Memory for reported events. In U. Neisser, & E. Winograd (Eds.), *Emory symposia in cognition, 2. Remembering reconsidered: Ecological and traditional approaches to the study of memory* (pp. 326–355). Cambridge University Press. https://doi.org/10.1017/CBO9780511664014.014.
Larsen, S. F. (1992). Potential flashbulbs: Memories for ordinary news as the baseline. In E. Winograd, & U. Neisser (Eds.), *Affect and accuracy in recall: Studies on "flashbulb"*

memories (pp. 32–64). Cambridge University Press. https://doi.org/10.1017/CBO9780511664069.004.
Larsen, S. F., & Plunkett, K. (1987). Remembering experienced and reported events. *Applied Cognitive Psychology, 1*, 15–26. https://doi.org/10.1002/acp.2350010104.
Liang, K.-Y., & Zeger, S. L. (1986). Longitudinal data analysis using generalized linear models. *Biometrika, 73*, 13–22.
Liu, J. H., Goldstein-Hawes, R., Hilton, D., Huang, L.-L., Gastardo-Conaco, C., Dresler-Hawke, E., … Hidaka, Y. (2005). Social representations of events and people in world history across 12 cultures. *Journal of Cross-Cultural Psychology, 36*, 1–21. https://doi.org/10.1177/0022022104272900.
Liu, J. H., Paez, D., Slawuta, P., Cabecinhas, R., Techio, E., Kokdemir, D., … Zlobina, A. (2009). Representing world history in the 21st century: The impact of 9/11, the Iraq war, and the nation-state on dynamics of collective remembering. *Journal of Cross-Cultural Psychology, 40*, 667–692. https://doi.org/10.1177/0022022109335557.
Luminet, O., & Curci, A. (2018). Flashbulb memories. In *New issues and new perspectives* (2nd ed.). Psychology Press. https://doi.org/10.4324/9781315623481.
Mace, J. H. (2004). Involuntary autobiographical memories are highly dependent on abstract cueing. The Proustian view is incorrect. *Applied Cognitive Psychology, 18*, 893–899. https://doi.org/10.1002/acp.1020.
Mace, J. H. (2007). *Involuntary memory*. Malden: Blackwell. https://doi.org/10.1002/9780470774069.
Manier, D., & Hirst, W. (2008). A cognitive taxonomy of collective memories. In A. Erll, & A. Nünning (Eds.), *Cultural memory studies: An international and interdisciplinary handbook* (pp. 253–262). Berlin: de Gruyter.
Meeter, M., Murre, J. M. J., & Janssen, S. M. J. (2005). Remembering the news: Modeling retention data from a study with 14,000 participants. *Memory & Cognition, 33*, 793–810. https://doi.org/10.3758/BF03193075.
Merck, C., Yamashiro, J. K., & Hirst, W. (2020). Remembering the big game: Social identity and memory for media events. *Memory, 28*, 795–814. https://doi.org/10.1080/09658211.2020.1784232.
Neuman, W. R. (1976). Patterns of recall among television news viewers. *Public Opinion Quarterly, 40*, 115–123. https://doi.org/10.1086/268274.
Newman, E. J., Garry, M., Bernstein, D. M., Kantner, J., & Lindsay, D. S. (2012). Nonprobative photographs (or words) inflate truthiness. *Psychonomic Bulletin & Review, 19*, 969–974. https://doi.org/10.3758/s13423-012-0292-0.
Pekar, S., & Brabec, M. (2018). Generalized estimating equations: A pragmatic and flexible approach to the marginal GLM modelling of correlated data in the behavioural sciences. *Ethology, 124*, 86–93. https://doi.org/10.1111/eth.12713.
Pennycook, G., Cannon, T. D., & Rand, D. G. (2018). Prior exposure increases perceived accuracy of fake news but has no effect on entirely implausible statements. *Journal of Experimental Psychology: General, 147*, 1865–1880. https://doi.org/10.1037/xge0000465.
Pillemer, D. B. (1992). Remembering personal circumstances: A functional analysis. In E. Winograd, & U. Neisser (Eds.), *Emory symposia in cognition, 4. Affect and accuracy in recall: Studies of "flashbulb" memories* (pp. 236–264). Cambridge University Press. https://doi.org/10.1017/CBO9780511664069.013.
