Flashbulb Memories Among College Students During COVID-19

Sabah Qureshi
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FLASHBULB MEMORIES AMONG COLLEGE STUDENTS DURING COVID-19

by

SABAH QURESHI

A thesis submitted in partial fulfillment of the requirements for the Honors in the Major Program in Biomedical Sciences in the College of Medicine and in the Burnett Honors College at the University of Central Florida Orlando, Florida

Spring Term, 2022

Thesis Chair: Valerie Sims, Ph.D.
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ABSTRACT

Flashbulb memories are formed through widely shared events that have affected the culture and community. The “flash” in flashbulb memories refers to the specific details that individuals have developed in their memories. The presented research focuses on the specific event of college students at the University of Central Florida (UCF) hearing about university closure due to the COVID-19 pandemic. This research study sought to identify the variables that have affected the accuracy of flashbulb memories formation regarding the event of college students hearing about university closure because of the pandemic. The variables of the students’ relevance to the university, location, source of hearing about the university’s closure, and political group they belong to were investigated to determine if they affected the accuracy of the memories that were developed. An online survey was sent to students inquiring about the specifics and details that they remembered when finding out that the university was closed and was going to move to remote instruction. Participants included 226 college students who filled out the survey between February 3, 2021, and July 21, 2021. The survey included questions regarding the experiences of students when they learned about COVID-19 and university closure. Data revealed that a greater relevance to the event can cause a greater amount of rehearsal and recall of memories. The rehearsal and recall of memories are crucial variables to developing accurate flashbulb memories. This study contributes to the lack of research in flashbulb memories associated with pandemics. The study will be an addition to determining variables that have affected the accuracy of flashbulb memories.
ACKNOWLEDGEMENTS

I would like to thank my amazing thesis committee for all the support and inspiration they have provided. I want to recognize Dr. Valerie Sims for introducing me to various fields in psychology, including the concept of flashbulb memories, which became the foundation of this study. A special thank you for the time and effort you have put into this study as my thesis chair and for always supporting my interests in research. I would also like to thank Pamela Thomas for always supporting my endeavors, believing in me, and for fostering my growth in accomplishing my goals. Additionally, I would like to thank Dr. Chrysalis Wright for enlightening me that regardless of the hardships that are faced, it is possible to work through them to reach our goals.

I would like to acknowledge all the participants who took the time and effort to answer the survey for the study. This study would have not been possible without the detailed and thoughtful answers that the participants provided.

Thank you to my parents, Sohail Qureshi and Mahamuda Qureshi, who have supported me and have been my motivation to complete this study. I would also like to show appreciation to my significant other, Marco Yanez, for always showing me how proud he is of me and ensuring me that everything is going to be okay.

Lastly, I would like to recognize Stephanie Coutinho, thank you for being my undergraduate research assistant. Thank you for your hard work in data analysis and coding. This study would have not been possible without your contribution and your hard work does not go unnoticed.
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CHAPTER ONE: INTRODUCTION

COVID-19 is known as the Coronavirus disease that was seen in 2019 as a result of the SARS-CoV-2 virus. The first cases of COVID-19 in the United States were reported in January 2020. It was March 2020, where drastic precautions were taken such as state lockdowns and curfews were in effect. Citizens everywhere were in panic and in a state of shock. They took necessary steps such as stocking up on masks, hand sanitizers, gasoline, and groceries. Following spring break, the University of Central Florida announced that campus will be closed for two weeks. The temporary two-week shutdown turned into the remaining of the semester and majority of the following semesters to be continued online. Many students, faculty, and staff at the time did not realize that the way of education and the world was going to change forever. Many individuals felt strong emotions when learning about the changes of the shocking news about the events around them. This brings us to the question of if the COVID-19 pandemic would cause significant changes to the daily lives of students and be enough to cause flashbulb memories.

Flashbulb memories are memories that are developed during large culturally shared events and individuals tend to be confident about the vivid images that they remember (Brown and Kulik, 1977). The flash in the term flashbulb memory refers to the flash of a camera since the memories are known to be extremely vivid such as in a snapshot of a photograph. Individuals were confident but they were not always accurate in recalling flashbulb memories. They were found to sharpen, level, and add other changes to their memories (Mcloskey, Wible, & Cohen, 1988). Individuals with flashbulb memories have also been seen to lose the most information and emotion from their formed memories within the first year of the associated event occurring (Hirst et al., 2015).
One of the reasons for this study was to see what students can remember about COVID-19 when they first learned about it. We are looking to determine if students have clear and vivid memories, known as flashbulb memories, about the pandemic. We are also seeking to find trends in any variables associated with the COVID-19 pandemic that can potentially affect memory formation of students. Although there have been many research studies on flashbulb memory, there has been a lack of research studies conducted on flashbulb memories associated with COVID-19. This research can examine the different variables that are correlated to the memory formation of college students during the pandemic. This research is unique as a part of flashbulb memory studies since COVID-19 is an event that has been affecting individuals for a significant amount of time unlike other events that may have occurred over short periods of time.
CHAPTER TWO: LITERATURE REVIEW

Significant Scenarios of Flashbulb Memory History

Flashbulb memories were examined previously in several high-profile cases. A flashbulb memory that was examined was when the assassination of President Kennedy took place in 1963 and participants were asked about what they remembered about the event (Brown and Kulik, 1977). We will ask students in this study about what they remembered when they first heard about the COVID-19 pandemic. Another example was on January 28th, 1986, the challenger disaster was a space shuttle that exploded soon after takeoff. Participants were asked in a study within one week of the challenger disaster occurring and then asked them again 9 months later (Neisser & Harsch, 1992). This study consisted of five questions inquiring the basics of where and what the participants were doing. When asked these same questions again 9 months later, only about 25% missed every single question and answered with a different response. Moreover, 85% missed one or more questions. This study argued that participants with flashbulb memories were confident but not accurate. Another study took a different approach and asked participants to share their story within a week of the challenger disaster and a year after (McCloskey, Wible, & Cohen, 1988). This study discovered many changes within the stories. Participants tended to sharpen and level their memories associated with the event. Participants were seen to partake in a phenomenon known as media intrusion where they added details to their stories. Many of these additions were details that the participants learned after the challenger disaster occurred. Participants were also seen to use memory schemas of their daily lives to add in details to their stories. When the schemas were investigated further, some of the details were never true to begin with. The question that developed was if the participants were accurate in recalling their
memories. In this research study, we asked specific dates of when university closure was announced so that we can measure how accurate they were in their flashbulb memories.

An additional example of an event that was associated with flashbulb memory was the Loma Prieta earthquake. The earthquake took place near the Santa Cruz and San Francisco Bay region during rush hour. The damage resulted in broken highway bridges and less deaths occurred than expected. This was most likely due to the World Series of 1989 taking place at the same time. Many people may have gone home early to watch the game. Participants who lived near the Santa Cruz and the East Coast were recruited in a study (Neisser et al., 1996). The participants who lived in the East coast often had a relationship to California such as having friends and family from there. However, the study also recruited people from the East Coast who had no relationship to California. The interviews of the participants took place one to two weeks after the earthquake and one year later. The results of the participants who lived in Santa Cruz were that they remembered the details of the event very well after a year has passed. This was because these participants in this area underwent repetitive rehearsal where they had to tell their story multiple times. These participants were highly aroused by the relevance the earthquake had in their area. The researchers found that the rehearsal of these memories led to better recall. The participants who lived on the East Coast and had ties to California also performed well at remembering the details of the earthquake. This was due to the rehearsal they may have participated in when they explained their stories. The participants who had no ties performed poorly on recalling the details after a year since they did not take part in rehearsal. The study showed that the factors of rehearsal, arousal, emotional, and physical closeness to the event had severe effects to their memories. Since COVID-19 is a pandemic that has been affecting students for a long time, we can examine if the amount of rehearsal, arousal, and emotional closeness
influenced the level of detail and formation of flashbulb memories. We determined if students that had greater relations with the university recalled the date of university closure more accurately.

The falling of the twin towers on September 11th, 2001 in New York City, was a tragic event that triggered many individuals to develop flashbulb memories. Participants were recruited in a study to examine their flashbulb memories associated with 9/11 and were interviewed again during a ten-year follow-up (Hirst et al., 2015). The study concluded that participants lost most information from their memories within the first year of the occurred event. Over time, the participants were also found to lose emotion and were able to talk about the details of the event more thoroughly. This study noted that the location did not matter since New York is well-known by many individuals. These findings are significant to this research study because we determined if location of where students discovered the news of COVID-19 and university closure caused a significant impact on the flashbulb memories they have formed.

