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Real Memories For False Events: An Examination Of Individual Characteristics That Predict Flashbulb Memories For Real And Fictitious Mass Shootings

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Real Memories for False Events: An Examination of Individual Characteristics that Predict Flashbulb Memories for Real and Fictitious Mass Shootings

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Abstract

Multiple studies have examined flashbulb memories (FBM) for various events, but few studies have evaluated these memories within the context of mass shootings. The current investigation examined adult participants' FBMs for both real and fictitious mass shootings collected in an online survey of 607 participants in the United States. ANOVA, Chi-Square, and regression analyses were used to analyze survey data to examine participant characteristics associated with FBMs for these events. More than 40% of participants had one or more FBMs for real mass shootings. Of note, more than 20% of participants had one or more FBMs for shootings that never occurred. Gun owners, Hispanic, Spanish, or Latino participants, and participants with higher scores on measures of homosexuality or conservative political views tended to be more likely to report FBMs of shootings that never occurred. These findings may have important implications for FBM research, particularly in addressing inaccuracies in FBM reporting, as well as contribute to the literature on the public's perception of mass shootings.

Keywords: mass shooting, flashbulb memory, false memory

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Appendix

Real Memories for False Events: An Examination of Flashbulb Memories for Real and Fictitious Mass Shootings

In recent years, mass shootings in the United States have increased in frequency. Defined as incidents of gun violence where three or more people are killed in a single incident (Blair & Schweit, 2014; Advanced Law Enforcement Rapid Response Training Center & FBI, 2018), there were only 30 mass shootings in the U.S. between 1977 to 1997. Between 1998 and 2018, there were 90 (Follman et al., 2021). Between the year 2015 to 2019, more than 350 people have been killed and over 850 have been wounded in mass shooting incidents in the U.S. (Follman et al., 2021). Responding to these increases in mass shootings, Craig Scott, a survivor of the Columbine school shooting, said during a 20-year anniversary of the fateful event that he worried these mass shootings have become "a part of the American psyche" (Elliot, 2019). Gaining a better understanding of how the American public views and reflects on these shootings may have useful implications for prevention efforts aimed at reducing the occurrence of these events (Siegel et al., 2020). In this study, we surveyed individuals about their flashbulb memories (FBM) for real and fictitious mass shootings in order to examine participant characteristics that predict the saliency of memories of these events.

Flashbulb Memories

An examination of flashbulb memories (FBMs) is one method of studying the impact of mass shootings. FBMs are vivid memories of a life event where individuals can recall first learning of the event (Luminet & Curci, 2018). FBMs are autobiographical memories of often shocking events that have personal significance to individuals (Luminet & Curci, 2018). In their seminal work on FBMs, Brown and Kulik (1977) described six components, known as canonical

categories, of FBMs. These hallmarks of FBMs include autobiographical memories in which individuals are able to report 1) where they first learned about the event (the place), 2) the ongoing event or activity that was occurring before learning about the event (the ongoing activity), 3) the person who informed the individual of the event (the informant), 4) the affect of other people upon hearing the event (the affect of others), 5) the affect of the individual upon hearing the event (the individual's own affect), and 6) the immediate aftermath of the individual directly after learning about the event (the aftermath).

Various events around the world have been studied through the lens of FBMs. These studies have focused on the September 11 terrorist attacks (Curci & Luminet, 2006; Hirst et al., 2015), the Challenger space shuttle disaster (Bohannon, 1988; Neisser & Harsch, 1992), the death of French President Mitterrand (Curci et al., 2001), terrorist bombings in Israel (Edery-Halpern & Nachson, 2004), the 1999 Marmara earthquake (Er, 2003), the German occupation of Denmark during World War II (Berntsen & Rubin, 2006), the 2015 Paris attacks (Gandolphe & El Haj, 2017), and the Hillsborough Disaster in England (Wright, 1993). More research has focused on identifying these memories of mass shootings within the United States (Belz, 2020), where 66% of participants had an FBM for at least one real shooting. These studies have shown that FBMs are often persistent memories for events that hold significance for individuals that are influenced by a variety of factors. While thought to have important roles in meaning making and identity development (Luminet & Curci, 2018), some studies have suggested what are remembered as FBMs may not always be accurate. In this Introduction, we will briefly review factors believed to influence FBMs as well as influences that may predict FBMs that are inaccurate or false.

Influences on FBMs

Various factors associated with FBMs have been studied over the last 50 years. These include such factors as cognitive/emotional functioning, political affiliation, ethnicity, age, and rehearsal. Each of these factors may have important implications for research on FBMs of mass shootings.

Cognitive Functioning and Mental Illness

A majority of studies examining FBMs in clinical populations have focused on disorders regarding cognitive impairment such as epilepsy and mild cognitive impairment (MCI; see Tat et al., 2018). Individuals with MCI have demonstrated an impaired ability to learn new information but were still able to form FBMs for the September 11 attacks (Tat et al., 2018). Individuals with epilepsy have demonstrated the ability to form FBMs for the death of Princess Diana, but had impairment in FBM quality (i.e., consistency) compared to those without epilepsy (Metternich et al., 2013). Having epilepsy, as well as a family history of Alzheimer's Disease, has been associated with increased memories for real shootings (Belz, 2020), which suggests the presence of epilepsy can more directly impact FBM quality compared to quantity.

FBM has been studied in individuals with posttraumatic stress disorder (PTSD). Individuals with PTSD have been shown to have similar FBMs compared to individuals without PTSD who also experienced trauma, but FBMs for individuals with PTSD tended to become more inaccurate with higher rates of forgetting (Qin et al., 2003). The relationship between other prevalent mental disorders (e.g., depression, anxiety disorders) and FBM has undergone less empirical evaluation. When looking at FBMs of mass shootings, Belz (2020) found some evidence suggesting that individuals who report a history of mental illness were more likely to

report more FBMs of shootings than those without a reported mental illness history, but specific measures of stress or depressive symptoms were unrelated to the frequency of FBMs in this sample.

Political Affiliation and Gun Ownership

The role of political affiliation on FBM has also been studied. Rice and colleagues (2018) examined the impact of race and political preference on FBMs for the 2008 election of former President Obama, and found that nonwhite participants recounted their discovery stories for the election three times more often than white participants. Further, political affiliation played a larger role than race, as liberals demonstrated greater recall compared to moderates or conservatives (Rice et al., 2018). These differences in FBMs may reflect differences in the meaning and significance of these events.

Another important factor to consider in FBM is gun ownership, which is often closely aligned with political affiliation, as gun owners are more likely to be politically conservative (Oraka et al., 2019). Research has shown that gun owners have a tendency to view mass shootings differently than those who do not own guns, as gun owners are more likely to attribute shootings to popular culture and poor parenting (Joslyn & Haider-Markel, 2017). Additionally, gun ownership has been associated with an increased amount of memories for real mass shootings (Belz, 2020).

Ethnicity

Ethnicity has shown to be an important group characteristic predictive of FBMs of these events. For example, African Americans were shown to more likely to report FBMs of

assassination of four civil rights political leaders than European Americans (Brown & Kulik, 1977). Similarly, citizens of the U.S. were more likely to report FBMs for the assassination of President Kennedy than citizens from Canada, although these group differences were only significant for participants who were children or adolescents during the shooting (Yarmey & Bull, 1978). These differences in FBMs may be reflective of ethnic group differences in the meaning and impact of the FBM events when these events impact a member of your perceived community. This may explain why individuals who knew someone affected by a mass shooting are more likely to report FBMs of them (Belz, 2020).