Pillemer, D. B., Steiner, K. L., Kuwabara, K. J., Thomsen, D. K., & Svob, C. (2015). Vicarious memories. *Consciousness and Cognition, 36*, 233–245. https://doi.org/10.1016/j.concog.2015.06.010.
Pu, X., & Tse, C.-S. (2014). The influence of intentional versus incidental retrieval practices on the role of recollection in test-enhanced learning. *Cognitive Processing, 15*, 55–64. https://doi.org/10.1007/s10339-013-0580-2.
Rajaram, S., & Pereira-Pasarin, L. (2010). Collaborative memory: Cognitive research and theory. *Perspectives on Psychological Science, 5*, 649–663. https://doi.org/10.1177/1745691610388763.
Rasmussen, A. S., & Berntsen, D. (2009). The possible functions of involuntary autobiographical memories. *Applied Cognitive Psychology, 23*, 1137–1152. https://doi.org/10.1002/acp.1615.
Rasmussen, A. S., & Berntsen, D. (2011). The unpredictable past: Spontaneous autobiographical memories outnumber autobiographical memories retrieved strategically. *Consciousness and Cognition, 20*, 1842–1846. https://doi.org/10.1016/j.concog.2011.07.010.
Rasmussen, A. S., Johannessen, K. B., & Berntsen, D. (2014). Ways of sampling voluntary and involuntary autobiographical memories in daily life. *Consciousness and Cognition, 30*, 156–168. https://doi.org/10.1016/j.concog.2014.09.008.
Rasmussen, A. S., Ramsgaard, S. B., & Berntsen, D. (2015). Frequency and functions of involuntary and voluntary autobiographical memories across the day. *Psychology of Consciousness: Theory, Research and Practice, 2*, 185–205. https://doi.org/10.1037/cns0000042.
Roediger, H. L., & Abel, M. (2015). Collective memory: A new arena of cognitive study. *Trends in Cognitive Sciences, 19*, 359–361. https://doi.org/10.1016/j.tics.2015.04.003.
Roediger, H. L., III, Zaromb, F., & Butler, A. C. (2009). The role of repeated retrieval in shaping collective memory. In P. Boyer, & J. V. Wertsch (Eds.), *Memory in mind and culture* (pp. 138–170). Cambridge: Cambridge University Press. https://doi.org/10.1017/CBO9780511626999.009.
Rubin, D. C., & Berntsen, D. (2009). The frequency of voluntary and involuntary autobiographical memories across the life span. *Memory & Cognition, 37*, 679–688. https://doi.org/10.3758/37.5.679.
Rubin, D. C., Boals, A., & Berntsen, D. (2008). Memory in posttraumatic stress disorder: Properties of voluntary and involuntary, traumatic and nontraumatic autobiographical memories in people with and without posttraumatic stress disorder symptoms. *Journal of Experimental Psychology: General, 137*, 591–614. https://doi.org/10.1037/a0013165.
Rubin, D. C., Wetzler, S. E., & Nebes, R. D. (1986). Autobiographical memory across the adult life span. In D. C. Rubin (Ed.), *Autobiographical memory* (pp. 202–221). Cambridge, United Kingdom: Cambridge University Press. https://doi.org/10.1017/CBO9780511558313.
Sawyer-Radloff, L. (1977). The CES-D scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement, 1*, 385–401. https://doi.org/10.1177/014662167700100306.
Schlagman, S., Kliegel, M., Schulz, J., & Kvavilashvili, L. (2009). Differential effects of age on involuntary and voluntary autobiographical memory. *Psychology and Aging, 24*, 397–411. https://doi.org/10.1037/a0015785.
Schlagman, S., & Kvavilashvili, L. (2008). Involuntary autobiographical memories in and outside the laboratory: How different are they from voluntary autobiographical memories? *Memory & Cognition, 36*, 920–932. https://doi.org/10.3758/MC.36.5.920.
Schuman, H., & Scott, J. (1989). Generations and collective memories. *American Sociological Review, 54*, 359–381. https://doi.org/10.2307/2095611.
Schwarz, N., Newman, E., & Leach, W. (2016). Making the truth stick and the myths fade: Lessons from cognitive psychology. *Behavioral Science & Policy, 2*, 85–95. https://doi.org/10.1353/bsp.2016.0009.
Shrikanth, S., & Szpunar, K. K. (2021). The good old days and the bad old days: Evidence for a valence-based dissociation between personal and public memory. *Memory, 29*, 180–192. https://doi.org/10.1080/09658211.2020.1871024.
