Retention of Positive and Negative Memories of School from the COVID-19 Pandemic for High School Juniors

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INTRODUCTION

Significant events, particularly those associated with strong emotions, have the potential to affect one's memory. Brewin finds in a study on memory in PTSD patients that traumatic events can have a profound impact on memory, often causing memory loss as a coping mechanism (1). The COVID-19 pandemic that began in 2020 is one such traumatic event, as evidenced by Oyejide et al.'s findings in a study on emotional responses during the lockdown that showed that COVID-19 significantly increased reports of anxiety and depression from 2020-2021 (2). These negative impacts were further seen through the academic medical center NYU Langone Health's discovery that the COVID-19 pandemic induced traumatic stress reactions in many children, impacting their ability to cope (3). Fan and Kang find in a study on childhood trauma and it's impacts on development that one common way children cope is through unconscious memory loss, which occurs when the brain triggers memory loss to prevent someone from reliving traumatic emotions (4). However, Pisano et al. suggest in a study on the effects of COVID-19 that the pandemic may have impacted this memory loss coping mechanism for children, finding that the lockdown led to decreases in working and prospective memory (5). Therefore, the COVID-19 pandemic can be classified as a traumatic event that significantly impacted children's memories and coping mechanisms (2, 3).

LITERATURE REVIEW

Memory is a complex process that includes both recollection and forgetting. In a study on memory and psychology, Ebbinghaus finds that the retention and reproduction of memories depend strongly on the intensity of attention attached to the mental states during the time period in which the memory was formed (6). In general, people avoid what brought them pain in vivid memories, leading many to forget painful or traumatic memories (6). This effect is particularly amplified in trauma survivors with post-traumatic stress disorder (1).

Chronic exposure to traumatic situations can also cause emotional memory suppression, which is why some individuals who suffer childhood trauma may forget traumatic events even if they know they occurred; alternatively, others may experience recovered traumatic memories or develop false memories (4). Smith et al. suggests in a study on behavior in children exposed to trauma that this occurs because children do not yet have the coping skills to manage trauma (7, 8). Alternatively, Bremner finds in a study on traumatic stress's impact on the brain that when the brain is faced with a traumatic situation, memories get stuck in the amygdala and do not reach the hippocampus, leading survivors to primarily recall emotions but not dates and locations from traumatic events (9).

The U.S. Center for Substance Abuse Treatment finds that another immediate cognitive reaction to trauma is memory problems (10). Strange and Takarangi find in a study on memory distortion that such memory problems can include not being able to recall what happened during the time of trauma or having a distorted memory of the traumatic event (10, 11). Moreover, additional details introduced during this process can lead to memory amplification, in which people remember more trauma than they experienced (11). Assistant Psychiatry Professor

Stern finds that the memory issues that arise are related to the overall process of re-traumatization, which is when people are reminded of traumatic events by triggers (12).

Conversely, Porter and Peace, in a study on traumatic and positive memories, find that traumatic experiences remained in patients' memories for years after and were more factually consistent over time than positive memories (13). Despite the potential for higher accuracy, Wetherell et al. find in a study on the impacts of childhood trauma that traumatic events early in life may negatively impact cognitive function and memory (14). Over time, some of these effects include children recalling unwanted thoughts in the future, encountering a wider range of negative feelings, and coping through avoidance of the traumatic event (3).

These effects are also applicable to the COVID-19 pandemic. In a study on how older adults remember the COVID-19 pandemic, Ford et al. find that older adults are more likely to remember more positive than negative events than younger adults; thus, age is positively correlated with the tendency to view the COVID-19 pandemic more positively (15). Aizpurua et al. suggest in a study on positivity bias, which is when one recalls information more positively than intended, that this occurs because older adults exhibit a positivity effect where they react less to negative situations and recall more positive stimuli (16).