Age

Age can be an important factor in FBMs, but the results are mixed. Some evidence suggests individuals are mostly likely to encode FBMs if the event occurred when the individual was between 10 and 30 years old (Pennebaker et al., 1997; Luminet & Curci, 2018). Generational factors may also produce cohort effects that shape FBMs. A national survey examining age differences in how Americans reflected on the relative importance of recent historic events found that there were various differences among generational groups (Deane et al., 2016). Five of the top ten self-rated significant events for Millennial group members included the mass shootings at Sandy Hook and Pulse nightclub, Osama bin Laden's death, the Boston Marathon bombing, and the Great Recession. However, none of these events were in the top ten list for older generation groups. Of note, a study by Belz (2020) did not find significant associations with age and FBMs for real shootings among participants who varied in age from 18 to as old as 74.

Rehearsal

Rehearsal, or repetition, of an event can contribute to the development of FBMs (Talarico & Rubin, 2018). Rehearsal can occur as individuals discuss an event and create shared meaning with others in order to understand an event, making the social context an important component of rehearsal and FBM formation (Bohannon, 1988; Bohannon & Symons, 1992; Otani et al., 2005; Tinti et al., 2014). Exposure to media communication regarding an event is another form of rehearsal (e.g., following ongoing media coverage about an event), with repeated media exposure appearing to increase the likelihood of FBM formation (see Curci et al., 2001; Schaefer et al., 2011). Of note, FBMs for mass shootings have been associated with greater frequency of Internet use to obtain or exchange information about mass shootings, as well as greater frequency of Internet use to get news about these events (Belz, 2020). This supports recent research on memory and media engagement for memories about COVID-19 news stories, as individuals who reported high levels of media engagement about COVID-19 reported an increase in true memories (Greene & Murphy, 2020).

False Memories and FBMs

In a recent study on FBMs conducted by Belz (2020), adult participants were asked to identify shootings they recognized from a list. This list included real and fictional mass shootings. The fictional shootings served as a validity check to test the accuracy in which participants identified mass shootings. In the next step in the study, the fictional shootings were removed from the list and participants were asked follow up questions to determine how many of the real shootings they recalled met criteria for FBMs. Due to time constraints in the Belz (2020) study, the same FBM follow-up questions were not used with the fictional shootings.

When reviewing the initial list of real and fictional mass shootings, Belz (2020) discovered that 34% of participants reported remembering one or more shootings that never occurred. Although the study by Belz assessed a number of variables that correlated with the participants' recognition of these fictional shootings, whether participants memories of these fictional events met the criteria for FBMs could not be determined. Determining how many of these fictional shootings could meet criteria for FBMs may have important implications for FBM research.

False memories have been studied extensively over the years for both suggested events (Crombag et al., 1996; Loftus & Palmer, 1974; Sondhi & Gupta, 2007; Hyman, Husband, & Billings, 1995) and FBMs (Budson et al., 2007; Greenberg, 2004; Hyman, 1999; Neisser & Harsch, 1992). For example, Hyman and Billings (1998) conducted a study on autobiographical memories in which participants were asked to describe their memory of a false event, spilling a drink on wedding guests at the age of 5, across two interviews separated by one day. The authors found that approximately 25% of participants created a false childhood memory, and were more likely to do so if they made connections to related self-knowledge (e.g., identified the false wedding event as being for one of their parent's friends) or if they had higher scores on measures related to imagination and dissociative experiences.

Research on FBMs has raised questions about the accuracy of these autobiographical memories. For example, Schmolck and colleagues (2000) examined memory for the O.J. Simpson murder trial on how the news was first heard, comparing responses 3 days after the verdict and 15 or 32 months after the verdict. The authors found after 15 months, 50% of the recollections were highly accurate, where 11% contained major errors or distortions, and after 32

months, only 29% of the recollections were highly accurate, and more than 40% contained major distortions. Additionally, McCloskey and colleagues (1998) found inconsistencies in 7% of recollections of the Challenger disaster after 9 months, and Neisser and Harsch (1992) found inconsistencies in 34% of recollections of the Challenger disaster after 34 months.

Potential Influences on False FBMs for Mass Shootings

Memory researchers have identified a number of individual and group differences associated with false memories. These factors include many of the same factors associated with FBMs, such as cognitive emotional functioning, political affiliation, and rehearsal. Social desirability, the tendency for people to present themselves in a generally favorable fashion (Holden & Passey, 2009) may be an additional factor worth consideration, given research showing links between social desirability and false memories. A brief summary of the research in these areas is provided below.

Cognitive Functioning and Mental Illness

Associations between false memories, stress, and depression have been well established. Individuals with high levels of stress or depression symptoms appear to be at greater risk for engaging in false recognition of stimuli than individuals with low stress or depression symptoms (Pardilla-Delgado et al., 2016; Yiping et al., 2018). Poor emotional regulation may thus disrupt the encoding and/or recall of FBMs. Although not directly measuring false FBMs, Belz (2020) found that participants who reported remembering fictional mass shootings tended to report higher scores on measures of psychological stress and depression.

One way to examine false memory is the Deese, Roediger and McDermott (DRM) task, a false memory paradigm where individuals are presented with lists of related words at encoding, then asked to recall or recognize these words after a delay (Pardilla-Delgado & Payne, 2017). In the recognition version of this task, individuals are asked whether they remember previously presented words, as well as related words that were not presented, which are typically recognized with high probability and confidence. This method has been utilized to demonstrate individuals with major depressive disorder have falsely recognized significantly more depression-relevant words than non-depressed controls, demonstrating mood congruence effects have been found on false memory performance for individuals with depression (Howe & Malone, 2011).The DRM paradigm has also been used to examine the impact of mood and arousal on false memory. A series of experiments by Van Damme (2013) found that low-arousal moods (e.g., serene, sad) elicited more false recognition than high-arousal moods (e.g., happy, angry), and this effect was attributed to individuals being more likely to accept the false item in cases of doubt when in low arousal, combined with tending to have improved item-specific memory when in high arousal. Mass shootings present an interesting examination of these findings, as mass shootings are negative events that can be subject to memory error in the context of low arousal moods such as depression. Taken together, this suggests further research (i.e., the present study) is warranted to evaluate the impact of mental conditions on FBMs, as Belz (2020) was the first study to our knowledge to address the impact of cognitive functioning and mental illness on real and false memories of mass shootings.

Political Affiliation

Political party can also be an important factor in FBMs, and can make people susceptible to false memories. For example, Frenda and colleagues (2013) found liberals were more likely to falsely remember former President George W. Bush on vacation during Hurricane Katrina compared to conservatives, and conservatives were more likely to falsely remember seeing former President Barack Obama shake the hand of former Iranian president Mahmoud Ahmadinejad. The authors proposed that memory about an event can form when they align with preexisting and congruent attitudes and evaluations that are due to recognition and familiarity (i.e., the degree of fit between attitudes toward the person involved as well as the behavior depicted in the event).