Singer, J., & Antrobus, J. (1970). *Manual for the imaginal processes inventory*. Princeton, New Jersey: Educational Testing Service.
Slamecka, N. J., & McElree, B. (1983). Normal forgetting of verbal lists as a function of their degree of learning. *Journal of Experimental Psychology. Learning, Memory, and Cognition, 9*, 384–397. https://doi.org/10.1037/0278-7393.9.3.384.
Soroka, S., & McAdams, S. (2015). News, politics, and negativity. *Political Communication, 32*, 1–22. https://doi.org/10.1080/10584609.2014.881942.
Squire, L. R., Haist, F., & Shimamura, A. P. (1989). The neurology of memory: Quantitative assessment of retrograde amnesia in two groups of amnesic patients. *Journal of Neuroscience, 9*, 828–839. https://doi.org/10.1523/JNEUROSCI.09-03-00828.1989.
Squire, L. R., & Slater, P. C. (1970). Forgetting in very long-term memory as assessed by an improved questionnaire technique. *Journal of Experimental Psychology: Human Learning and Memory, 104*, 50–54. https://doi.org/10.1037/0278-7393.1.1.50.
Stauffer, J., Frost, R., & Rybolt, W. (1983). The attention factor in recalling network television news. *Journal of Communication, 33*, 29–37. https://doi.org/10.1111/j.1460-2466.1983.tb02371.x.
Tajfel, H. (Ed.). (1982). *Social identity and intergroup relations*. Cambridge, UK: Cambridge University Press.
Tannenbaum, P. H. (1954). Effect of serial position on recall of radio news stories. *Journalism Quarterly, 31*, 319–323. https://doi.org/10.1177/107769905403100305.
Tekcan, A. I., Boduroglu, A., Mutlutürk, A., & Erciyes, A. A. (2017). Life-span retrieval of public events: Reminiscence bump for high-impact events, recency for others. *Memory & Cognition, 45*, 1095–1112. https://doi.org/10.3758/s13421-017-0724-1.
Tinti, C., Schmidt, S., Testa, S., & Levine, L. J. (2014). Distinct processes shape flashbulb and event memories. *Memory & Cognition, 42*, 539–551. https://doi.org/10.3758/s13421-013-0383-9.
Topcu, M. N., & Hirst, W. (2020). Remembering a nation's past to imagine its future: The role of event specificity, phenomenology, valence, and perceived agency. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 46*, 563–579. https://doi.org/10.1037/xlm0000746.
Trussler, M., & Soroka, S. (2014). Consumer demand for cynical and negative news frames. *The International Journal of Press/Politics, 19*, 360–379. https://doi.org/10.1177/1940161214524832.
Uitvlugt, M. G., & Healey, M. K. (2019). Temporal proximity links unrelated news events in memory. *Psychological Science, 30*, 92–104. https://doi.org/10.1177/0956797618808474.
Walker, W. R., Skowronski, J. J., & Thompson, C. P. (2003). Life is pleasant – And memory helps to keep it that way! *Review of General Psychology, 7*, 203–210. https://doi.org/10.1037/1089-2680.7.2.203.
Warrington, E. K., & Silberstein, M. (1970). A questionnaire technique for investigating very long-term memory. *Quarterly Journal of Experimental Psychology, 22*, 508–512. https://doi.org/10.1080/14640747008401927.
Weathers, F. W., Litz, B. T., Keane, T. M., Palmieri, P. A., Marx, B. P., & Schnurr, P. P. (2013). The PTSD checklist for DSM-5 (PCL-5). Scale available from the National Center for PTSD at www.ptsd.va.gov.
Wertsch, J. V., & Roediger, H. L., III (2008). Collective memory: Conceptual foundations and theoretical approaches. *Memory, 16*, 318–326. https://doi.org/10.1080/09658210701801434.
Zaromb, F., Butler, A. C., Agarwal, P. K., & Roediger, H. L. (2014). Collective memories of three wars in United States history in younger and older adults. *Memory & Cognition, 42*, 383–399. https://doi.org/10.3758/s13421-013-0369-7.
Zebian, S., & Brown, N. R. (2014). Living in history in Lebanon: The influence of chronic social upheaval on the organisation of autobiographical memories. *Memory, 22*, 194–211. https://doi.org/10.1080/09658211.2013.775310.