Sharing personal memories on ephemeral social media facilitates autobiographical memory

Running title: Ephemeral social media and memory

Abstract

The mnemonic effect of posting personal experiences on ephemeral social media was examined. Participants completed a daily diary for six consecutive days. On alternate days they were instructed to use, or refrain from using, the ephemeral social media platform Snapchat. At the end of the week, participants received a surprise memory test for the contents of the diaries. We observed significantly superior recall for memories encoded on the Snapchat days, demonstrating memory facilitation despite memory type equivalency across the posting and no posting conditions. The study is the first to examine the effect of Snapchat use on autobiographical memory, with the findings supporting previous work showing that posting on social media facilitates memory. Given the ephemerality of Snapchat posts, the reported improvement in memory contradicts the notion that cognitive offloading occurs automatically when posting memories online.

136 words

Introduction

Memory impairments have been shown when information is encoded via digital media[1-4]. One explanation for these impairments is that organic memory is offloaded/outsourced[1] as an individual is cognisant that this information can be subsequently accessed digitally (a phenomenon also known as 'The Google Effect'[4]).

The transactive memory/cognitive offloading account predicts that memories shared on social media should be impaired as an individual is out-sourcing storage of the event to a digital store. Such a prediction is, however, complicated by the emergence of ephemeral social media platforms. Snapchat is one such social media platform where content is transient, with a unique feature being that posted content can be viewed for a maximum of 10-seconds before disappearing[5]. Consequently, advocates of a transactive/offloading account might predict that, paradoxically, memories posted on Snapchat would exhibit superior recall due to the ephemerality of the platform, i.e., the content cannot be reviewed later (analogously to face-to-face exchanges[6]). It is, however, worth noting that memory for facts and images encoded via Snapchat are impaired relative to non-digital encoding[2,3], i.e., the classic Google Effect[4]. Soares and Soames[3] therefore argue that if these effects follow memory offloading, then this process must be automatic.

Wang, Lee, and Hou[7] examined whether autobiographical memories were affected after being shared on social media and, in contrast to the offloading prediction, reported improved memory for events shared on the social media platform 'Facebook'. In this study participants completed a 7-day daily diary for personal events as well as recording whether each event was shared on Facebook. Both at the end of the week and following an additional 1-week interval, participants completed a surprise memory task for the diary events. In direct contradiction to the transactive/offloading account, Wang et al.[7] found that posting events on

social media significantly improved autobiographical memory. Wang et al. suggest that the act of posting online functions as a form of rehearsal where the information is not only repeated but processed in more depth as the act of posting involves deeper reflection on the experience. Indeed, given the deliberate management of how the self is presented online[8-10], autobiographical memories posted on social media may possess increased salience in memory due to the close association with self-identity[11,12].

However, an important limitation to Wang et al.'s[7] elegantly designed study concerned the extent to which the memories posted online and memories not posted online qualitatively differed. Wang et al.[7] reported that online and offline memories differed significantly with respect to both personal importance and emotional intensity. Whilst the authors argued that these differences were statistically controlled, it seems likely that these memories (which only comprised 6% of the diary entry memories) differed on other additional constructs (e.g., day of the week etc.). If events posted online are different/special, this exceptionality may be underpinning the recall advantage rather than the act of posting online per se.

The present study adapts the Wang et al.[7] design in order to address the possibility that the type of memories posted online are generally more memorable than those not posted online. Here we manipulate the days in which participants are permitted to post content on social media and we compare autobiographical memory recall across the online posting and non-online posting days. This manipulation ensures that the same types of memories/events are included in the social media and non-social media days. In addition, given that explicit offloading of memories to a digital store should not occur with ephemeral social media platforms, the present study will use Snapchat in order to maximise the opportunity of detecting a facilitative effect of social media on memory. Indeed, importantly, this

ephemerality is salient, with users perceiving the platform as transient[13], i.e., they are cognisant that this content cannot subsequently be viewed.

In this study, participants complete a daily diary across six consecutive days, with Snapchat posting permitted on alternate days of the study. On the seventh day, participants receive a surprise memory test for the diary entries. If using Snapchat improves memory, we predict significantly superior memory for the diary entries on the days in which Snapchat use was permitted, as well as significantly more words used (a proxy measure of memory complexity).