Murphy and colleagues (2019) examined false memories related to an abortion referendum in Ireland. Participants were shown six news stories. Four were real stories about events from the referendum campaigns and two stories were fabricated, which were about the Yes side or the No side having to destroy illegal campaign posters and the other false story linked the referendum campaign to a recent high-profile sexual assault trial. The authors found participants were most susceptible to forming false memories for fake news that aligned with their beliefs, as participants on the Yes side were more likely to state they remembered a fabricated No campaign scandal than for those on the No side, and participants on the No side were more likely to state they remembered a fabricated Yes campaign scandal than for those on the Yes side.

False memory has also been examined in the context of expertise and interest in a topic. O'Connell and Greene (2017) asked participants to rank seven topics from most to least interesting, then were asked if they remembered the events described in four news items related

to the topic they selected as the most interesting and least interesting, where three of the events were real and one was fictional. The authors found a high level of interest in a topic led to an increase in both true memories for the topic and false memories, which was present after controlling for level of knowledge participants had in the topic. In fact, interest in the topic, on average, doubled the number of false memories related to the topic. This aligns with research demonstrating experts can be more susceptible to false memory effects in their areas of expertise (see Baird, 2003; Castel et al., 2007), as the highly developed schemata of experts can make them prone to error when the false information has features in common with correct information.

Rehearsal and False Memories

Rehearsal, or repetition, of an event can also contribute to the development of false memories. Rehearsal through media exposure can increase memory errors and reporting details of memories for events that did not occur (i.e., memories that are false; Crombag et al., 1996; see Hyman et al., 1995), as well as inaccurately reporting details of events that did occur, which can vary by social group (Ost et al., 2008). For example, Ost and colleagues (2008) examined the impact of media exposure on autobiographical memory distortions for a London bus explosion among groups of United Kingdom (UK) and Swedish participants and found participants in the UK were more likely to report seeing non-existent footage of the explosion compared to participants in Sweden. Since FBMs have been described as including autobiographical memory components (Talarico & Rubin, 2018), the present study can serve to further examine the impact of group membership on false memory processes.

Media exposure can also increase retrieval-induced forgetting (i.e., the phenomenon where recalling information from a particular category can reduce one's memory capability for

related information that is not retrieved; Pica et al., 2018) through individual behavior (e.g., seeking news stories about a topic) as well as group interactions (e.g., discussing a news story with peers). Thus, conversations about an event and one's circumstances surrounding that event can impact the memories of the people involved in the discussion (Coman, Manier, & Hirst, 2009). Exposure to media about an event can be viewed as a component of cognitive and social processes of rehearsal, providing the backdrop for the larger cultural context of FBM for that event (Wang & Aydin, 2018). Thus, differences in media exposure, media consumption, and rehearsal can have important influences on the development of FBMs for false and real events.

Social Desirability

Research has shown a relationship between social desirability and false memories, with displaying greater social desirability having an increased tendency to report false memories (see Bernstein & Loftus, 2009; Qin, Ogle, & Goodman, 2008). The literature in this area is mixed, however, as some studies have not shown a significant relationship (Hyman & Billings, 1998; Paddock et al., 2000; Faulkner & Leaver, 2016; Patihis & Loftus 2016). Relatedly, research has demonstrated a relationship between social desirability and suggestibility influencing both true and false memories, where individuals can be more susceptible to suggestion, including giving in to leading questions in a criminal investigation, as social desirability increases (Richardson & Kelly, 2004). Social desirability effects may depend on perceived social pressure, where individuals who feel under greater social pressure may be more likely to give in, as perceived pressure from an authority figure may lower criteria for accepting a false event as true (see Ost et al., 2005). This literature has also been mixed, where social desirability has been correlated with one measure of suggestibility but not with a parallel form of this measure (Polczyk, 2005). Given

these findings, it may be important to include measures of social desirability in measures of true and false FBMs.

The Impact of COVID-19 on Mass Shootings and FBMs of Them

COVID-19 is an infectious, worldwide disease caused by a novel coronavirus termed SARS-CoV-2 (Chandu et al., 2020). In regards to the present study, it is relevant to briefly discuss the impact of COVID-19 on the frequency of mass shootings as well as the potential impact of COVID-19 (i.e., symptoms of the virus, stress related to the virus) on memory for mass shootings. Although the frequency of mass shootings have been increasing in recent years (Duwe, 2020), the combination of shelter in place and social distancing orders, as well as cancellation of large gatherings, throughout 2020 and into 2021 have led to a reduction in the amount of mass shootings (Pane, 2020)[1]. With a reduction in mass shootings and less media attention on these events due to COVID-19, the saliency and memory for these events may be impacted. Additionally, early research on COVID-19 symptoms has indicated the virus can lead to neurological issues such as brain damage, short-term memory loss, and problems in concentration during and after the course of the disease, which can be exacerbated by age and

[1] Incidentally, as President Biden's administration announced a surge in access to vaccinations and many states repealed COVID social distancing restrictions in the Spring of 2021, a shooting in the Atlanta, GA area made national headlines. The gunman targeted three massage parlors, killing eight people. Six of the victims were of Asian descent and two were white, in an attack that many view as racially motivated (Hanna, Chen, & Holcombe, 2021).

symptom severity (Paterson et al., 2020; Liotta et al., 2020; Heneka et al., 2020; Hosey & Needham, 2020; Zhou et al., 2020). Further, increased stress related to COVID-19 may impact individual's mental health and impact subsequent memory. Greater life stress has been associated with poorer working memory performance, as cognitions relating to stressful life events compete with task demands for attention resources (Klein & Boals, 2001). Additionally, mood dependency effects in memory, where memories that match an individual's mood are more accessible, may be impacted by COVID-19 stress, as individuals may be more primed to recall negative events such as mass shootings (see Alexander & Guenther, 1986; Robinson & Rollings, 2011). Due to on the ongoing COVID-19 pandemic in the United States, researchers studying memory should consider the importance of including measures that can account for the potential influence of the pandemic on their research findings.

The Present Study: Aims and Hypotheses

The present study seeks to expand prior work on FBMs for mass shootings by using a more nuanced approach. Although Belz (2020) laid the groundwork for research on FBMs of mass shooting events in his original study, the fictional shootings he assessed were not evaluated to determine whether they met criteria as FBMs. More research was needed to identify characteristics that predicted both true and fictional FBMs of mass shootings.

Aim 1. The first aim of this study was to identify the presence of FBMs for both real and false mass shootings. This would replicate and extend the results of a previous study by Belz (2020), where mass shootings were able to be encoded, recalled, and measured using a flashbulb memory framework with a moderately high prevalence. Based on previous research (see Hirst et al., 2015), the presence of an FBM for an event was defined as participants being able to identify

at least five out of six canonical features (i.e., an attribute of the reception context; see Brown & Kulik, 1977), of at least one mass shooting. Based on the work of Belz (2020), we hypothesized that at least a third of participants would have at least one FBM with five or more canonical categories for a real or false shooting.

Aim 2. The second aim of this study was to identify participant characteristics that are significantly associated with FBMs for real shootings, including mental health and group membership (e.g., gun ownership, political affiliation). Based on Belz (2020), where gun ownership and the presence of mental illness have been shown to be related to greater FBMs, we hypothesize that gun ownership and the presence of mental illness would significantly predict the presence of FBMs for real mass shootings.

Aim 3. The third aim of this study was to identify participant characteristics that are significantly associated with FBMs for false shootings, including mental health and group membership (e.g., gun ownership, political affiliation). Based on Belz (2020), we hypothesize that being younger and being more conservative in political ideology would significantly predict the presence of FBMs for false mass shootings.