There are additional studies that show that flashbulb memories can fade over time. For example, a research study focused on the vividness and elaborateness of memories that gay men have experienced when dealing with the death of their loved ones due to AIDS (Mahmood, Manier, & Hirst, 2004). The study gathered data from participants that involved the first death they experienced and the most recent death they experienced. The study’s results showed a trend of the participants earlier memories being significantly less vivid than their recent memories. The study also supported those emotional memories, perhaps flashbulb memories, are just as susceptible to decay as ordinary memories are. However, the study noted that emotional memories are more likely to decay at a slower rate than other memories. In my research study,
we examined the accuracy of the flashbulb memories from students caused by the changes from COVID-19.

Overall, it is seen that flashbulb memories can occur in large events that are culturally shared and tend to be vivid memories where individuals appear confident in what they remember but may not always be accurate. Flashbulb memories may fade over time likewise to ordinary memories and become less vivid. However, flashbulb memories can also be seen to form in personal events, such as a first kiss. As seen in the previous mentioned examples of flashbulb memories, they are similar to ordinary memories because they need to be rehearsed. Individuals should be aroused to have a better memory of the associated event. The location of an event can have different effects on memory depending on the situation.

**Recent Research on Flashbulb Memories**

In recent years, there has been more insight to the formation of flashbulb memories. Flashbulb memories are not only described as vivid but also “salient memories for the moment one hears about a surprising, emotional, and a significant event” (May, Dein, & Ford, 2020). Participants were recruited in a study to complete an online survey to collect the stories of mothers who found out that their child received a diagnosis of Down syndrome (May, Dein, & Ford, 2020). These surveys were completed anywhere from a month to 52 years after they have received the diagnosis. The importance of this research was that it established that flashbulb memories greatly depend on who delivers the diagnosis and in the manner that the information was received. For example, if someone from the medical staff delivered the diagnosis it was perceived less negative. It was also noted that support received from medical personnel when the diagnosis was delivered was a critical role in how mothers remembered the event and the extent
of details they remembered. These findings are relevant to my research study because we observed the source in how the students heard about COVID-19 and university closure to determine if there was an effect on the level of detail that they remembered.

In a recent meta-analysis, it was seen that the flashbulb memories of older adults were significantly less consistent over time than those of younger adults (Kopp, Sockol, & Multhaup, 2020). It was also seen that rehearsal was a critical factor in the retention of flashbulb memories. In my research study, we determined how closely students were relevant to UCF and how that has affected their rehearsal amount which in turn may have affected their memory formation.

In a recent article, the six canonical categories of flashbulb memories established by Brown and Kulik’s original findings were examined (Muzzulini et al., 2020). These canonical categories consisted of place, ongoing activity, source, own affect, affect in others, and the aftermath. However, this study claimed that examining flashbulb memories under these specific categories can be misleading. Although the researchers suggested to use free call reports when collecting data, they found that flashbulb memories caused a consistent remembrance of memories if they are a part of the canonical categories. In my research study, the survey incorporated multiple questions that targets all of the six categories of flashbulb memories. The survey included various written response questions to allow the students to write their flashbulb memories. We expected that this will aid in the recall of student’s flashbulb memories when they write about them as their answers to the survey.

In another recent study, flashbulb memories were observed in terms of memberships in social groups (Talarico, Bohn, & Wessel, 2019). The Fukushima nuclear disaster happened on March 11th, 2011, and this became a relevant topic in political conversations in Germany and the
Netherlands. While the Germans believed that nuclear energy was dangerous, the Dutch supported nuclear power. The opposing beliefs of these social groups with differing national identities played an important role in the formation of their flashbulb memories. The Danish participants were seen to find this disaster irrelevant. However, the German participants were more likely than the Danish participants to develop flashbulb memories. In my research study, we asked participants which social groups they belong to, such as stating their political affiliation. This allowed us to analyze if a particular social group developed more accurate flashbulb memories than other groups.

**Research on Prior Pandemic Responses**

Even though the pandemic of 1918 was a century ago, the precautions that were taken for the Spanish Flu was very similar to the responses to COVID-19 (Schwartz, 2018). For instance, precautions such as school closures, limitations on large gatherings, and quarantine were all key concepts in combatting the Spanish Flu. Moreover, the influenza pandemic of 2009-2010, known as the Swine Flu, has also taken similar precautions such as school closures (Schwartz, 2018). A research study recruited college students to complete surveys between the peak of the flu season and when the media was focused on the impacts to health (Wheaton et al., 2012). The results of the studied showed that the college students faced feelings of anxiety regarding health, contamination, and disgust sensitivity.

Furthermore, during the Ebola outbreak in 2014, similar precautions such as placing restrictions on public gatherings and closing schools took place (Schwartz, 2018). A research study recruited university students to assess their fears of Ebola, safety behavior performances, knowledge of the virus, and other variables that were used to predict fears related to Ebola
(Blakey et al., 2015). The study revealed that the fears that students had were not necessarily related to contracting Ebola. Instead, the fears were related to “general distress, contamination cognitions, disgust sensitivity, body vigilance, and anxiety sensitivity-related physical problems” (Blakey et al., 2015).

Overall, there has been research that established how precautions were taken in response to pandemics. Although, there has been some research analyzing the anxiety that people have experienced as a result of the pandemics, there has not been significant research on memories that are associated with the pandemic of COVID-19. More specifically, there has not been significant research conducted on flashbulb memories formed as a consequence of a pandemic.

**Purpose Statement**

The history of flashbulb memories has contributed significant information about the formation of memories. We have seen that flashbulb memories may not always be accurate even if they seem confident. We have noted that flashbulb memories are not as special as they seem to be. This is because similar to ordinary memories, flashbulb memories need to be rehearsed and individuals need to be aroused emotionally to recall the vividness and to be able to elaborate on their memories. Also, likewise to ordinary memories, flashbulb memories are susceptible to decaying over time. The location and relevance of an event are important factors that affect the formation of flashbulb memories. The social group that someone is a member of can affect whether an individual will form flashbulb memories. Other crucial factors that are associated with flashbulb memories are the source that delivered the information and the support they received during the event.
There has been many pandemics such as the Spanish Flu, Swine Flu, and Ebola before the COVID-19 pandemic. All of these pandemics had similar responses when taking precautions and responding to the outbreaks. It was revealed that many had high levels of anxiety due to the stress and fears of the pandemics they have faced.

However, my research study aims to combine the memory mechanism of flashbulb memories and apply them to the memories that students may have formed during COVID-19. This study will be able to contribute to the research among flashbulb memories in response to a pandemic. There is a lack of research in flashbulb memories and COVID-19. The data collected through the surveys will examine the formation and the characteristics of the flashbulb memories students may have developed. This study aimed to determine if the variables such as relevance, recall, location, age, social group, and method of communication have affected flashbulb memories associated with the pandemic of COVID-19.

**Theory**

Based on the literature review, this study has accumulated a few hypotheses that will be examined. Studies have shown that individuals with flashbulb memories regarding a particular event were not always accurate in their memories of the events that have taken place (Neisser & Harsch, 1992). Students may have encoded specific events, dates, and times about the moments where they found out that COVID-19 was causing drastic effects on their daily lives such as campus closing for the following semesters. This leads to the hypothesis that the greater half of the students were not accurate in recalling the date of the university closure.

Research studies have determined that a greater rehearsal of events due to the relevance of the event to the individual may have led to better recall of certain flashbulb memories (Neisser
et al., 1996). Students at UCF will be emotionally closer to the event of university closure due to COVID-19 than students who have not attended UCF yet (incoming freshmen or transfer students). This idea contributes to the hypothesis of students who were currently attending UCF will have a greater rehearsal and therefore, remembering the university closure date more accurately than the students who did not attend UCF at the time.

A study on flashbulb memories associated with the event of 9/11 established that since a popular destination such as New York City is well-known, the location of where individuals found out about the event did not significantly affect how well they recalled their memories (Hirst et al., 2015). Since UCF is not as well-known or as popular as New York City, the hypothesis of location playing a role in memory formation is formed. Students who were not near or relevant to UCF will not have remembered the university closure date as accurately as the students who were close to the location of UCF.

A study has shown that the source of how the information was received regarding an event may affect the recall and the quality of information individuals remember (May, Dein, & Ford, 2020). The source of how they were notified that the university would close due to COVID-19 may have had a significant effect. This forms the hypothesis that students who have received the news of university closure through an official communication method of UCF will more accurately recall the date of the closure.