Fivush, a Ph.D. professor of developmental psychology, finds that students who experienced the pandemic reported higher levels of anxiety, depression, academic distress, loneliness, and isolation (17). Brown provides an example of the potential impacts of these effects on memory in a study on the effects of the COVID-19 pandemic on autobiographical memory, in which Brown predicts an increase in the availability of memories at the onset of the pandemic and a decrease in the availability of memories during the lockdown period (18). Autobiographical memory is defined by Hjuler et al. in a study on autobiographical memory for the COVID-19 pandemic as the ability to remember, relive, and place personal experiences in a real-life context (19). Autobiographical memory is typically biased toward positive emotional memories, leading to easier and more frequent recall of such memories (19). Although Hjuler et al. hypothesize that memories retained during the lockdown are more negative, they also note that memories often lose their details and emotional content over time, which may lead to a decrease in negative effect (19).

Current Gap and Approach

Therefore, the COVID-19 pandemic and subsequent lockdown had a significant impact on people's memories, including those of current high school juniors or 11th-graders who primarily experienced the pandemic during elementary and middle school. Currently, the retention of memories from the COVID-19 pandemic for those who experienced it as children under the age of 18 has not been studied. Although Ford et al. studied positivity bias during the pandemic for young adults, middle-aged adults, and old adults, children were not included in the sample (15). Therefore, there is a need to study whether current high school students and those who experienced the pandemic as children retain more positive or negative memories from it to understand the impact of traumatic events on memory retention.

Thus, the gap in knowledge this study will address is the lack of research on the retention of positive and negative memories for those under the age of 18 during the 2020-2021 COVID-19 pandemic. It will do so by studying students at a high school, hereafter referred to by the pseudonym "Seacrest High School," who previously attended a particular elementary school, hereafter referred to by the pseudonym "Northpine Elementary School." This gap will be further investigated in this paper with the following research question: *How did the COVID-19*

pandemic impact the retention of positive and negative memories of school from 2020-2021 for current Seacrest High School juniors who attended Northpine Elementary School?

Hypothesis

Based on the current literature, autobiographical memory is primarily biased toward positive emotional memories, suggesting that positive memories will be more frequently recalled (19). Additionally, young adults agreed with more positive than negative statements in a positivity bias study, despite not exhibiting the positivity effect (16). Thus, the hypothesis for this study is that current juniors from Seacrest High School will have retained more positive than negative memories of school from 2020-2021 during the COVID-19 pandemic.

METHODS

Research Design

The purpose of this study was to investigate whether students retained more positive or negative memories of school from 2020-2021 during the COVID-19 pandemic. Institutional Review Board approval was obtained before the study began, as was informed consent from the parents and guardians of the student participants; moreover, all participant data was de-identified to protect participant confidentiality by using pseudonyms for all participant names.

For this study, “negative memories” were defined as memories associated with negative emotions, such as sadness, fear, and anger; while “positive memories” were defined as memories associated with positive emotions, such as happiness, hope, and excitement. These definitions were largely derived from Ford et al.’s definitions of “positive aspects” as including feelings of “community, hope, and interconnectedness,” and “negative aspects” as including feelings of “fears, social isolation, and financial uncertainty” (15). This study focused on current high school juniors who were in elementary school when the pandemic first began. Although these students were in high school during data collection, they drew on their memories from 2020-2021, when they were in elementary and middle school as 5th and 6th-graders. Due to the qualitative nature of this study, it did not include traditional independent and dependent variables; instead, it focused on students’ memories as the primary variable.

In order to explore the retention of students’ memories of school during the pandemic, a small-scale phenomenological study was conducted. While survey research also appeared to be a strong methodology option, Leedy and Ormod found that phenomenological research aims to understand participants’ perspectives on events, while survey research’s goal is to determine the frequency or distribution of population characteristics (20). As the goal of this study was to understand the participants’ lived experiences, a qualitative research methodology was necessary, and as survey research is primarily quantitative, phenomenological research was a better alternative. Phenomenological research also involves interviews, which are generally more useful for gaining in-depth information about participants’ experiences than surveys, as surveys often yield shorter responses to open-ended questions.