Aim 4. The fourth aim of this study was to identify links between social desirability and FBMs of both true and false mass shootings. Based on the research outlined above, we hypothesize that social desirability would be related to both true and false FBMs, with individuals with higher social desirability scores tending to also report more overall FBMs.

To further address the aims described above in a more nuanced capacity, we separated participants into groups according to the amount of real and false FBMs. Participants were placed into one of four groups by comparison of real and false memories using the median split procedure (DeCoster et al., 2011): having a high amount of real and false memories (HR-HF),

having a high amount of real memories and a low amount of false memories (HR-LF), having a low amount of real memories and a high amount of false memories (LR-HF), and having a low amount of both real and false memories (LR-LF). By dividing participants into these categories, we wanted to explore differences in how individuals identified, reported, and recalled these mass shootings. While the evaluation of these group differences were exploratory, we hypothesized that participants will tend to have more real FBMs than false FBMs, and that individuals will not be equally distributed across these four groups, with the fewest participants in the low real FBM and high false FBM group.

Method

Participants. A total of 607 participants (49% female, 50% male) were recruited through Mechanical Turk (MTurk), a crowdsourcing website operated by Amazon that allows people to request certain tasks to be completed that the performers of the tasks are compensated for. Participants received 50 cents each for completing an online questionnaire that was administered through Qualtrics, a software program that functions as an online survey tool for building and administering surveys. The questionnaire contained three items (i.e., "I have never fallen asleep", "I am 150 years old", "I have been to every country in the world in the past week") to serve as validity checks to identify participants who may need to be dropped from analysis due to inattentive and/or invalid responding. No participants in the sample selected an invalid response on any of the three items.

Since the study examined the public's perception of certain phenomena and focus on perception within the U.S., participants were required to live in the U.S. Participants ranged in age from 18 to 89 years old (M = 38.36, SD = 12.9). Additional demographic information is

presented in Table 1. Of note, gun ownership appears to be consistent with recent Gallup polls, where 32 percent of U.S. adults reported owning a gun and 44 percent reported living in a gun household (i.e., having a gun in the home or on the property; Saad, 2020). Political affiliation values were slightly different than other estimates, as Gallup (2020) reported 31 percent of U.S. adults are democrat, 25 percent are republican, and 41 percent are independent. However, the present sample is consistent with political composition in other larger studies that have shown MTurk samples tend to be more left leaning (see Levay et al., 2016), which can also account for the diversity in sexuality in the sample (see Jones, 2021).

Measures and Procedure. Measurement tools were collected in two phases. Phase I surveyed memories of actual and fictitious mass shootings. Phase II measured participant demographics, emotional adjustment, and attitudes regarding mass shootings. These two phases were administered in random order to avoid priming effects. These blocks of assessment measures were administered in random order, resulting in 51.9% of participants administered Phase I materials before Phase II.

Participants completed a survey developed for this study, termed the Flashbulb Memories of Real and False Mass Shootings Survey (FBM RFMSS). This survey was based on the work of Gandolphe and El Haj (2017), Hirst et al. (2015), Belz (2020), and Mahmood et al. (2004). In Phase I of the FBM RFMSS, a list of 30 mass shootings are presented, including 20 real and 10 fictitious events. Twenty real shootings are included following recommendations by Lankford (2016) and Legerski and Nedegaard (2018), including the deadliest shooting in the last 25 years. The FBM RFMSS also includes ten fictitious shootings developed using an online random location generator (Random Lists, 2013).

After selecting each shooting (true or false) they remembered, participants were asked a series of 13 follow-up questions relating to FBM and questions about the characteristics of the shooter and the event. These questions included six questions corresponding to the canonical categories of FBM, questions that corresponded to components of FBM (e.g., rehearsal), as well as questions that asked about the race of the shooter and if the shooting occurred close to where the participants live.

During Phase II, participants were asked to provide demographic information and to provide their age, race, U.S. state of residence, gender, gun ownership status, belief in background checks, political ideology, history of a psychiatric or mental condition, political affiliation, sexuality, and amount of children. Screener questions regarding memory impairment (e.g., cognitive impairment, history of epilepsy) were also included. Political ideology was scored from 0 to 10, where higher values reflected more conservative political ideology. Sexuality was measured using the Kinsey Scale (Kinsey et al., 1948), a 7-point Likert scale where participants rate themselves from 0 = exclusively heterosexual, to 6 = exclusively homosexual. After finishing the demographic items, participants completed a short battery of clinical and memory inventories. These measures are described below.

Penn State Worry Questionnaire (PSWQ). The PSWQ is a reliable and valid self-report measure of trait-like pathological worry (Stober & Bittencourt, 1998). The PSWQ consists of 16 items that assess the excessiveness, duration and uncontrollability of worry and associated stress. Cronbach's alphas have been shown to range between .86 and .95 in clinical and nonclinical samples, with an average value of .90. Cronbach's alpha for the current study was acceptable at .89. PSWQ scores are presented as Anxiety scores, ranging from 16 to 80. Higher scores reflect

greater anxiety. Scores between 16 and 39 are in the low range, 40 to 59 are in the moderate range, and 60 to 80 are in the high range.

10-item Perceived Stress Scale (PSS-10). The PSS-10 assesses the degree to which situations in life are perceived as stressful (Cohen et al., 1983; Cohen & Williamson, 1988). The items provide a measure of how unpredictable, uncontrollable, and overwhelming respondents viewed their lives. Participants respond on a 5-point scale ranging from 0 (never) to 4 (very often), with four reverse-scored items. The responses to the 10 items are totaled to create a psychological stress score, where higher scores indicate greater psychological stress. Internal reliability of Cronbach's alpha has been shown to be .84, .85, and .86 for the validation samples (Cohen et al., 1983). Cronbach's alpha for the current study was acceptable at .71. PSS-10 scores are presented as Stress scores, ranging from 0 to 40. Higher scores indicate higher perceived stress. Scores from 0 to 13 are in the low range, scores from 14 to 26 are in the moderate range, and scores from 27 to 40 are in the high range.

Impact of COVID-19. Additionally, in order to control for the potential impact of the coronavirus (COVID-19) on the results, participants were asked five questions relating to the coronavirus: have you lost your source of income at any point during the COVID-19 pandemic (i.e. after March 1, 2020), have you or a loved one ever had symptoms of COVID-19, have you ever been diagnosed with COVID-19, have you lost a loved one due to COVID-19, and how much has COVID-19 impacted your day-to-day life. The last item was scored on a 5-point Likert scale, where 0 = Not at All, 1 = Somewhat, 2 = Moderately, 3 = Very Much, and 4 = Extremely.

Quick Inventory of Depressive Symptomatology, Self-Report (QIDS-SR16). The QIDS-SR16 is a 16-item self-report measure of depressive symptom severity derived from the 30-item

Inventory of Depressive Symptomatology (IDS; Rush et al., 1996). The QIDS-SR16 has nine symptom domains, which consist of sad mood, concentration, self-criticism, suicidal ideation, general interest, energy/fatigue, sleep disturbance, appetite/weight, and psychomotor agitation/retardation (Rush et al., 2003). Each symptom item is scored on a scale of 0 to 3. Higher scores represent greater symptom severity. A systematic review and meta-analysis by Reilly and colleagues (2015) demonstrated Cronbach's alpha ranged from .69 to .89 across 37 studies. Cronbach's alpha for the current study was acceptable at .80. QIDS-SR16 scores are presented as Depression scores, ranging from 0 to 27. Higher values reflect greater depressive symptoms. Scores 5 or lower are in the no depression range, scores from 6 to 10 are in the mild range, 11 to 15 are in the moderate range, 16 to 20 are in the severe range, and total scores greater than 21 are in the very severe range.