It has been discovered that the social groups individuals belong to can affect the accuracy and the formation of flashbulb memories (Talarico, Bohn, & Wessel, 2019). It was detected that Democrats were seen to be more concerned with the COVID-19 pandemic than Republicans as a higher percentage of Democrats showed fear of contracting COVID-19, requiring
hospitalization, and spreading COVID-19 unknowingly to others (Thomson-DeVeaux and Wiederkehr, 2020). This finding forms the hypothesis that students who identified as Democrats may have encoded the university closure date more accurately than other political affiliations. This may be due to Democrats having a higher level of concern regarding the COVID-19 pandemic.
CHAPTER THREE: METHODS

Participants

A total of 226 students participated in the study. Participants who took part in this study were required to be 18 or over. Participants were recruited from UCF through the Psychology Department’s SONA website, https://ucf.sona-systems.com/. The participants were undergraduate students and included a diverse background and population. The average age of the participants was 20.504 years, SD = 4.067 years. The survey included 155 females and 71 males. The tables below can be examined for additional details regarding the participants. Table 1 contains details on the age of the participants. Table 2 provides the percentages of the biological sex of the participants. Table 3 shows the percentages of the participants academic standing in college such as identifying as a freshman, sophomore, junior, or senior. Table 4 includes the percentage of the participants political affiliation such as Democrat, Republican, Independent, not registered to vote, or if they preferred not to say.

Table 1. Participants’ Age

<table>
<thead>
<tr>
<th>Age (N = 226)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
</tr>
<tr>
<td>Standard Deviation</td>
</tr>
<tr>
<td>Minimum</td>
</tr>
<tr>
<td>Maximum</td>
</tr>
</tbody>
</table>

Table 2. Participants’ Biological Sex

<table>
<thead>
<tr>
<th>Please identify your biological sex.</th>
<th>Frequency (N =226)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>155</td>
<td>68.584</td>
</tr>
<tr>
<td>Male</td>
<td>71</td>
<td>31.416</td>
</tr>
</tbody>
</table>
Table 3. Participants’ Academic Standing

<table>
<thead>
<tr>
<th>What is your academic standing?</th>
<th>Frequency (N = 226)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshmen</td>
<td>78</td>
<td>34.513</td>
</tr>
<tr>
<td>Junior</td>
<td>60</td>
<td>26.549</td>
</tr>
<tr>
<td>Senior</td>
<td>34</td>
<td>15.044</td>
</tr>
<tr>
<td>Sophomore</td>
<td>54</td>
<td>23.894</td>
</tr>
</tbody>
</table>

Table 4. Participants’ Political Affiliation

<table>
<thead>
<tr>
<th>Please share your political affiliation.</th>
<th>Frequency (N = 226)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Democrat</td>
<td>103</td>
<td>45.575</td>
</tr>
<tr>
<td>I am not registered to vote</td>
<td>17</td>
<td>7.522</td>
</tr>
<tr>
<td>Independent</td>
<td>44</td>
<td>19.469</td>
</tr>
<tr>
<td>Prefer not to say</td>
<td>32</td>
<td>14.159</td>
</tr>
<tr>
<td>Republican</td>
<td>30</td>
<td>13.274</td>
</tr>
</tbody>
</table>

**Materials**

**Qualtrics Survey.** The survey that was created for this study was used to assess if students formed flashbulb memories regarding COVID-19 effects to their professional and personal lives. This survey had a total of 59 questions and included the multidimensional health locus of control scale along with the VSA authoritarianism scale. The survey included demographic questions such as biological sex, gender, race, age, college status, and ethnicity. The average duration time to complete the survey was approximately 45 minutes. To avoid blank answers, students were required to fill in the answer to questions that had a written response component. The survey included questions when, where, and how the participants heard about their classes and campus closing due to COVID-19. The survey also included questions about the emotions of participants during the changes resulting from COVID-19. The aim of these questions was to target the flashbulb memories that students have developed to analyze their memories.
The scale is provided in Appendix A.

**Multidimensional Health Locus of Control Scale.** This scale was used in the survey to determine the beliefs participants had on how much control they had over their health. All items were answered on a seven-point scale (strongly agree, agree, somewhat agree, neither agree nor disagree, somewhat disagree, disagree, or strongly disagree). This scale was part four of the survey and included 18 questions. This scale was used for exploratory purposes in evaluating the effects of health beliefs on the flashbulb memories students have formed.

The scale is provided in Appendix B.

**VSA Authoritarianism Scale.** This scale was used in the survey to determine authoritarian personality traits among participants. All items will be answered on a seven-point scale (strongly agree, agree, somewhat agree, neither agree nor disagree, somewhat disagree, disagree, or strongly disagree). This scale was part five of the survey and included six questions. This scale was an exploratory item that can aid in assessing if personality traits played a significant role in the flashbulb memories students have developed.

The scale is provided in Appendix C.

**Procedure**

Participants were informed that they will be participating in a research study regarding memories that they may have formed about the beginnings of COVID-19. This study was conducted online, facilitated through the Department of Psychology’s SONA system. Participants completed the survey through the Qualtrics survey software on their personal device with internet access. To begin, participants read the informed consent. At the conclusion of the
informed consent, participants agree (by selecting “yes”) or disagree (by selecting “no”) to continue the study. Participants who agreed to continue the study advanced to the beginning of the study. Those who declined to participate were directed to the end of the study. All students who completed the survey were awarded 0.5 credits for their participation as a course requirement for their psychology classes.

Participants were asked a series of questions in the survey. The first part of the survey asked for participants’ age, sex, gender, academic standing, and political affiliation. The second part of the survey asked participants when, how, and where, they heard about their classes and campus closing due to COVID-19. In this section, participants responded to the questions by typing in their responses. The third part of the survey asked participants about the emotions they felt during the changes resulting from COVID-19 and how they have adapted to these changes. The fourth part of the survey examined the beliefs that participants may have about their health and identified the extent of control they believe to have over their health by using the multidimensional health locus of control scale. The fifth part of the survey examined the participant’s personality by asking questions from an authoritarianism scale adapted from the VSA scale. The last part of the survey asked about the general effects of COVID-19 such as the quality of education and hardships. Participants ended the survey by answering questions about their family, demographics, and zip codes.

Data Coding

In order to statistically analyze the data collected from the survey, some of the data needed to be cleaned and coded. The data was coded by two individuals where each individual went through the data independently at first to assign the data different codes. After each individual completed coding, the two coders came together to discuss any differences in their
analysis. The coders explained their reasonings and a mutual decision was reached to code the data.

The first item that was coded was the answer to the question “When did you hear about the news that UCF was closing for the remaining of the Spring 2020 semester due to COVID-19? Please try to estimate the SPECIFIC date you found out to the best of your knowledge without looking it up.” If students mentioned the dates from March 9th, 2021, to March 16th, 2021, then it was classified as code 1. This category is classified as the most accurate in remembering the dates for university closure. This range of dates included when official UCF announcements such as alerts, emails, and websites posted that the campus would be closed due to COVID-19. The next category included if students mentioned spring break 2021 or any date in March 2021. This category is the following most accurate in remembering when UCF released that they would be closed due to the pandemic and was coded as the number 2. The least accurate category was coded as the number 3 and included student response that mentioned any other dates that were not classified as code 1 or 2.

The next set of data that needed to be coded was the location that students found out about the university closure. The answers to the question “Where were you when you found out that UCF was closing for the rest of the semester?” was coded as 1, 2, 3, or 4. The code 1 category indicated that the student was at UCF or in the Orlando area when they found out about university closure. The code 2 category included students who identified being in Florida other than the UCF or Orlando area. The code 3 category composed of students who indicated that they were out of state from Florida or in a different country than the United States. The code 4
category included student responses that did not include a specified location of where they found
that the university was closing because of the pandemic.

Additionally, the data set that included the source of how the participants found out about
university was coded. The answers to the question “How did you find out UCF was going to be
closed? Please include if you found out from a friend, family member, UCF alert, the news,
social media or etc.” was coded as 1, 2, 3, 4, or 5. The code 1 category included responses that
were related to an official UCF announcement such as an email, alert text, advisor, professor, or
coach informing the student that the university was going to be closed. The code 2 category
included if the participants found out from social media that was not UCF affiliated. For
example, the code 2 category included Instagram, Twitter, Discord servers, Reddit, and
Facebook. The code 3 category included if the participants heard the news about university
closure from their family or friends. The code 4 category included if the participants found out
about university closure through news channels or news outlets. The code 5 category included if
participants who did not specify the source of how they found out about university closure, or the
source did not fall into one of the prior categories. For instance, if students found out about the
news of university closure through their workplace including their coworkers was placed into the
code 5 category.