To recruit participants, flyers about the study were posted around Seacrest High School. When students scanned the QR code on the flyer, it led them to an interest form that asked for their contact information, provided a brief overview of the study, and determined their eligibility.

After they had filled out the interest form, eligible students were emailed to ask whether they were still interested in participating in the study. Upon receiving confirmation, their assent was requested via the Student Assent Form, and their parents’ or guardians’ consent via the

Parent/Guardian Consent Form. Once assent and consent had been received, the student was emailed again to schedule a one-on-one in-person interview at a public library. During the interview, participants were asked questions about their experiences, memories, and feelings from the COVID-19 pandemic from 2020 to 2021.

After conducting the interview, the recordings and the transcripts generated by Otter AI, an automatic transcription tool, were reviewed and refined by playing back the recordings and manually correcting any errors or discrepancies in the transcripts. Although it was planned for notes to be taken during interviews and reviewed afterward for any participants who did not give permission for Otter AI to be used, no participants refused the use of Otter AI, so Otter AI generated transcripts and recordings for all participants that were later reviewed. Finally, the information from the interviews was synthesized, and a qualitative deductive coding analysis was conducted on the transcripts.

In order to protect participants' privacy, pseudonyms were used for participants' names when sharing results to keep their identities anonymous. Aside from participants' genders, which were reflected in their pseudonyms, all personally identifying information was removed. Additionally, the recordings and transcripts of interviews were kept securely on a password-protected phone, with access restricted to ensure data security. Re-identification risk was minimized by removing nonessential contextual information and details that could potentially permit deductive identification.

Sampling. Seacrest High School juniors who attended Northpine Elementary School were eligible to be participants. This unit of analysis was appropriate because focusing on Northpine Elementary School alumni standardized the school experiences of all participants from 2020-2021, preventing some participants from leaning toward recalling either positive or negative memories due to different school experiences. Moreover, focusing solely on Seacrest High School juniors who attended Northpine Elementary School further narrowed the study's scope. Additionally, juniors from Seacrest High School were specifically chosen because the pandemic affected students of every grade differently, so focusing on one grade ensured that the findings reported were not generalized to groups that might not have had the same experiences.

8 participants were recruited, which fits within Ahmed's recommended sample size of 5-25 participants for phenomenological research (21). Thus, the first 8 students who followed the steps to participate in the study were chosen. A sample of 8 participants was considered appropriate because qualitative saturation was achieved, with the latter interviews yielding recurring themes rather than novel concepts, suggesting that the sample size used was adequate. Moreover, each interview maintained significant thematic depth, with participants providing detailed accounts of their lived experiences.

Limitations

One limitation of this study was the possibility of participants not retaining memories from the pandemic. If during the interview a participant claimed not to recall anything, this was addressed by continuing to ask relevant interview questions to gather data on what, if anything, they did remember. This was also noted as a limitation in the paper's study findings.

Additionally, participants may have had unconscious bias in the memories they recalled, which could have skewed the results regarding whether they remembered more positive or negative memories and why. For example, participants may have recalled more positive

memories from the pandemic if their most recent memories of the pandemic were positive, suggesting that it is easier to recall more recent memories rather than highlighting a tendency to recall more positive or negative memories from the pandemic. This bias was mitigated by asking participants to consider as wide a range of their pandemic memories as possible.

Moreover, this study was limited by the specific participant demographics. Although the study aimed to include participants of both genders, all potential participants who followed the steps to participate were female, resulting in a sample consisting solely of females.

Ethical Considerations

One ethical concern this study had was the potential to cause psychological harm to participants if they remembered traumatic experiences they had during the COVID-19 pandemic. To mitigate the potential for harm, participants were not required to share any experiences they were not comfortable discussing. Moreover, at the start of each interview, the participant was given a brief overview of what would be discussed and told they could stop at any time if they were uncomfortable answering a question or would like to skip it.