Materials & Methods

Participants. Thirty-three Bournemouth University undergraduates (mean age = 20.67 years; 26 female and 7 male) participated in exchange for research participation credits. All participants reported regular use of the social media messaging app Snapchat (Snap Inc., Santa Monica, USA). At the analysis stage, seven participants were excluded due to incomplete diary data. Ethical approval was obtained from the Bournemouth University Psychology Ethics Committee.

Materials. The online survey platform Qualtrics (Qualtrics International Inc., Provo, USA) was used to collate diary entries from the participants.

Design. A within-participants design was employed with the independent variable concerning the posting or non-posting of autobiographical events on the social media platform Snapchat. Across a consecutive 6-day period (Tuesday-Sunday), participants were instructed, on alternate days, to use Snapchat or refrain from using Snapchat. The order of these days was counterbalanced.

The dependent variables were the number of diary entries recorded and then correctly recalled at test; and the total number of words used in the diaries and then at recall. The accuracy coding of the Day 7 diary retrievals followed that described by Wang et al.[7], wherein recalled events were judged with respect to whether they followed the gist (or central theme) of the original diary entry (a method additionally employed by Wang[14]). If the recalled memory description shared the original account in the diary it was coded as consistent (a score of 1). If the recalled event was inconsistent with events described in the original diary, the memory was coded as inconsistent (a score of 0). The recalled memories were marked as consistent if the central element of the specific memory matched a diary entry and used the same/similar words (for example, recall of going to the cinema with John). The memory is marked as inconsistent if central components of the recall were contradictory to the original diary entry (for example, recalling going to the cinema with Bob, or the restaurant with John). In the present study, this coding was independently undertaken by both authors.

Procedure. The study was conducted across an 8-day period. On the first Monday, participants visited the laboratory and were briefed on the study. On the following 6-days, participants received an email at 17:00 asking them to complete a free recall diary for autobiographical events that have occurred in the preceding 24-hours. The email included a weblink to the online survey. On alternate days (in a counterbalanced order) participants were told that they could use Snapchat normally or should refrain from using Snapchat. On the eighth day of the study, participants returned to the laboratory and received a surprise free recall memory test for all the diary entries provided across the preceding 6 days. Finally, participants were asked to privately view their archived Snapchat posts over the preceding 6 days and report the number of posts they uploaded during each day of the study.

Results

The statistical analysis was conducted using JASP[15], with the Bayes Factors using default priors.

Manipulation Check: Snapchat Posts

Across the 3 days in which Snapchat use was permitted, all participants reported uploading at least one autobiographical event: Snapchat Day 1 mean number of posts = 1.88 (range: 1-5), Snapchat Day 2 mean number of posts = 1.92 (range: 1-4), and Snapchat Day 3 mean number of posts = 1.62 (range: 1-3).

Number of Diary Entries

The total number of diary entries for the Snapchat (mean entries = 9.923, 95% CI [8.236,11.612]) and non-Snapchat (mean entries = 8.731, 95% CI [7.045,10.417]) days did not significantly differ, $t(25) = 1.755$, $p = .092$, $d = 0.344$, $BF_{10} = 0.791$, although the Bayes Factor was insensitive (see Figure 1a).

The accuracy of the recalled diary entries was coded separately by the authors, with an inter-rater reliability of .89. Participants correctly recalled significantly more diary entries from the Snapchat days (mean recall = 5.500, 95% CI [4.608,6.392]) compared to the non-Snapchat days (mean recall = 4.038, 95% CI [3.075,5.002]), $t(25) = 3.144$, $p = .004$, $d = 0.617$, $BF_{10} = 9.754$ (see Figure 1b).

Figure 1 about here please

Amount of Words

The total number of words used in the original daily diaries for the Snapchat (mean total words = 128.15, 95% CI [101.572,154.736]) and non-Snapchat (mean total words = 110.96, 95% CI [78.791,143.132]) days did not significantly differ, $t(25) = 1.539$, $p = .136$, $d = 0.302$, $BF_{10} = 0.588$, although the Bayes Factor was insensitive (see Figure 1c).

Participants used significantly more words when recalling events in the surprise memory test for the Snapchat days (mean words = 68.69, 95% CI [52.330,85.055]) compared to the non-Snapchat days (mean words = 53.54, 95% CI [40.142,66.934]), $t(25) = 2.520$, $p = .018$, $d = 0.494$, $BF_{10} = 2.828$, although the Bayes Factor was insensitive (see Figure 1d).