The last set of data that was coded was the student’s relevance to UCF at the time of the
news declaring that UCF will be closed due to the pandemic. The answers to the question of
“What term and year did you start at UCF?” was coded as 1, 2, or 3. The category coded as 1
included responses that stated they attended UCF at the time of hearing about the university
closure. The category coded as 2 contained responses that they did not attend UCF at the time of
hearing about university closure. This included incoming freshmen or transfer students that were admitted to UCF and started their first term after the Spring 2020 term when UCF closed. The category coded as 3 included responses that indicated the participants first term at UCF was Spring 2020.
CHAPTER FOUR: RESULTS

Hypothesis One: Data analysis

In this study, hypothesis one predicted that most of the students will describe an inaccurate date from their memories of when university closure was announced. Table 6 displays that the least number of participants were classified as the most accurate category of code 1. It also shows that majority of the participants were placed in the less accurate categories of code 2 and 3. In Table 6, it is seen that 55 participants were classified as the most accurate category of code 1 (participants describing dates from March 9th-16th of 2020). There were 84 participants that were classified in the following most accurate category as code 2 (participants mentioning spring break or any date in March 2020). There were 87 participants in the least accurate category as code 3 (all other responses that are not a part of code 1 or 2).

<table>
<thead>
<tr>
<th>Cases</th>
<th>Frequency (N =226)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code 1</td>
<td>55</td>
<td>24.336</td>
</tr>
<tr>
<td>Code 2</td>
<td>84</td>
<td>37.168</td>
</tr>
<tr>
<td>Code 3</td>
<td>87</td>
<td>38.496</td>
</tr>
</tbody>
</table>

Hypothesis Two: Data analysis

In this study, hypothesis two predicted that participants who are more relevant to UCF will have a greater accuracy of the date they encoded in their memories of the university closure. Figure 1 exhibits that participants who were placed in the code 1 (students identified as a UCF student during Spring 2020) category had the most accurate date encoded \( (M = 1.863, \text{SD} = 0.694) \) with the lowest mean recorded. The figure shows participants who were in the code 3 (students identified that Spring 2020 was their first term at UCF) category had the second most accurate date encoded \( (M = 2.000, \text{SD} = 0.725) \). It also shows that participants who were
classified as code 2 (students identified not at UCF during spring 2020) had the least accurate date encoded \( (M = 2.405, SD = 0.779) \) with the highest mean recorded. A higher mean indicates that the date that were encoded were the least accurate, whereas a lower mean indicates the date that was encoded was more accurate. There were 95 participants in code 1, 111 participants for code 2, and 20 participants for code 3. Figure 1 below displays the relationship between the relevance of students to UCF and the mean date that the students encoded.

**Figure 1**

*Student Relevance to UCF vs. Date Encoded*

Furthermore, a one-way ANOVA test was conducted to determine if the relevance of the participants significantly impacted the accuracy of the date, they encoded for the university closure. Analyses from Table 7 indicated that the relevance of the participants to UCF had a significant impact on the accuracy of the date they encoded \( (F(2, 223) = 14.161, p < .001) \). In addition, post-hoc tests revealed that code 1 participants who were at UCF during Spring 2020 \( (M = 1.863, SD = 0.694) \) were more accurate than code 2 participants who were not at UCF.
during Spring 2020 ($M = 2.405, SD = 0.779$) or those who enrolled at UCF during Spring 2020 ($M = 2.000, SD = 0.725; p<.001$). The difference between code 1 participants and code 2 participants was significant. Table 7 below shows the results of the ANOVA test conducted to determine whether the students more relevant to UCF recalled the date of university closure more accurately and Table 8 below displays the post-hoc tests that were conducted.

Table 7. ANOVA of Hypothesis 2: Relevant Will Remember More Accurately

<table>
<thead>
<tr>
<th>Cases</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>UCF Relevance</td>
<td>15.491</td>
<td>2</td>
<td>7.746</td>
<td>14.161</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Residuals</td>
<td>121.978</td>
<td>223</td>
<td>0.547</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Mean Difference</th>
<th>SE</th>
<th>t</th>
<th>$P_{tukey}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code 1 Code 2</td>
<td>-0.542</td>
<td>0.103</td>
<td>-5.246</td>
</tr>
<tr>
<td>Code 1 Code 3</td>
<td>-0.137</td>
<td>0.182</td>
<td>-0.752</td>
</tr>
<tr>
<td>Code 2 Code 3</td>
<td>0.405</td>
<td>0.180</td>
<td>2.257</td>
</tr>
</tbody>
</table>

In this study, the word count to the question of “Describe any other details you can remember during the event when you found out UCF was closing because of COVID-19” was investigated. Figure 2 displays those participants in the code 1 category included the most details with the highest mean of word count ($M = 25.600, SD = 22.721$). Participants who were in the code 2 category included the following most details they wrote about ($M = 19.324, SD = 20.387$). Participants who were in in the code 3 category had the least detailed responses with the lowest mean word count recorded ($M = 15.500, SD = 13.020$). Figure 2 below illustrates the relationship between the relevance of students to UCF and the number of words they wrote in their answers.
Additionally, a one-way ANOVA test was conducted to determine if the relevance of the participants significantly impacted the word count, they included to the question about any other details they remember about university closure. Analyses from Table 9 indicated that the relevance of the participants to UCF had a significant impact on the word count to the question regarding additional details about university closure \((F(2, 223) = 3.248, p < .0041)\). Post-hoc tests showed that code 1 participants who were at UCF during Spring 2020 \((M = 25.600, SD = 22.721)\) included more details than code 2 participants who were not at UCF during Spring 2020 \((M = 19.324, SD = 20.387)\) or those who enrolled at UCF during Spring 2020 \((M = 15.500, SD = 13.020)\). The differences between code 1, 2, or 3 were not significant. Table 9 below examines the ANOVA test to analyze the relationship between the relevance of students to UCF and the word count of their answer and Table 10 shows the post-hoc tests conducted.

| Table 9. ANOVA of Hypothesis 2 Word Count: Relevant Will Remember More Accurately |
|-----------------------------------|----------------|-----|----------------|-----|
| Cases                            | Sum of Squares | df  | Mean Square    | F   | p   |
| UCF Relevance                    | 2838.907       | 2   | 1419.453       | 3.248| 0.041|
| Residuals                        | 97470.124      | 223 | 437.086        |     |     |

<table>
<thead>
<tr>
<th></th>
<th>Mean Difference</th>
<th>SE</th>
<th>t</th>
<th>P_{tukey}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code 1</td>
<td>Code 2</td>
<td>6.276</td>
<td>2.922</td>
<td>2.148</td>
</tr>
<tr>
<td>Code 1</td>
<td>Code 3</td>
<td>10.100</td>
<td>5.143</td>
<td>1.964</td>
</tr>
<tr>
<td>Code 2</td>
<td>Code 3</td>
<td>3.824</td>
<td>5.079</td>
<td>0.753</td>
</tr>
</tbody>
</table>

**Hypothesis Three: Data analysis**

Hypothesis three made the prediction that participants who were further away from UCF would have a less accurate date encoded for university closure than students who were located closer when first hearing about the closure. There were 21 participants in code 1 (located in the UCF or Orlando area), 32 participants in code 2 (located anywhere in Florida outside of Orlando), 17 participants in code 3 (located out of state or country), and 156 participants in code 4 (did not specify their location). Figure 3 exhibits that participants classified in the code 3 category encoded the most accurate date of university closure ($M = 1.824, SD = 0.883$). Participants placed in the code 1 category was the following most accurate in the date they encoded for university closure ($M = 1.905, SD = 0.625$). Participants who were from the code 2 category were the following most accurate after code 1 of the date they encoded ($M = 2.063, SD = 0.716$). Participants in code 4 had the least accurate date encoded ($M = 2.224, SD = 0.792$). Figure 3 below displays the relationship between the location of the student when they found out about university closure and how accurate the date, they encoded was for university closure.
Moreover, a one-way ANOVA test was conducted to determine if the location of where participants found out about university closure significantly impacted the accuracy in the date they encoded. Analyses from Table 11 indicated that the location of the participants to UCF did not have a significant impact on the date they encoded about university closure ($F(3, 222) = 2.313, p = 0.077$). Table 11 shows the ANOVA test results conducted to determine the relationship between the location of the student when they heard about university closure and the accuracy of the date they encoded.