Another ethical concern arose from the recording and transcription of the interviews using Otter AI. Using AI to generate transcripts of potentially sensitive information raised ethical concerns and was a limitation, but this were mitigated by reviewing the interview recordings and manually editing the AI-generated transcripts to ensure accuracy and remove personally identifiable information. Additionally, participants were encouraged not to share any information they would not be comfortable with being transcribed by AI during the interview. Students and parents/guardians were also offered the option to opt out of their interviews being recorded and transcribed by Otter AI within the consent and assent forms. If they chose not to have the interviews recorded and transcribed using Otter AI, the interviews would not have been recorded or transcribed, and notes would have been typed manually during the interview; however, no participants chose this option. For students and parents who consented to their interviews being recorded and transcribed with Otter AI, the student participant was also reminded at the start of their interview that their interview was being recorded with AI, providing them with another opportunity to refuse recording.

RESULTS

A deductive coding analysis was performed on the qualitative data collected through interviews on the basis of three pre-set themes that were identified from a review of the literature in the field: Positive memories and sentiment, Negative memories and sentiment, and Neutral memories and sentiment. All three themes were chosen after careful consideration of the patterns that existed within previous literature. In accordance with the deductive coding process, after identifying these three themes, the transcripts were reanalyzed to identify instances of each theme.

Ford et al. found that participants tended to focus more on the negative than the positive aspects of the pandemic, and that older age correlated with a stronger focus on the positive aspects (15). Thus, the qualitative data in this study was coded to analyze whether the participants recalled more “positive” or “negative” memories from school during the pandemic. Similarly, Aizpurua et al. concluded that older adults recalled more positive than negative content and that young participants were more likely to repeat negative statements than older

adults (16). As this study also involved relatively young participants who were in fifth grade at the onset of the pandemic, the “Negative memories” and “Positive memories” codes were established to determine which one participants were more likely to recall. Additionally, Hjuler et al.’s findings on how memory content about the COVID-19 pandemic over time caused decreases in both Positive Emotional Tone and Negative Emotional Tone led to the development of the codes “Positive sentiment” and “Negative sentiment,” which were added to this study and grouped with the other codes of “Positive memories” and “Negative memories” (19). Moreover, Aizpurua et al.’s finding that older participants occasionally transformed initially positive or negative statements into neutral ones led to the creation of the “Neutral memories and sentiment” code (16). Each code was also limited to memories and sentiments from school during the pandemic, given the scope of the research question.

Positive Memories and Sentiment

Overall, 32 positive memories of school from the COVID-19 pandemic were retained from 8 participants. 3 participants (Sasha, Jennifer, and Ella) recalled their last few days of school before the start of distance learning positively. These students described how they were originally excited for distance learning, as they then believed distance learning would be a fun and short experience, leading them to recall excitement as a positive sentiment from the few days before distance learning began. For instance, Jennifer stated that she recalled her and her friends “Just being at school during lunch and like, wanting school to get canceled and being like, ‘I’ll see you in two weeks. See you in two weeks.’ [...] But like, so much, you know, talking, and then, like, packing up and being excited.”

Others described positive experiences that they had had during the pandemic, including 2 participants (Isabella and Reagan) who recalled their fifth-grade graduation ceremony positively, and 1 participant (Olivia) who noted spending time with friends online during classes. Participants also described other perceived benefits of the pandemic; for instance, 1 participant (Reagan) noted that the pandemic helped her learn to use technology better. Another (Kara) described how distance learning taught her maturity and responsibility, in addition to allowing her to spend more time with her family and learn the value of building stronger relationships: “I think I appreciate it now, like five, six years later, because I think it did a lot to like my personal growth journey and like forced me to be more mature and responsible, then maybe I would have been if it hadn’t happened.”

Negative Memories and Sentiment

Conversely, 4 of the students (Sasha, Ella, Jennifer, and Olivia) mentioned feeling as if school during the pandemic didn’t matter and not caring about doing what they were supposed to or about their grades because the experience did not feel like they were actually in school. Additionally, 5 participants (Sasha, Jennifer, Olivia, Ella, and Kara) felt extremely bored due to having nothing else to do, 1 (Reagan) stressed about adapting to a new learning environment, 4 (Reagan, Jennifer, Chloe, and Kara), felt lonely due to a lack of social interaction, and 4 (Sasha, Reagan, Olivia, and Isabella) were upset about missing events and experiences they were looking forward to.