Discussion

The present study is the first to investigate the mnemonic effect of ephemeral social media Snapchat posts on autobiographical memory for those events. Participants received a surprise memory test on diary entries produced on days in which posting on Snapchat was permitted or prohibited. We showed that participants recalled significantly more diary entries and used significantly more words when recalling entries from the Snapchat days compared to the non-Snapchat days. These findings are consistent with those of Wang et al.[7] who found superior recall for autobiographical memories posted on Facebook compared to those not. The present findings generalise those of Wang et al.[7] to ephemeral social media and, importantly, attempts to ensure equivalency between the types of memories compared across the online posting and non-posting condition. That is, since we manipulated the days in which Snapchat use was permitted, there is no *a priori* reason to suggest that the types of events/memories being recorded in the diary entries would have differed between the Snapchat posting and no posting days. We argue therefore that the facilitative memory effect of posting content on

Snapchat is underpinned by the act of posting and not differences in the types of memories recalled.

The exact mechanism that drives superior recall for posted memories is unclear, although Wang et al.[7] suggest that posting online operates as verbal rehearsal of these personal experiences (a process shown to improve subsequent retrieval[18-20]). Moreover, it is possible that the act of posting on social media involves a deeper level of processing and planning of those memories, with individuals carefully curating the content in order to manage the projection of their online identity[8-10]. Engaging with those experiences at a deeper and more personal level would, from a levels of processing perspective, strengthen memory.

That using Snapchat has improved autobiographical memory contradicts previous studies showing a detrimental effect of the social media platform on recall[2-3] and more generally contradicts the Google Effect (Sparrow et al.[4]) where memory is impaired for information that can be subsequently accessed digitally. The Google Effect is thought to follow a process of cognitive offloading, where individuals utilise network-enabled devices (and more broadly the internet) as external memory systems. There are two possible explanations as to why this process did not occur in the present study (and in that reported by Wang et al.[7]). First, in the present study any autobiographical memories posted on Snapchat would have initially been encoded offline (during the experience) and then posted online (studies supporting the Google Effect, e.g., Khan & Martinez, 2020; and Soares & Storm, 2018, require encoding of the to-be-remembered items via Snapchat). Future research should examine to what extent the Google Effect is confined to when the information is encoded via the online platform from which the information is stored. This has implications with respect to the point at which the purported cognitive offloading occurs. If the Google Effect can only be found when information is encoded online, it suggests that the content is encoded

superficially with the knowledge that it can be subsequently accessed externally. If, however, the Google Effect can be found for information initially encoded offline and then subsequently posted online, it suggests that encoded information can be forgotten based on the subsequent knowledge of external storage.

The second explanation for the absence of memory impairment (The Google Effect) for information posted on social media is that these memories are qualitatively different to the semantic information typically used to show the Google Effect. Autobiographical memory is, by definition, more personal and intertwined with the self[11,12] (and therefore of increased emotional importance). Given the importance of social media in projecting self-identity[8-10], deliberate management of the content posted online might result in deeper encoding of the material as time and cognitive resources are employed in curating the post. One might speculate that deeper engagement with the posted content operates as a protective factor to memory representations being impaired by the Google Effect. This could be examined in future work by manipulating whether memories are posted to open or closed platforms, in addition to exploring the types of memories that can be improved via social media posting (e.g., semantic information compared to autobiographical experiences).

That the facilitative effect of social media posting on autobiographical memory has been shown with both Facebook[7] and Snapchat is important due to the differences in the ephemerality of platforms. One might argue that the Google Effect[4] is not found in the present study because the ephemerality of the platform prevents it functioning as a backup memory store. However, it is important to note that the facilitative mnemonic effect of posting on social media has been shown with a permanent store[7]. This suggests that the effects of posting autobiographical memory on social media are different to the 'Google Effect' and remain irrespective of platform ephemerality.

It is important to note that whilst memory for diary entries was superior for the Snapchat posting days, we do not know if that improvement directly reflects recall of the autobiographical events that were posted online. The trade-off in attempting to ensure equivalence of memory between the posting and no posting days resulted in a lack of control over whether diary entries for the posting days were shared online. Notwithstanding this uncertainty, we have demonstrated improved recall for diary entries encoded on the Snapchat days suggesting that there exists some general facilitative effect of using Snapchat on autobiographical memory. Given that our findings are a conceptual replication of Wang et al.[7] but employing a different methodology, it adds weight to the proposition that posting personal experiences on social media improves autobiographical memory. Future research should explore the extent to which this facilitation is a general rehearsal-based effect (irrespective of how rehearsal is administered) or whether there is something additive about posting this information on social media.