<table>
<thead>
<tr>
<th>Cases</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>4.166</td>
<td>3</td>
<td>1.389</td>
<td>2.313</td>
<td>0.077</td>
</tr>
<tr>
<td>Residuals</td>
<td>133.303</td>
<td>222</td>
<td>0.600</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Hypothesis Four: Data analysis**

Hypothesis four predicted that participants who found out through an official UCF source of communication would have a more accurate date encoded about university closure. There were 98 participants in code 1 (official UCF announcements), 29 participants in code 2 (social media), 72 participants in code 3 (family and friends), 9 participants in code 4 (news channels or outlets), and 18 participants in code 5 (other or did not specify). Figure 4 displays that participants in code 2 had the most accurate dates encoded ($M = 1.793, SD = 0.819$) than participants in code 1 ($M = 2.010, SD = 0.753$), participants in code 3 ($M = 2.250, SD = 0.746$), participants in code 5 ($M = 2.667, SD = 0.686$) and participants in code 4 ($M = 2.778, SD = 0.441$). Figure 4 below shows the relationship of the source of how students found out university closure and the accuracy of the date they encoded.

**Figure 4**

*Source of How Students Heard about University Closure vs. Date Encoded*
In addition, a one-way ANOVA test was conducted to determine if the source of how participants heard about university closure had a significant impact on the accuracy of the date they encoded. Analyses from Table 12 indicated that the source of how participants heard about university closure had a significant impact on the accuracy of the date they encoded ($F(4, 221) = 6.598, p < .001$). Post-hoc tests showed that code 1 participants ($M = 2.010, SD = 0.753$) and code 2 ($M = 1.793, SD = 0.819$) significantly encoded the date of university closure more accurately than code 5 participants ($M = 2.667, SD = 0.686; p < .05$). It is seen that code 2 participants ($M = 1.793, SD = 0.819$) significantly encoded the date of university closure more accurately than code 4 participants ($M = 2.778, SD = 0.441; p < .05$). Table 12 shows the ANOVA test that was conducted to assess the relationship of students who found out through official UCF sources and how accurately they encoded the date. Table 13 shows the post-hoc test that were conducted.

Table 12. ANOVA of Hypothesis 4: Official Sources Will Remember More Accurately

<table>
<thead>
<tr>
<th>Cases</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source</td>
<td>14.665</td>
<td>4</td>
<td>3.666</td>
<td>6.598</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Residuals</td>
<td>122.804</td>
<td>221</td>
<td>0.556</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 13. Post-Hoc Test of Hypothesis 4: Official Sources Will Remember More Accurately

<table>
<thead>
<tr>
<th>Code 1</th>
<th>Code 2</th>
<th>Mean Difference</th>
<th>SE</th>
<th>t</th>
<th>P_{Tukey}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code 3</td>
<td>-0.240</td>
<td>0.217</td>
<td>0.158</td>
<td>1.378</td>
<td>0.643</td>
</tr>
<tr>
<td>Code 4</td>
<td>-0.768</td>
<td>-0.240</td>
<td>0.116</td>
<td>-2.072</td>
<td>0.236</td>
</tr>
<tr>
<td>Code 5</td>
<td>-0.656</td>
<td>-0.768</td>
<td>0.260</td>
<td>-2.956</td>
<td>0.028</td>
</tr>
<tr>
<td>Code 2</td>
<td>Code 3</td>
<td>-0.457</td>
<td>0.191</td>
<td>-3.434</td>
<td>0.006</td>
</tr>
<tr>
<td>Code 4</td>
<td>-0.985</td>
<td>-0.457</td>
<td>0.164</td>
<td>-2.787</td>
<td>0.045</td>
</tr>
<tr>
<td>Code 5</td>
<td>-0.874</td>
<td>-0.985</td>
<td>0.284</td>
<td>-3.462</td>
<td>0.006</td>
</tr>
<tr>
<td>Code 3</td>
<td>Code 4</td>
<td>-0.528</td>
<td>0.224</td>
<td>-3.905</td>
<td>0.001</td>
</tr>
<tr>
<td>Code 5</td>
<td>-0.417</td>
<td>-0.528</td>
<td>0.264</td>
<td>-2.003</td>
<td>0.268</td>
</tr>
<tr>
<td>Code 4</td>
<td>Code 5</td>
<td>0.111</td>
<td>0.196</td>
<td>-2.121</td>
<td>0.215</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.304</td>
<td>0.365</td>
<td>0.996</td>
</tr>
</tbody>
</table>
Hypothesis Five: Data analysis

In hypothesis five, it was predicted that participants with the political affiliation of being a Democrat would encode a more accurate date of university closure compared to participants that identify with other political affiliations. There were 103 participants that identified as Democrats, 17 participants that are not registered to vote, 44 participants identified as Independent, 30 participants that identified as Republican, and 32 participants preferred not to say. Figure 5 displays that Democrat participants ($M = 2.068$, $SD = 0.783$) had the most accurate date encoded compared to Independent participants ($M = 2.114$, $SD = 0.722$), Republican participants ($M = 2.200$, $SD = 0.887$), not registered to vote participants ($M = 2.235$, $SD = 0.831$), and participants who preferred not to say their political affiliation ($M = 2.313$, $SD = 0.738$). Figure 5 shows the relationship between the political affiliation the students identified as and how accurate the date they encoded was.

Figure 5

Political Affiliation of Students vs. Date Encoded
A one-way ANOVA test was conducted to determine if the political affiliation of the participants had a significant impact how the accuracy of the date of university closure they encoded. Results from Table 14 indicated that the political affiliation of the student did not have a significant impact on the accuracy of the date encoded \((F(4, 221) = 0.724, p = 0.576)\). Table 14 shows the results of the ANOVA test that was conducted to assess the relationship between the students who identified as Democrats and how accurate the date they encoded was.

Table 14. ANOVA of Hypothesis 5: Democrats Will Remember More Accurately

<table>
<thead>
<tr>
<th>Cases</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Political Affiliation</td>
<td>1.779</td>
<td>4</td>
<td>0.445</td>
<td>0.724</td>
<td>0.576</td>
</tr>
<tr>
<td>Residuals</td>
<td>135.690</td>
<td>221</td>
<td>0.614</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Furthermore, the word count to the question of “Please share with us when you first heard about COVID-19. Include how and where you heard about it. Describe what you were doing.” was examined. Figure 6 displays those participants who identified as Democrats \((M = 42.175, SD = 33.184)\) included a higher word count compared to participants who identified as Independent \((M = 37.205, SD = 22.805)\), Republican participants \((M = 29.233, SD = 22.895)\), not registered to vote participants \((M = 28.176, SD = 17.030)\), and participants that preferred not say their political affiliation \((M = 21.469, SD = 17.099)\). Figure 6 shows the relationship between the political affiliation the student classified themselves as and the word count they included to answer the question of what they were doing when they found out about university closure.
A one-way ANOVA test was conducted to determine if the political affiliation of the participants had a significant impact on the word count they included to the question regarding their memories of when they first heard about COVID-19. Results from Table 15 indicated that the political affiliation of the participants had a significant impact on the word count they wrote to answer the question \( F(4, 221) = 4.427, p < .05 \). Post-hoc tests showed that participants who identified as Democrats significantly wrote more \( (M = 42.175, SD = 33.184) \) than participants who preferred not to say their political affiliation \( (M = 21.469, SD = 17.099; p < .05) \). Table 15 shows the results of the ANOVA test that was conducted to determine the relationship between students who identified as Democrats and the word count they included to the question regarding what they remembered about the pandemic when they first heard about it. Table 16 shows the post-hoc tests that were conducted.
Table 15. ANOVA of Hypothesis 5 Word Count: Democrats Will Remember More

<table>
<thead>
<tr>
<th>Cases</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Political Affiliation</td>
<td>13106.676</td>
<td>4</td>
<td>3276.669</td>
<td>4.427</td>
<td>0.002</td>
</tr>
<tr>
<td>Residuals</td>
<td>163591.819</td>
<td>221</td>
<td>740.234</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Mean Difference</th>
<th>SE</th>
<th>t</th>
<th>Pukey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Democrat</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I am not registered to vote</td>
<td>13.998</td>
<td>7.122</td>
<td>1.965</td>
</tr>
<tr>
<td>Independent</td>
<td>4.970</td>
<td>4.900</td>
<td>1.014</td>
</tr>
<tr>
<td>Prefer not to say</td>
<td>20.706</td>
<td>5.506</td>
<td>3.760</td>
</tr>
<tr>
<td>Republican</td>
<td>12.941</td>
<td>5.645</td>
<td>2.293</td>
</tr>
<tr>
<td>I am not registered to vote</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Independent</td>
<td>-9.028</td>
<td>7.770</td>
<td>-1.162</td>
</tr>
<tr>
<td>Prefer not to say</td>
<td>6.108</td>
<td>8.166</td>
<td>0.821</td>
</tr>
<tr>
<td>Republican</td>
<td>-1.057</td>
<td>8.259</td>
<td>-0.128</td>
</tr>
<tr>
<td>Independent</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prefer not to say</td>
<td>15.736</td>
<td>6.321</td>
<td>2.489</td>
</tr>
<tr>
<td>Republican</td>
<td>7.791</td>
<td>6.442</td>
<td>1.237</td>
</tr>
<tr>
<td>Prefer not to say</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Republican</td>
<td>-7.765</td>
<td>6.914</td>
<td>-1.123</td>
</tr>
</tbody>
</table>
CHAPTER FIVE: DISCUSSION

Findings

In hypothesis one, it was predicted that the majority of students were not accurate in the date they encoded of university closure. The results showed that most of the students were inaccurate. Most of the students were classified in the less accurate categories of code 2 (mentioning any date in March or spring break of 2020) or code 3 (all other responses that were not included in code 1 or 2). The least number of students were classified in code 1 (stating dates from March 9th-16th of 2020) which was the most accurate category for the date encoded.