Online Political Engagement Scale (OPEnS). The modified version of OPEnS (Pontes et al., 2017) used in the present study, termed OPEnS-United States Adapted (OPEnS-USA), is an 8-item measure of political engagement. This scale assesses how frequently participants visit several categories of websites (e.g., websites of political parties, news organization websites). Each item is rated on a 4-point scale, where 3 = Many times, 2 = Several times, 1 = Once or twice, and 0 = Never visited. An additional item was added to assess whether participants had voted in a recent election. A total score is derived from adding the scores for the first seven questions, where higher scores represent higher levels of online political engagement. Participants can be dichotomously compared by being classified as politically- engaged (i.e., if the total score is ≥ 1) or non-online politically-engaged (i.e., if the score is 0 for every question). In addition, Cronbach's alpha has been shown to be .81 (Pontes et al., 2017). Cronbach's alpha

for the current study was acceptable at .85. OPEnS scores are presented as Political Engagement scores, ranging from 0 to 21. Higher values reflect greater political engagement.

Internet use was also examined using three variables. The variable "use the internet for information about politics or current affairs" was scored on a 5-point Likert scale, where 0 = none, 1 = less than half an hour, 2 = half an hour to an hour, 3 = one to two hours, 4 = more than two hours. The variable "use the internet for information about mass shootings" was scored on a 4-point Likert scale, where 0 = not at all, 1 = not very much, 2 = a fair amount, 3 = a great deal. The variable "use the internet for information about a recent mass shooting" was scored on a 4-point Likert scale, where 0 = no, 1 = once or twice, 2 = several times, 3 = many times.

Marlowe-Crowne Social Desirability Scale (MC-SDS). The Marlowe-Crowne Social Desirability Scale is a 33-item measure of social desirability, where higher scores indicate greater social desirability (Crowne & Marlowe, 1960). Although this is not common in FBM research, which tends to focus on a single event (see Luminet & Curci, 2018), this measure will be included to account for potential over-reporting of shootings. Research has shown that the 13-item version (Zook & Sipps, 1985; Loo & Thorpe, 2000) has a more robust factor structure compared to the 33-item version, as well as acceptable internal consistency, with a Cronbach's alpha value of .75 (Sarbescu et al., 2012). Cronbach's alpha for the current study was low but acceptable at .6. MC-SDS scores are presented as Social Desirability scores, ranging from 0 to 13. Higher values reflect greater social desirability.

Everyday Memory Questionnaire – Revised (EMQ-R). To control for the potential impact of memory impairment on results, the EMQ-R (Royle & Lincoln, 2008) was used in the present study. The EMQ-R is a 13-item measure of memory impairment. Each item is rated on a

5-point scale, where 0 = once or less in the last month, 1 = more than once a month but less than once a week, 2 = about once a week, 3 = more than once a week but less than once a day, and 4 = once or more in a day. Cronbach's alpha has been shown to be 0.89, with all items showing a corrected item-total correlation of at least 0.3, in the validation sample. Cronbach's alpha for the current study was acceptable at .96. EMQ-R scores are listed as Memory Impairment scores for ease of reading, where scores range from 0 to 52. Higher values reflect greater memory impairment.

Blame attribution. Participants were also presented with five questions relating to blame attribution based on Joslyn and Haider-Markel (2017): "Do you believe mass shootings have become more frequent in recent years?", "How much blame for mass shootings would you place on the availability of guns?", "How much blame for mass shootings would you place on the influence of violence in popular culture such as movies, television, and the internet?", "How much blame for mass shootings would you place on the way parents raise their children?", and "How much blame for this shooting would you place on the shooter(s)?". Participants then answered a question regarding past involvement in mass shootings (i.e., "Have you ever known anyone who has ever been affected by a mass shooting").

Debriefing Procedure. After administering the measures outlined above, participants were presented with debriefing information, including a complete list of the dates of the shootings and a list of the ten shootings that were fictionalized for the purposes of the study. Participants were also given a list of resources (e.g., websites, hotline numbers) to contact if they experienced any emotional duress as a result of the study.

Results

To assess order or priming effects of block administration on dependent variables of interest, we conducted preliminary analyses to test whether the order of the administration was systematically associated with differences in scores on various measures. A comparison of mean differences in variables between the two test order administration groups failed to show a consistent pattern indicative of order effects. For example, an independent t-test performed to examine the relationship between order of phases (i.e., Phase I administered first, Phase II administered first) and total amount of FBMs was not significant (p = .454). There was no significant difference between Phase I administered first (M = 3.57, SD = 4.1) and Phase II administered first (M = 3.4, SD = 4.6) on total FBMs. Due to these results, all participants were collapsed into one group for analyses.

Presence of FBM for mass shootings. Based on previous research (see Hirst et al., 2015) analyses were conducted using FBMs that had five or more canonical categories. According to participant responses, 42.7% of participants had an FBM for one or more real shootings using this criteria. Further, 20.9% of participants had an FBM for one or more false shootings. The percentage of participants with real and false FBMs are presented in Table 2.

Table 3 provides the percentages of participants that identified each real and false mass shooting as an FBM and provides a measure of the most commonly recalled shootings.

Characteristics associated with FBMs for real shootings. To address the second aim, the impact of participant characteristics (e.g., mental health, gun ownership) on FBMs was examined. To examine the total amount of FBMs for real mass shootings, bivariate correlations were examined among the variables of interest. Questionnaire data was entered and analyzed using SPSS. Descriptive statistics for relevant variables are presented in Table 4.

There was a significant correlation between the total amount of real FBMs and the following variables (see Table 5): Ethnicity (Hispanic, Spanish, or Latino = 1 and not Hispanic, Spanish, or Latino = 0), Use the Internet for information about mass shootings, Memory Impairment, Gun Ownership, Political Ideology (higher=more conservative), Presence of mental illness (1=yes, 0=no), Stress, Political Engagement, and sexuality (higher=more homosexuality).

Thus, multiple regression was used to predict the total amount of real FBMs using Ethnicity, Use the Internet for information about mass shootings, Memory Impairment, Gun Ownership, Political Ideology (higher=more conservative), Presence of mental illness (1=yes, 0=no), Stress, Political Engagement, and sexuality (higher=more homosexuality) as predictors. These variables significantly predicted the total amount of real FBMs, $F(9, 496) = 11.852$, $p < .001$, $R^2_{adjusted} = .162$. Ethnicity, use of the Internet to get news or information about mass shootings, Memory Impairment scores, gun ownership, and the presence of mental illness were significantly associated with more shooting-related FBMs ($p < .05$; see Table 6). Political ideology, stress scores, and sexuality were not significantly associated with total real FBMs (p = ns). To address the potential influence of COVID-19 on the data, multiple regression was used to predict the total amount of real FBMs using Ethnicity, Use the Internet for information about mass shootings, Memory Impairment, Gun Ownership, Political Ideology (higher=more conservative), Presence of mental illness (1=yes, 0=no), Stress, Political Engagement, sexuality (higher=more homosexuality), and Impact of COVID-19 on day-to-day life as predictors. These variables significantly predicted the total amount of real FBMs, $F(10, 495) = 10.746$, $p < .001$, $R^2_{adjusted} = .162$. Since the addition of this COVID-19 variable did not significantly add to the model (i.e., *Adjusted* R^2 did not change and the COVID-19 predictor was not significant), only the multiple regression without the COVID-19 variable is presented (i.e., Table 6).