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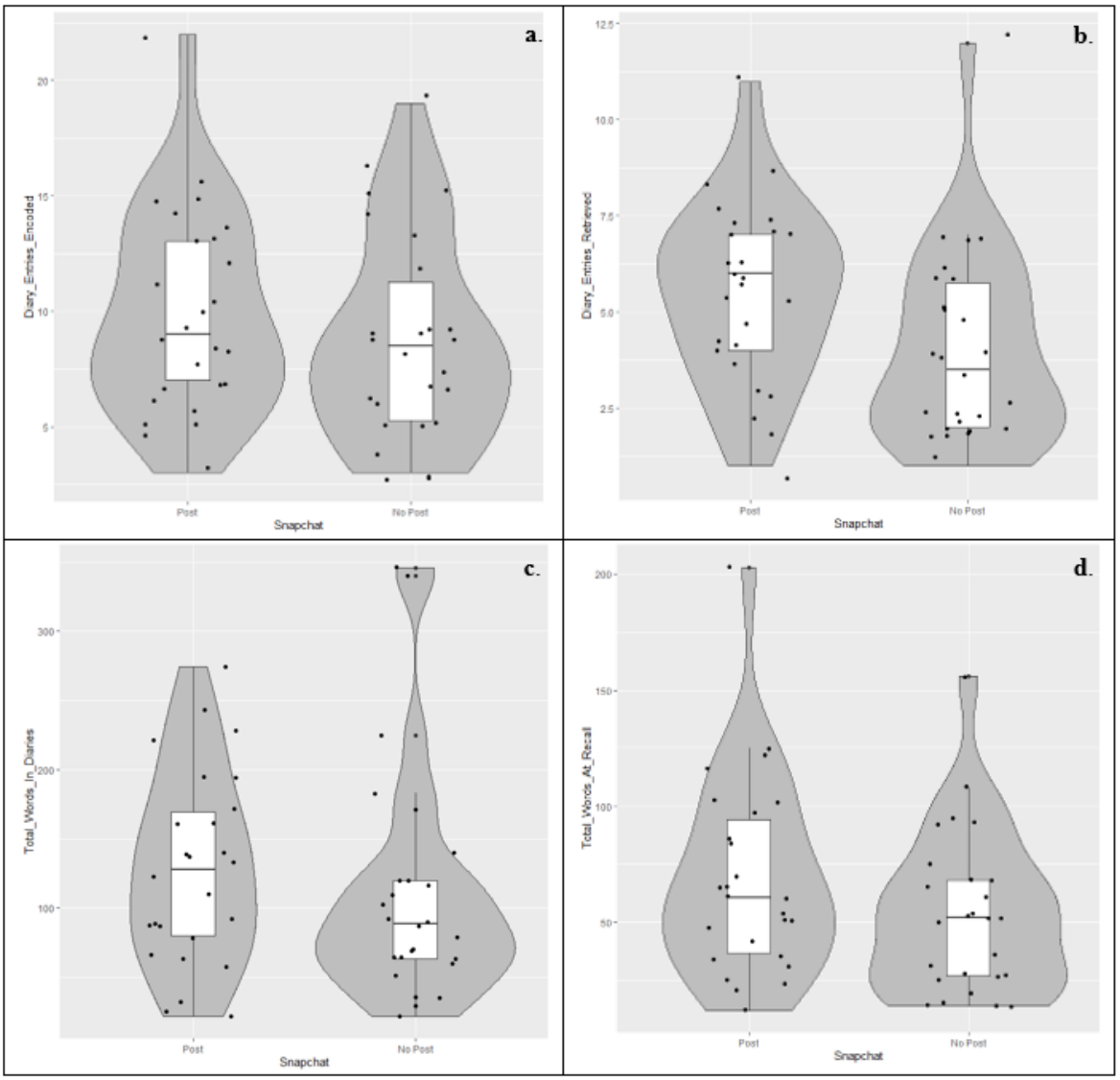

Figure 1(a-d). Violin-plots demonstrating (a) the total number of diary entries, (b) the number of correctly recalled diary entries on Day 7, (c) the total number of words used on the diary entries, and (d) the number of words used when recalling the diary entries on Day 7, for the Snapchat (post) and no post days. Median and interquartile range are shown in the boxplots. Figures were produced in R (R Core team[16]) using the GGplot2 package (Wickham[17]).