This shows that the hypothesis of students encoding inaccurate flashbulb memories, such as the date encoded for university closure, is correct. The results agree with the idea that individuals may not always be accurate in the memories of the events that have taken place. As discussed in the literature review, the study of where participants were asked questions regarding the challenger disaster after time has passed often answered the questions incorrectly (Neisser & Harsch, 1992). The finding of students recalling an inaccurate date for university closure is consistent with the literature review since it shows that as time passed after flashbulb memories have formed, the students can still have inaccurate memories such as the date encoded. This indicates that flashbulb memories, likewise to ordinary memories, can also be recalled inaccurately as time passes. This is consistent with the literature review discussion of emotional memories, such as flashbulb memories, are likely to decay over time which is similar to other types of memories (Mahmood, Manier, & Hirst, 2004).

In hypothesis two, it was predicted that students who are more relevant to UCF would encode the date of university closure more accurately. Results showed that code 1 (students who
attended UCF during Spring 2020) participants were more accurate than code 2 (students who did not attend UCF during Spring 2020). It was also seen that code 3 (students who started during the Spring 2020 term) participants encoded the date more accurately than code 2 participants. It was also noted that code 1 participants included higher word counts than code 2 to the question regarding any additional details they remembered during university closure.

These findings show that the hypothesis of students who are more relevant to UCF would remember flashbulb memories more accurately is correct. The results also support the idea that a more accurate recall of flashbulb memories develop from a greater rehearsal of events from the event being more relevant. This is consistent with the study discussed in the literature review where participants who were more relevant to the Loma Prieta earthquake by living near or through connections to the location remembered more accurately (Neisser et al., 1996). The study indicated that a higher level of relevance can cause a greater amount of rehearsal. For instance, participants who lived near the earthquake may have constantly been reminded of the events that took place since they may have been suffering the consequences of the earthquake. Another example of rehearsal includes those participants who had connections to the earthquake such as through friends or family. These participants may have been exposed to rehearsal from hearing from their relatives about the events from time to time and how it affected their lives after the event. In our study, students who were currently attending or had just began attending UCF remembered more accurately indicating that the higher level of relevance led to a greater amount of rehearsal which led to the more accurate recall of the date the university closed. Students who were currently attending may have had to explain the story of how the university closure affected their education to their families, friends, and professors. Students who were currently attending UCF may have also been exposed to rehearsal from listening to the
experiences of their classmates who went through a similar experience. The higher word count found in answers from students who were currently attending UCF further supports the hypothesis that those who are more relevant to the event had a more accurate recall of the university closure date. This shows that students who were the most relevant to the event included the most details in their answer to the question. This could be due to a greater rehearsal of events they shared throughout time such as telling their experiences, listening to other experiences regarding COVID-19, and constantly experiencing the changes to their education due to university closure.

In hypothesis three, it was predicted that participants who were not located near UCF at the time of hearing about university closure would have a less accurate date encoded than students who were located near the UCF or Orlando region. Results showed that code 3 (students who were out of state or the country) participants had the most accurate date encoded than code 1 (students located near UCF and the Orlando area). It was also discovered that code 2 (located anywhere in Florida outside of Orlando) was the following most accurate after code 1. The least accurate category was code 4 (did not specify their location).

This finding does not support the hypothesis of location having a significant impact on the accuracy of the date they encoded. However, the study showing that location did not have a significant effect is consistent with the study discussed in the literature review where participants who lived far away from the earthquake remembered details well if they had connections to the location (Neisser et al., 1996). Participants who remembered more accurately even though they were located far away suggests that they had strong connections and relevance to UCF as students. For instance, students may have been away for spring break and needed to be aware of
whether UCF was closing. Students may have also been concerned and needed to figure out if they should stay at home or return to UCF. The findings show that the physical location may not be as an important factor as relevance when encoding accurate flashbulb memories if there are strong connections emotionally. The finding that students who were further away from the event and remembered more accurately supports the idea that relevance to a situation leads to a greater amount of rehearsal and can cause a more accurate recall of memories. Students who were located further may have experienced a higher level of rehearsal during their flashbulb memory formation which may have resulted in the more accurate recall for the date encoded. The high level of rehearsal can be due to expressing greater concern to whether they needed to relocate such as traveling back to the country or move out of their dorm. These students may have the experiences of having a deadline date to move out for the pandemic. The following consequences on their education may have also caused a continuous level of rehearsal. These concerns may have caused a greater impact on students who lived further than students that lived nearby. Students who lived locally may not of had the need to relocate since they may have commuted to the university. The relocation of students who lived further may have caused a greater rehearsal of events. Therefore, students who were located further at the time of finding out about university closure may have remembered the date more accurately due to their relevance and higher levels of rehearsal.

In hypothesis four, it was predicted that the source of how participants found out about university closure can affect the accuracy of the date they encoded. It was predicted that participants who found out from an official UCF source (alert, email, or website) would more accurately have the date of university closure encoded. Results showed that participants who found out from social media had the most accurate date of university closure encoded compared
to students who found out through UCF official communication methods, family and friends, news channels, and other sources. It was seen that students who mentioned that they found out through an official UCF communication method (code 1), or social media (code 2) significantly remembered the university closure date more accurately than those who did not specify how they found out (code 5).

This finding does not support the hypothesis of participants who found out through the source of UCF would have a more accurate date encoded. Instead, the students who found out the university closure due to the pandemic through social media encoded a more accurate date. This further supports the idea that a greater relevance to the event leads to a higher chance of rehearsal of events which may lead to a better recall of accurate flashbulb memories. The finding of those who learned the university closure dates from social media indicate they may have a greater relevance to UCF as they may follow social media related to the university, such as following classmates. This shows that these participants may have been exposed to the high levels of rehearsal as they may have followed the news closely on social media. Students who checked their social media more frequently may have contributed to the higher level of rehearsal. The following of many social media accounts related to the news of UCF closing may have increased the levels of rehearsal as they saw the news multiple times, and this could have led to the more accurate date encoded. The finding that students who learned about university closure through social media having a higher relevance to UCF through the media they follow causing a high level of rehearsal and leading to a more accurate recall of memories is consistent with the literature review. It is consistent with the study in the literature review that participants who were relevant to the earthquake in California through location or connections remembered better than those who were not relevant due to rehearsal of their memories (Neisser et al., 1996). This
finding is also consistent with the study discussed in the literature review that the source of how the information was learned can have a significant impact on the quality of the memories that participants remember, in this case qualities such as accuracy (May, Dein, & Ford, 2020). This study showed that those who learned about university closure through social media significantly remembered the date more accurately than those who found out from other sources.

The finding that students who learned the information of university closure through social media recalled the date of university closure most accurately can be used in future situations. This finding can be applied to any situation where the aim is for students to remember the details of an event accurately. For example, if organizations from the university wanted to market their groups to students, social media can be a significant resource to utilize to achieve the goal of students remembering details and recalling more accurately. It is a useful way to provide students information so that they can remember more accurately.

In hypothesis five, it was predicted that participants who identified as Democrats would have a more accurate date encoded about university closure than other political affiliations. This came from the idea that social groups, such as Democrats, who showed a greater fear to COVID-19 (Thomson-DeVeaux and Wiederkehr, 2020) would have a more accurate date encoded. Although there was not a significant result in the one-way ANOVA test that was conducted, results show that participants who identified as Democrats had a more accurate date encoded on university closure than participants of other political affiliations. It was also seen that participants who identified as Democrats had a higher word count to the question regarding sharing details about when they first heard about COVID-19 than participants with other political affiliations.
This finding shows that the hypothesis of Democrats remembering the university closure date more accurately than those of other political affiliations is correct. This finding is consistent with the discussion in the literature review that belonging to a political or social group who are more concerned with certain events can affect the recall, accuracy, and rehearsal of flashbulb memories. A study in the literature review showed that Germans who did not support nuclear power developed more flashbulb memories than the Dutch who were not as concerned about the Fukushima disaster (Talarico, Bohn, & Wessel 2019). Since Democrats were found to be more fearful of the pandemic and expressing higher concerns that they may contract COVID-19, require hospitalization, or pass the virus to others (Thomson-DeVeaux and Wiederkehr, 2020), may have caused a higher level of rehearsal which may have led to their higher accuracy in remembering the date of university closure. The rehearsal may have come from constant worry about the pandemic, discussing with others in their political affiliation about the pandemic, and listening to the news regarding what their political affiliation thinks about the pandemic. The higher level of rehearsal leading to a more accurate recall is also consistent with the literature review where relevance played a key role in rehearsal (Neisser et al., 1996).