One such experience that 4 out of 8 of the participants (Sasha, Reagan, Olivia, and Isabella) were upset about missing was the Outdoor Education experience in 5th grade (Figure 1). 3 of the 8 participants (Reagan, Olivia, and Isabella) recalled the anger and sadness they felt at the trip being canceled, while 1 participant (Sasha) reflected on her experience and stated

that while she originally did not want to attend, in hindsight, she wished that she had had the opportunity to do so. Reagan described how she felt about missing Outdoor Education, and how it impacted her perception of the pandemic: “I remember missing Outdoor Ed. I was really upset that it [the initial COVID-19 pandemic lockdown] was going to be like the week we were supposed to be going. I literally, like, practiced rolling my suitcase around the house like they told us to do. And I was really excited, because my family is, like, really big on camping. And then I remember when they were, like, closing the schools and stuff, and we had to stay home. That was definitely like, the first thing I think that I was disappointed about that really hit like, ‘Oh, this is gonna, like, have a big impact.’”

Moreover, 5 of the 8 participants (Sasha, Jennifer, Olivia, Ella, and Kara) described feeling bored during the pandemic (Figure 1) and expressed negative feelings about the boredom they experienced. In addition to feelings of boredom, 4 participants reported feeling that nothing was important or engaging during school (Sasha, Olivia, Jennifer, and Ella), leading many of them to take a disinterested view of school, as they felt their effort did not matter. Sasha noted how her feelings around grades shifted during the pandemic due to the boredom she felt: “I wasn’t very educationally focused, which is a contrast to how I was like as soon as we got back from COVID, and how I was like in early elementary school. Because I did care a lot about my grades, and I still care a lot about my grades, but I remember during, like, sixth grade and COVID, it didn’t matter to me, and I didn’t care about classes, because it was, like, all easy stuff and all busy work.”

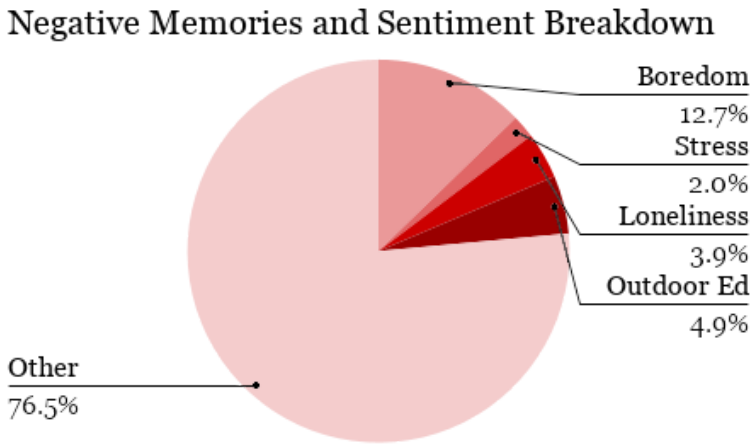

Figure 1. *Chart showing the breakdown of coded negative statements representing negative memories and sentiment that participants recalled. Of the 102 statements coded as Negative memories and sentiment, 13 mentioned boredom during the pandemic, 2 mentioned stress, 4 mentioned loneliness, and 5 mentioned Outdoor Ed. The “Other” category consists of all other negatively coded memories that did not fit into one of the other marked categories.*

Overall, 102 negative memories were retained across the study, highlighting how participants recalled far more negative memories and sentiment from school during the pandemic than positive memories and sentiment. However, this trend is not reflected in every individual’s experiences, as 1 participant (Chloe) maintained more positive than negative memories.