Among these variables, memory impairment, gun ownership, and political engagement appeared to be the strongest predictors of the total amount of real FBMs, where increased memory impairment, owning a gun, and decreased political engagement were associated with a greater amount of real FBMs.

Characteristics associated with FBMs for false shootings. To address the third and fourth aim, the impact of participant characteristics (e.g., mental health, gun ownership) on FBMs was examined. There was a significant correlation between the total amount of false FBMs and the following variables (see Table 5): Ethnicity, Use the Internet for information about mass shootings, Memory Impairment, Gun Ownership, Political Ideology (higher=more conservative), Stress, Social Desirability, Political Engagement, and sexuality (higher=more homosexuality).

As with the analysis with real mass shootings, multiple regression was used to predict the total amount of false FBMs using Ethnicity, Use the Internet for information about mass shootings, Memory Impairment, Gun Ownership, Political Ideology (higher=more conservative), Stress, Social Desirability, Political Engagement, and sexuality (higher=more homosexuality) as predictors. These variables significantly predicted the total amount of false FBMs, $F(9, 482) = 14.842$, $p < .001$, $R^2_{adjusted} = .202$. Ethnicity, increased Memory Impairment scores, gun ownership, decreased political engagement scores, and greater homosexuality identification were significantly associated with more false FBMs ($p < .05$; see Table 7). The use of the Internet to get news or information about mass shootings ($p = .079$) was nearly significantly associated with the total amount of false FBMs. Political ideology, stress scores, and social desirability scores were not significantly associated with total FBMs (p = ns).

To address the potential influence of COVID-19 on the data, multiple regression was used to predict the total amount of false FBMs using Ethnicity, Use the Internet for information

about mass shootings, Memory Impairment, Gun Ownership, Political Ideology (higher=more conservative), Stress, Social Desirability, Political Engagement, sexuality (higher=more homosexuality), and Impact of COVID-19 on day-to-day life as predictors. These variables significantly predicted the total amount of false FBMs, $F(10, 481) = 13.33$, $p < .001$, $R^2_{adjusted} = .201$. Since the addition of this COVID-19 variable did not significantly add to the model (i.e., *Adjusted* R^2 decreased by .001 and the COVID-19 predictor was not significant), only the multiple regression without the COVID-19 variable is presented (i.e., Table 7).

Among these variables, memory impairment, ethnicity, and gun ownership appeared to be the strongest predictors of the total amount of false FBMs, where increased memory impairment, being Hispanic, Spanish, or Latino, and owning a gun were associated with a greater amount of false FBMs.

Differences between real and false FBMs: ANOVA analyses. To address the second, third, and fourth aims of the study and examine real and false FBMs in a more nuanced capacity, participants were divided into groups based on their amount of real and false FBMs using the median split procedure. For the total amount of real FBMs, $M = 1.47$, $SD = 2.58$, *Median* = 0. For the total amount of false FBMs, $M = .5$, $SD = 1.27$, *Median* = 0. Thus, participants had a high amount of real FBMs if they had FBMs for 1 or more real mass shootings, and a low amount of real FBMs if they had FBMs for 0 real mass shootings. Participants had a high amount of false FBMs if they had FBMs for 1 or more false mass shootings, and a low amount of false FBMs if they had FBMs for 0 false mass shootings. As seen in Figure 1, this procedure created four groups: High Real High False (i.e., one or more real FBMs and one or more false FBMs; 19.1 percent of the sample), High Real Low False (i.e., one or more real FBMs and zero false FBMs; 23.6 percent of the sample), Low Real High False (i.e., zero real FBMs and one or more false

FBMs; 1.8 percent of the sample), Low Real Low False (i.e., zero real FBMs and zero false FBMs; 55.5 percent of the sample). Since the amount of participants in the Low Real High False group (1.8 percent) was negligible, it was dropped from analyses.

A summary of ANOVA analyses are presented in Table 8. When the assumption of homogeneity of variance for ANOVA was not met, the Welch statistic was used. Bonferroni post hoc tests were conducted when the ANOVA was significant.

In summary, the HR HF group was significantly higher than one or more groups on several variables. Participants were more likely to be in the HR HF group compared to the other two groups if they had higher PSS-10 scores (i.e., had higher stress scores), higher EMQ-R scores (i.e., greater memory impairment), higher sexuality scores on the Kinsey Scale (i.e., who identified as more homosexual), or were more conservative. Participants were more likely to be in the HR HF group compared to the HR LF group if they had higher QIDS-SR16 scores (i.e., higher depression scores). Participants were more likely to be in the HR HF group compared to the LR LF group if they had higher impact of COVID-19 on daily life scores. Participants were more likely to be in the HR LF group compared to the other two groups if they had higher MC-SDS scores (i.e., higher social desirability scores). Participants were more likely to be in the LR LF group compared to the other two groups if they were more politically engaged. Participants with greater political engagement scores tended to have a low amount of false memories compared to participants who were less politically engaged, and participants in the HR HF group were the least politically engaged.

Differences between real and false FBMs: Independent T-test and Chi Square Analyses. Independent t-test analyses were conducted to examine dichotomous variables of interest (i.e., Ethnicity, Gun Ownership, Presence of Mental Illness) for total amount of real FBMs and for

total amount of false FBMs. Follow up chi square analyses were conducted to examine dichotomous variables of interest (i.e., Ethnicity, Gun Ownership) for each FBM category.

Ethnicity T-tests. An independent t-test was performed to examine the relationship between Ethnicity (i.e., identify as Hispanic, Latino, or Spanish) and total amount of real FBMs. The t-test was significant, $t = 5.387$, $p < .001$. Participants who identified as Hispanic, Latino, or Spanish ($M = 2.72$, $SD = 3.47$) had a significantly greater amount of real FBMs compared to participants who did not identify as Hispanic, Latino, or Spanish ($M = 1.22$, $SD = 2.31$).

An independent t-test was performed to examine the relationship between Ethnicity (i.e., identify as Hispanic, Latino, or Spanish) and total amount of false FBMs. The t-test was significant, $t = 5.403$, $p < .001$. Participants who identified as Hispanic, Latino, or Spanish ($M = 1.12$, $SD = 1.79$) had a significantly greater amount of false FBMs compared to participants who did not identify as Hispanic, Latino, or Spanish ($M = 0.38$, $SD = 1.12$).

Ethnicity Chi Square. A chi-square test of association was performed to examine the relationship between Ethnicity (i.e., identify as Hispanic, Latino, or Spanish) and FBM Categories (i.e., High Real FBM and High False FBM, High Real FBM and Low False FBM, Low Real FBM and Low False FBM). The chi-square test was significant, X^2 (2, N = 580) = 38.405, $p < .001$. To further evaluate the relationships among Ethnicity and FBM Categories, follow-up chi-square analyses were conducted (see Table 9).