Overall, the main takeaway from this study is that individuals who have a greater relevance to a particular event are more likely to have a greater rehearsal of the events and details that they remember. This can lead to a greater amount of recall which can aid individuals to develop more accurate flashbulb memories. It is also important to note that belonging to a specific social group can also enhance the relevance of the individual to the event, which in turn can lead to a greater rehearsal, recall, and accuracy in flashbulb memories.
**Limitations**

A limitation of this study was the time that the survey was published and sent out for students to participate in. Ideally, it would have been best to send out this study within a week of initial reactions to COVID-19 changes in the student’s lives as most of the discussed flashbulb memory studies have previously done. This way the study could have more accurately analyze what students remembered initially. Individuals are seen to lose the most information from flashbulb memories within the first year of event (Hirst et al., 2015). It was difficult to send out the survey within a specific timeframe since the IRB approval and distribution process to the SONA system, where the survey was published, was a time-consuming process. This resulted the study being published on February 1st, 2021. However, since the survey was sent out after the initial events of COVID-19, it was able to analyze the memories that students developed and can recall after the initial period of time.

Another limitation is that participants recruited in this study were not recruited for a second time in order to compare their initial answers. This would have allowed us to examine if the participants were accurate in the memories they encoded initially. Many studies with flashbulb memories included participants that participated in the study twice to allow a comparison of the accuracy and the amount that individuals retained.

The online survey that participants completed revealed limitations. The instruction of the survey included that in order to answer the participants were required to have been a student during the Spring 2020 term. Many students who were admitted to UCF past the Spring 2020 term answered the survey. The initial goal was to analyze the memories of the students who attended UCF at the time of hearing about university closure to evaluate the memories of how it
affected their lives. However, after gathering the data of students who were admitted to UCF beyond the Spring 2020 term, it led to the hypothesis that students who attended UCF at the time encoded flashbulb memories more accurately than students who were not at UCF at the time. Studies have shown that individuals who are more relevant to the event scene may have a higher rate of rehearsal which can affect the accuracy of memories (Neisser et al., 1996).

Another limitation in the online survey was the format and wording of how some of the questions were asked. The question that asked, “Where were you when you found out that UCF was closing for the rest of the semester?” received many unspecified responses such as stating, “at home.” The question should have been worded to ask for the specific location such as city, state, or zip code that they were located at when they heard about the university closure. This way the data from the participants who were unspecific about their location at the time of the news could have been used for analysis.

**Future Work**

The survey results included a great number of data that has yet to be analyzed. This study examined the relationship between the location of the participant when finding out the news of university closure and how accurately they remembered the date of university closure. This study did not examine if the participant’s relevance to UCF overlooked the variable of the participant’s location when hearing about the university closure. There is a possibility that participants who were more relevant to UCF at the time of closure remembered the university closure date more accurately regardless of their location when they found out. In future analyses, the variables of relevance, location, and accuracy in remembering the university date should be evaluated in more detail.
The Multidimensional Health Locus of Control Scale was included in the online survey and has not yet been analyzed. In future data analyses, the results of this scale should be assessed. The scale has three categories of results: internal, chance, and powerful others. The internal category measures the participant’s internal factor of the extent they believe they are in control of their health. The chance category measures the extent the participant believes that external roles in the environment can affect their health. The powerful others category measures the extent of their beliefs that others such as healthcare providers are in control of their health. In future analyses, the relationship between the categories and evaluating which group remembered more along with the most accurate on the events of university closure can provide further insight to the variables that affect flashbulb memory formation. The data analysis can involve evaluating word counts and identifying if the participants remembered accurate dates.

The VSA Authoritarianism Scale was a part of the online survey to be analyzed in the future. This scale measures the authoritarianism personality traits of the participants. In future analyses, the relationship between the participant’s level of authoritarianism traits and flashbulb memory of university closure during the pandemic should be analyzed. This can determine if personality traits have an effect on flashbulb memories.
APPENDIX A: IRB APPROVAL
EXEMPTION DETERMINATION

November 23, 2020

Dear Valerie Sims:

On 11/23/2020, the IRB determined the following submission to be human subjects research that is exempt from regulation:

<table>
<thead>
<tr>
<th>Type of Review:</th>
<th>Initial Study</th>
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<tbody>
<tr>
<td>Title:</td>
<td>Flashbulb Memories associated with the COVID-19 pandemic among College Students</td>
</tr>
<tr>
<td>Investigator:</td>
<td>Valerie Sims</td>
</tr>
<tr>
<td>IRB ID:</td>
<td>STUDY00002381</td>
</tr>
<tr>
<td>Funding:</td>
<td>None</td>
</tr>
<tr>
<td>Grant ID:</td>
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</table>

Documents Reviewed:
- IRB Sims 2381 HRP-254-FORM Explanation of Research 11122020 (4).pdf, Category: Consent Form;
- Qualtrics Survey Software Flashbulb Memory COVID-19.docx, Category: Survey / Questionnaire;

This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are made, and there are questions about whether these changes affect the exempt status of the human research, please submit a modification request to the IRB. Guidance on submitting Modifications and Administrative Check-in are detailed in the Investigator Manual (HRP-103), which can be found by navigating to the IRB Library within the IRB system. When you have completed your research, please submit a Study Closure request so that IRB records will be accurate.

Due to current COVID-19 restrictions, in-person research is not permitted to begin unless you are able to follow the COVID-19 Human Subject Research (HSR) Standard Safety Plan with permission from your Dean of Research or submitted your Study-Specific Safety Plan and received IRB and EH&S approval. Be sure to monitor correspondence from the Office of Research, as they will communicate when restrictions are lifted, and all in-person research can resume.
APPENDIX B: QUALTRICS SURVEY
In answering the questions in this questionnaire, it is important to be as **SPECIFIC** and provide as many **DETAILS** as you can.

Welcome! This survey contains questions that ask about when you first heard about COVID-19 and what you remember now.

It is **EXTREMELY** important to answer the fill in the bank questions with as much **DETAIL** as you can possibly remember. Please make sure to be as **SPECIFIC** as you can. Please include whatever **INFORMATION** that comes into thought no matter how irrelevant it is.

If you wish to NOT answer a question, please write in "I do not want to answer" and if you cannot REMEMBER the answer to the question, please write in "I do not remember."

The survey should about 20-30 minutes. We appreciate your time, thank you!
In answering the questions in this questionnaire, it is important to be as specific and provide as many details as you can.

What is your age in years?

Please identify your biological sex.
- Male
- Female
- Other

Please identify your gender.
- Male
- Female
- Other

What is your academic standing?
- Freshman
- Sophomore
- Junior
- Senior

What term and year did you start at UCF?

Please share your political affiliation:
- Democrat
- Republican
- Independent
- I am not registered to vote
- Prefer not to say
When did you hear about the news that UCF was closing for the remaining of the Spring 2020 semester due to COVID-19? Please try to estimate the SPECIFIC date you found out to the best of your knowledge without looking it up.

Where were you when you found out that UCF was closing for the rest of the semester?

What were you doing when you found out UCF was closing?

How did you find out UCF was going to be closed? Please include if you found out from a friend, family member, UCF alert, the news, social media or etc.
Please describe how you felt when you found out UCF was only closing for 2 weeks and then finding out UCF was going to be closed for the rest of the semester. Include your emotional responses.

Describe any other details you can remember during the event when you found out UCF was closing because of COVID-19.

Please share with us when you first heard about COVID-19. Include how and where you heard about it. Describe what you were doing.
I had feelings of sadness when I found out UCF was closing.

- Strongly agree
- Agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Disagree
- Strongly disagree

I had feelings of anger when I found out UCF was closing.

- Strongly agree
- Agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Disagree
- Strongly disagree
I had feelings of anxiety when I found out UCF was closing.

- Strongly Agree
- Agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Disagree
- Strongly disagree

I was scared that I might contract COVID-19 when UCF was going remote.