Neutral Memories and Sentiment

Few similarities were found between participants' memories and sentiment, which is a limitation of this study. Although no specific neutrally-coded memories, experiences, or feelings were mentioned across participant interviews, several patterns emerged in the types of memories that were coded as neutral from participant to participant.

Memories that students did not recall well were primarily coded as neutral, as were experiences that they later felt had become normalized during the pandemic. Additionally, 4 of the 8 participants (Reagan, Jennifer, Chloe, and Kara) noted differences between the experiences they believed that they would have had in person and those they did have online during distance learning. These statements used terms that did not express any particular positive or negative sentiment or feeling, and were therefore grouped as neutral.

DISCUSSION

The results of this study showed that negative memories retained often involved feelings of anger, difference, boredom, and loneliness, particularly in relation to events participants missed out on due to the pandemic. Conversely, positive memories retained were related to early feelings of excitement at the onset of the pandemic regarding distance learning and positive experiences, such as the participants' 5th-grade promotion ceremony. The primary finding of this study was that participants retained more negative memories than positive, which does not support the hypothesis that participants would retain more positive memories than negative to be wrong.

In this study, negative experiences remained far more consistent in participants' memories than positive experiences, which aligns with Porter and Peace's findings that positive emotional memories tend to deteriorate over time, unlike traumatic memories (13). Traumatic memories also remained more consistent than positive memories for approximately 3 years in participants' minds in Porter and Peace's study, supporting the idea that traumatic and negative memories are better retained than positive memories (13). This pattern of increased recall of negative experiences among younger age groups has been observed in both this study and previous ones, as evidenced by Aizpurua et al.'s finding that young people had a better recall of negative content about the COVID-19 pandemic than older and middle-aged adults (16). This aligns with the findings of this study, as this study found that young adolescents remembered far more negative than positive content regarding the COVID-19 pandemic.

Participants in this study also described feeling upset about missed experiences, bored and indifferent during school, and lonely during distance learning. Similar feelings are mentioned by Fivush, who describes how participants in their own study reported feelings of loneliness, isolation, and a lack of motivation as a result of the pandemic, which all aligned with the sentiments expressed by participants in this study (17). NYU Langone Health also highlights similar patterns in negative feelings, stating that children under the age of 10 may have reacted to the pandemic by feeling more sad, hopeless, irritable, angry, and numb, some of which were either mentioned outright by participants or alluded to within this study (3).

However, Fivush also claims that one positive experience their students recalled from the pandemic was a better understanding of the value of familial relationships, an idea also mentioned by a participant in this study (Kara) and coded as a positive memory for her (18). Additionally, participants in this study specifically mentioned being excited about distance learning at the onset of the COVID-19 pandemic; however, no prior research on this topic was found.

CONCLUSION

This study aimed to understand whether current high school juniors retained more positive or negative memories of school from during the COVID-19 pandemic. One of the primary findings from this study was that participants tended to recall more negative than positive memories, which was consistent with Porter and Peace's findings that traumatic memories are more consistent over time than positive memories, as well as Ford et al.'s and Aizpurua et al.'s claims that younger people recall negative content better than older adults do (13, 15, 16). Additionally, this study addressed the gap in literature regarding the lack of research on memory retention from the COVID-19 pandemic for those under 18, as key findings from Ford et al. and Aizpurua et al. were only applicable to adults (15, 16).

Future studies should include more research on adolescent memories and general feelings at the onset of the pandemic, which can be placed in conversation with study findings regarding memories retained. Future research should also address the limitation of a lack of memories retained by providing more detailed prompts when asking interview questions to help stimulate participants' memories, as well as by altering questions to focus more on the general sentiment surrounding the pandemic.

Moreover, as this study included only female participants, specifically recruiting participants of diverse genders in future studies would help yield more generalizable and thorough results. It would also likely be beneficial for future researchers to aim to recruit more participants for greater accuracy and more generalizable results. By doing so, further work in this area may lead to a better understanding of the relationship between memory and trauma, which can be applied to potential future research regarding counseling and therapeutic services for adolescents and children.

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