The chi-square test of association for Ethnicity and FBM Categories (i.e., HR HF, HR LF) was significant, X^2 (1, N = 251) = 20.743, $p < .001$. Participants who were Hispanic were more likely than participants who were not Hispanic to be in the HR HF group compared to the HR LF group. In other words, Hispanic participants with a high amount of real FBMs were more likely to also have false FBM. The chi-square test of association for Ethnicity and FBM

Categories (i.e., HR HF, LR LF) was significant, X^2 (1, N = 441) = 33.311, $p < .001$. Participants who were not Hispanic were more likely than participants who were Hispanic to be in the LR LF group compared to the HR LF group. The chi-square test of association for Ethnicity and FBM Categories (i.e., HR LF, LR LF) was not significant, X^2 (1, N = 468) = 0.000476, $p = .983$.The two groups were equally as likely to be in the HR LF group compared to the LR LF group.

Gun Ownership T-tests. An independent t-test was performed to examine the relationship between gun ownership and total amount of real FBMs. The t-test was significant, $t = 6.107$, $p < .001$. Participants who were gun owners ($M = 2.20$, $SD = 3.13$) had a significantly greater amount of real FBMs compared to participants who were not gun owners ($M = 0.95$, $SD = 1.93$).

An independent t-test was performed to examine the relationship between gun ownership and total amount of false FBMs. The t-test was significant, $t = 6.513$, $p < .001$. Participants who were gun owners ($M = 0.89$, $SD = 1.62$) had a significantly greater amount of false FBMs compared to participants who were not gun owners ($M = 0.23$, $SD = 0.86$).

Gun Ownership Chi Square. A chi-square test of association was performed to examine the relationship between Gun Ownership and FBM Categories (i.e., High Real FBM and High False FBM, High Real FBM and Low False FBM, Low Real FBM and Low False FBM). The chi-square test was significant, X^2 (2, N = 592) = 56.761, $p < .001$. To further evaluate the relationships among Gun Ownership and FBM Categories, follow-up chi-square analyses were conducted (see Table 10).

The chi-square test of association for Gun Ownership and FBM Categories (i.e., HR HF, HR LF) was significant, X^2 (1, N = 256) = 38.743, $p < .001$. Gun owners were more likely to be in the HR HF group compared to the HR LF group. The chi-square test of association for Gun

Ownership and FBM Categories (i.e., HR HF, LR LF) was significant, X^2 (1, N = 449) = 50.498, $p < .001$. Gun owners are more likely to be in the HR HF group compared to the LR LF group. The chi-square test of association for Gun Ownership and FBM Categories (i.e., HR LF, LR LF) was not significant, X^2 (1, N = 479) = 0.054, $p = .817$. There was no significant difference between the LR LF group and the HR LF group for gun owners and non-gun owners.

Presence of Mental Illness T-tests. An independent t-test was performed to examine the relationship between the presence of mental illness and total amount of real FBMs. The t-test was significant, $t = 3.208$, $p = .001$. Participants who were diagnosed with mental illness ($M = 2.17$, $SD = 3.01$) had a significantly greater amount of real FBMs compared to participants who were not diagnosed with mental illness ($M = 1.31$, $SD = 2.46$).

An independent t-test was performed to examine the relationship between the presence of mental illness and total amount of false FBMs. The t-test approached significance, $t = 1.489$, $p = .137$. Participants who were diagnosed with mental illness ($M = 0.66$, $SD = 1.52$) did not have a greater or lesser amount of false FBMs compared to participants who were diagnosed with mental illness ($M = 0.46$, $SD = 1.21$).

Presence of Mental Illness Chi square. A chi-square test of association was performed to examine the relationship between the Presence of Mental Illness and FBM Categories (i.e., High Real FBM and High False FBM, High Real FBM and Low False FBM, Low Real FBM and Low False FBM). The chi-square test was significant, X^2 (2, N = 592) = 11.563, $p < .01$. To further evaluate the relationships among the Presence of Mental Illness and FBM Categories, follow-up chi-square analyses were conducted and are summarized in Table 11.

A chi-square test of association for the Presence of Mental Illness and FBM Categories (i.e., HR HF, HR LF) was not significant, X^2 (1, N = 257) = .226, $p = .635$. In other words, there

was no significant difference between the number of participants in the HR HF group vs. the HF LF group across the two conditions. A chi-square test of association for the Presence of Mental Illness and FBM Categories (i.e., HR LF, LR LF) was significant, X^2 (1, N = 450) = 5.562, $p <$ .05. Participants diagnosed with mental illness are more likely to be in the LR LF group compared to the HR HF group. A chi-square test of association for the Presence of Mental Illness and FBM Categories (i.e., HR LF, LR LF) was significant, X^2 (1, N = 477) = 9.942, $p <$ .01. Participants who were diagnosed with mental illness were less likely than participants who were not diagnosed with mental illness to be in the LR LF group compared to the HR LF group. In other words, participants with mental illness who had a low amount of false FBMs were less likely to have a low amount of real FBMs compared to participants without mental illness. Individuals diagnosed with mental illness were relatively equally distributed across FBM groups, while a majority of individuals not diagnosed with mental illness were in the LR LF group.

Differences between real and false FBMs: Multinomial Logistic Regression. To further address the second and third aims of the study, multinomial logistic regression was conducted to examine the individual contributions of variables of interest on group differences while accounting for the other variables in the model. Variables that significantly correlated with the total amount of real FBMs and total amount of false FBMs, and that were significant or nearly significant in previous regression analyses, were used as predictors (see Table 6, 7, and 8). Thus ethnicity, use of the Internet to get news or information about mass shootings, memory impairment scores, political ideology (higher scores = more conservative), gun ownership, and the presence of mental illness were used to examine FBM categories with HR LF as the reference group. These variables significantly predicted FBM categories, X^2 (12, N = 543) = 155.504, $p <$ .001 (see Table 12).

HR HF vs HR LF. Participants were significantly more likely ($p < .001$) to be in the HR HF group compared to the HR LF group if they had higher Memory Impairment scores (*odds ratio* = 1.058). Thus, for every one unit increase in memory impairment scores, participants were 1.058 times more likely to be in the HR HF group compared to the HR LF group. Participants were significantly less likely ($p < .05$) to be in the HR HF group compared to being in the HR LF group if they were not Hispanic, Spanish, or Latino (*odds ratio* = .423). In other words, non-Hispanic people were .423 times as likely to be in the HR HF group compared to the HR LF group. Further, Hispanic people were more likely than non-Hispanic people to have a high amount of false FBMs compared to a low amount of false FBMs if they had a high amount of real FBMs. Participants were significantly less likely ($p < .001$) to be in the HR HF group compared to being in the HR LF group if they were not gun owners (*odds ratio* = .392). Presence of Mental Illness, frequency of using the internet to get information about mass shootings, and political ideology scores were not significant ($p > .05$).

HR LF vs LR LF. Participants were nearly significantly more likely ($p < .054$) to be in the LR LF group compared to being in the HR LF group if they had higher Memory Impairment scores (*odds ratio* = 1.018). Participants were significantly less likely ($p < .01$) to be in the LR LF group compared to being in the HR LF group if they more frequently used the internet to get information about mass shootings (*odds ratio* = .678). Participants were significantly more likely ($p < .01$) to be in the LR LF group compared to being in the HR LF group if they did not have a mental health diagnosis (*odds ratio* = 2.287). Political ideology scores, ethnicity, and gun ownership were not significant ($p > .05$).