- Strongly Agree
- Agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Disagree
- Strongly disagree
I am scared that I might contract COVID-19 now.

- Strongly agree
- Agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Disagree
- Strongly disagree

I make sure to use face masks when I am in public.

- Strongly agree
- Agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Disagree
- Strongly disagree
I make sure to use hand sanitizer when I am in public.

- Strongly agree
- Agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Disagree
- Strongly disagree

I make sure to practice social distancing for the safety of myself and others.

- Strongly agree
- Agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Disagree
- Strongly disagree
I avoid large gatherings due to COVID-19.

- Strongly agree
- Agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Disagree
- Strongly disagree

If I get sick, it is my own behavior which determines how soon I get well again.

- Strongly agree
- Moderately agree
- Agree
- Disagree
- Moderately disagree
- Strongly disagree

No matter what I do, if I am going to get sick, I will get sick.

- Strongly agree
- Moderately agree
- Agree
- Disagree
- Moderately disagree
- Strongly disagree
Having regular contact with my physician is the best way for me to avoid illness.

- [ ] Strongly agree
- [ ] Moderately agree
- [ ] Agree
- [ ] Disagree
- [ ] Moderately disagree
- [ ] Strongly disagree

Most things that affect my health happen to me by accident.

- [ ] Strongly agree
- [ ] Moderately agree
- [ ] Agree
- [ ] Disagree
- [ ] Moderately disagree
- [ ] Strongly disagree
Whenever I don’t feel well, I should consult a medically trained professional.

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I am in control of my health.

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<tr>
<td>Strongly disagree</td>
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My family has a lot to do with my becoming sick or staying healthy.

- [ ] Strongly agree
- [ ] Moderately agree
- [ ] Agree
- [ ] Disagree
- [ ] Moderately disagree
- [ ] Strongly disagree

When I get sick, I am to blame.

- [ ] Strongly agree
- [ ] Moderately agree
- [ ] Agree
- [ ] Disagree
- [ ] Moderately disagree
- [ ] Strongly disagree
Luck plays a big part in determining how soon I will recover from an illness.

- Strongly agree
- Moderately agree
- Agree
- Disagree
- Moderately disagree
- Strongly disagree

Health professionals control my health.

- Strongly agree
- Moderately agree
- Agree
- Disagree
- Moderately disagree
- Strongly disagree
My good health is largely a matter of good fortune.

- Strongly agree
- Moderately agree
- Agree
- Disagree
- Moderately disagree
- Strongly disagree

The main thing which affects my health is what I myself do.

- Strongly agree
- Moderately agree
- Agree
- Disagree
- Moderately disagree
- Strongly disagree

If I take care of myself, I can avoid illness.

- Strongly agree
- Moderately agree
- Agree
- Disagree
- Moderately disagree
- Strongly disagree
Whenever I recover from an illness, it's usually because other people (for example, doctors, nurses, family, friends) have been taking good care of me.

- Strongly agree
- Moderately agree
- Agree
- Disagree
- Moderately disagree
- Strongly disagree

No matter what I do, I'm likely to get sick.

- Strongly agree
- Moderately agree
- Agree
- Disagree
- Moderately disagree
- Strongly disagree
If it’s meant to be, I will likely stay healthy.

- [ ] Strongly agree
- [ ] Moderately agree
- [ ] Agree
- [ ] Disagree
- [ ] Moderately disagree
- [ ] Strongly disagree

If I take the right actions, I can stay healthy.

- [ ] Strongly agree
- [ ] Moderately agree
- [ ] Agree
- [ ] Disagree
- [ ] Moderately disagree
- [ ] Strongly disagree
Regarding my health, I can only do what my doctor tells me to do.

- Strongly agree
- Moderately agree
- Agree
- Disagree
- Moderately disagree
- Strongly disagree

It’s great that many young people today are prepared to defy authority.

- Very strongly agree
- Strongly agree
- Somewhat agree
- Slightly agree
- Unsure or neutral
- Slightly disagree
- Somewhat disagree
- Strongly disagree
- Very strongly disagree
What our country needs the most is discipline, with everyone following our leaders in unity.

- Very strongly agree
- Strongly agree
- Somewhat agree
- Slightly agree
- Unsure or neutral
- Slightly disagree
- Somewhat disagree
- Strongly disagree
- Very strongly disagree

God’s law about abortion, pornography, and marriage must be strictly followed before it is too late.

- Very strongly agree
- Strongly agree
- Somewhat agree
- Slightly agree
- Unsure or neutral
- Slightly disagree
- Somewhat disagree
- Strongly disagree
- Very strongly disagree
There is nothing wrong with premarital sexual intercourse.

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Our society does NOT need tougher government and stricter laws.

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<tr>
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</tr>
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The facts on crime and the recent public disorders show we have to crack down harder on troublemakers, if we are going to preserve law and order.

- Very strongly agree
- Strongly agree
- Somewhat agree
- Slightly agree
- Unsure or neutral
- Slightly disagree
- Somewhat disagree
- Strongly disagree
- Very strongly disagree

Have you ever been tested for COVID-19?

- Yes
- No

Have you or someone close to you contracted COVID-19?

- Yes
- No

Has anyone close to you passed away due to COVID-19?

- Yes
- No
Have you experienced hardships due to COVID-19? Select all that apply.

- □ Unemployment of self
- □ Unemployment of family member
- □ Financial problems (food, housing, and etc.)
- □ Loss of opportunities (internships, volunteering, and etc.)
- □ Medical related (getting COVID-19 or family member getting COVID-19)
- □ Other

The quality of my education has decreased due to the COVID-19 transition.

- □ Strongly agree
- □ Agree
- □ Somewhat agree
- □ Neither agree nor disagree
- □ Somewhat disagree
- □ Disagree
- □ Strongly disagree
I am satisfied with the quality of my education during COVID-19.

- [ ] Strongly agree
- [ ] Agree
- [ ] Somewhat agree
- [ ] Neither agree nor disagree
- [ ] Somewhat disagree
- [ ] Disagree
- [ ] Strongly disagree

Please identify your ethnicity. Check all that apply.

- [ ] White
- [ ] Black or African American
- [ ] American Indian or Alaska Native
- [ ] Asian
- [ ] Native Hawaiian or Pacific Islander
- [ ] Hispanic or Latino
- [ ] Other
Do you have children?
- Yes
- No

Are you in a partnered relationship?
- Yes
- No

What is the zip code from the area you grew up in?

What is your current zip code?

Describe any other comments you have regarding the impacts on your education and opportunities related to your career such as internships, volunteering, shadowing and etc.

Describe any other hardships you may have faced due to COVID-19. This may include leaving belongings at your dorm, having to move out, struggles with online classes, and other aspects of life.
If I get sick, it is my own behavior which determines how soon I get well again.
Strongly agree
Moderately agree
Agree
Disagree
Moderately disagree
Strongly disagree

No matter what I do, if I am going to get sick, I will get sick.
Strongly agree
Moderately agree
Agree
Disagree
Moderately disagree
Strongly disagree

Having regular contact with my physician is the best way for me to avoid illness.
Strongly agree
Moderately agree
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Disagree
Moderately disagree
Strongly disagree

Most things that affect my health happen to me by accident.
Strongly agree
Moderately agree
Agree
Disagree
Moderately disagree
Strongly disagree

69
Whenever I don't feel well, I should consult a medically trained professional.
Strongly agree
Moderately agree
Agree
Disagree
Moderately disagree
Strongly disagree

I am in control of my health.
Strongly agree
Moderately agree
Agree
Disagree
Moderately disagree
Strongly disagree

My family has a lot to do with my becoming sick or staying healthy.
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If I take the right actions, I can stay healthy.
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Moderately disagree
Strongly disagree

Regarding my health, I can only do what my doctor tells me to do.
Strongly agree
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Strongly disagree
APPENDIX D: VSA AUTHORITARIANISM SCALE
It's great that many young people today are prepared to defy authority.
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Strongly agree
Somewhat agree
Slightly agree
Unsure or neutral
Slightly disagree
Somewhat disagree
Strongly disagree
Very strongly disagree

What our country needs the most is discipline, with everyone following our leaders in unity.
Very strongly agree
Strongly agree
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Slightly agree
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Slightly disagree
Somewhat disagree
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Very strongly agree
Strongly agree
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Somewhat disagree
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Very strongly disagree
There is nothing wrong with premarital sexual intercourse.

Our society does NOT need tougher government and stricter laws.

The facts on crime and the recent public disorders show we have to crack down harder on troublemakers, if we are going to preserve law and order.
Strongly disagree
Very strongly disagree
REFERENCES


https://doi.org/10.1017/cbo9780511664069.003