To address the potential influence of COVID-19 on the data, the following variables were used to were used to examine FBM categories with HR LF as the reference group: ethnicity, use

of the Internet to get news or information about mass shootings, memory impairment scores, gun ownership, the presence of mental illness, and impact of COVID-19 on daily life. These variables significantly predicted FBM categories, X^2 (14, N = 543) = 157.316, $p < .001$. Since the addition of this COVID-19 variable did not significantly add to the model (i.e., Nagelkerke's R^2 increased by .003, AIC increased, BIC increased, and the COVID-19 predictor was not significant for HR HF compared to HR LF or for HR LF compared to LR LF), only the multinomial logistic regression without the COVID-19 variable is presented (i.e., Table 12).

In sum, participants with higher memory impairment scores, who were Hispanic, and who were gun owners were more likely to be in the HR HF group compared to the HR LF group. Further, participants who used the internet less frequently for information about mass shootings and who were diagnosed with mental illness were more likely to be in the LR LF group compared to the HR LF group. Thus, participants who were more likely to be in the HR LF group (i.e., the most accurate) had lower memory impairment scores, did not identify as Hispanic, were not gun owners, used the internet for information about mass shootings more frequently, and were not diagnosed with mental illness.

HR HF vs LR LF. To examine the relationship of the HR HF and LR LF groups, a second multinomial logistic regression was conducted. Thus ethnicity, use of the Internet to get news or information about mass shootings, memory impairment scores, political ideology (higher scores = more conservative), gun ownership, and the presence of mental illness were used to examine FBM categories with HR HF as the reference group. These variables significantly predicted FBM categories, X^2 (12, N = 543) = 155.504, $p < .001$ (see Table 13).

Participants were significantly less likely ($p < .001$) to be in the LR LF group compared to the HR HF group if they had higher memory impairment scores (*odds ratio = .518*) or if they

more frequently used the internet to get information about mass shootings (*odds ratio = .962*). Participants were significantly more likely ($p < .001$) to be in the LR LF group compared to the HR HF group if they were not gun owners (odds ratio = 2.558) and were significantly more likely ($p < .05$) to be in the LR LF group compared to the HR HF group if they were not Hispanic. Presence of Mental Illness and political ideology scores were not significant ($p > .05$).

Discussion

This study was designed to replicate and expand on Belz (2020), examining factors that predict autobiographical memories of real and false mass shootings using a flashbulb memory framework. The first aim of this study was to identify the presence of FBMs for both real and false mass shootings. According to participant responses, 42.7% of participants had one or more real FBMs and 20.9% of participants had one or more false FBMs, replicating the results of Belz (2020). These findings were present even when requiring an FBM to be classified as having 5 or more canonical features. The relatively high number of false FBMs reported highlights the significant challenge of relying on self-report measures for FBM research.

Due to concerns that ongoing factors related to the COVID-19 pandemic at the time of data collection may have influenced participant responses, we assessed for COVID-related stressors and found that the impact of COVID-19 on the data was marginal. Although the impact of COVID on daily life was significantly correlated with the total amount of real and false FBMs, COVID stressors were not significant when controlling for other variables in the regression analyses. There was a small statistically significant effect on the FBM category in the ANOVA analysis (i.e., individuals with higher impact of COVID-19 on daily life scores being slightly more likely to be in the HR HF group compared to the LR LF group only). Thus, the focus of this discussion will be on the main variables of interest.

The remaining aims of this study were to identify participant characteristics that were significantly associated with real and false FBMs. When grouping participants into 3 groups (i.e., High Real and High False, HR HF; High Real and Low False, HR LF; Low Real Low False, LR LF) according to their FBMs of mass shootings, interesting group differences emerged. Note that the terms high real and high false is again demarcated by the presence of one or more memories.

Members of the HR HF group tended to report greater memory impairment than those in the other groups. This link to memory impairment is perhaps unsurprising given the association between memory problems and retrieval errors (McDonough & Gallo, 2013) and false memories (see Mendez & Fras, 2011; Johnson & Raye, 2000). Similarly, members of this group also had relatively higher depression and stress scores. As with studies by Pardilla-Delgado & Payne (2017), individuals with depression appear to recognize more depression-related stimuli which is congruent to their affect (see Howe & Malone, 2011). Further, our findings align with research by Van Damme (2013), who found depression was associated with increased memory for negative events. In the context of the current study, mass shootings may be classified as negative events that individuals with depression may be more attune to and thus have greater memories of, even if the negative events are false. This supports models of depression by Beck (Disner et al., 2011) which can help explain why individuals with depression may over-estimate the presence of threats and have memory disturbances that over emphasize negative events (see Losiak et al., 2019; Peckham et al., 2010).

Conversely, participants who reported having a history of mental illness had more real FBMs, but not more false FBMs. Furthermore, individuals with mental illness were more likely to be in the HR LF (i.e., more accurate) group compared to the LR LF group, and most

individuals without mental illness were in the LR LF group compared to the accurate group. This discrepancy between how reported history of mental illness and depression scores related to FBMs is difficult to explain. Unfortunately we did not require participants to report specific details regarding their mental health histories when surveying their past mental health wellbeing. A participant's mental health history could involve a variety of different diagnoses (depression, PTSD, ADHD, etc.) that may have unique associations with FBMs. Future studies of FBMs may benefit from a more thorough examination of participant mental history.

Members of the HR HF group were also more often gun owners and gun ownership was associated with greater endorsement of false FBMs. These findings indicate that gun owners may overestimate the frequency of mass shootings. The tendency for gun owners to overestimate mass shootings may be indicative of elevated perceptions of the threat of assault (e.g., being attacked) and danger (Stroebe et al., 2017; Buttrick, 2020; see Warner & Thrash, 2020). These threat perceptions may be intensified by greater news exposure (which can influence FBM formation, see Belz, 2020), that can heighten perceived risk of assault and belief in a dangerous world (Kreienkamp et al., 2021).

Similarly we found that levels of political conservativism, which is strongly correlated with gun ownership (Joslyn & Haider-Markel, 2017), was higher in the HR HF group compared to the other groups. Thus, individuals who were more conservative were more likely to have false FBMs, providing support for the third hypothesis. Interestingly, we also found that members of the HR HF group were also the least politically engaged, as measured by how often they reported accessing political news media sources. Thus gun owners, those who tend to be conservative in their values, and individuals who are less politically informed, may be less apt to distinguish between these real and false mass shootings and may have a tendency to overestimate

their prevalence. Janoff-Bulman (2009) has proposed attunement to and being primed for danger and threat is the default mode of conservatives, who may be more likely to perceive mass shootings as threatening to them and be more likely to encode memories for these events.

Members of the HR HF group also tended to identify as Hispanic, Spanish, or Latino and have greater attraction to the same sex compared to the members of the other FBM groups. Individuals in minority groups (e.g., being Hispanic) have unique vulnerabilities (e.g., disproportionate health outcomes and poverty, experiences of individual and structural racism; Velasco-Mondragon et al., 2016; Kim & Fredriksen-Goldsen, 2011) that can foster higher levels of stress and unique challenges that can impact their worldview and what is regarded as salient, such as mass shootings, compared to individuals in the majority group or culture. Similarly, members of the LGBT community are at a greater risk for crimes committed against them (Katz-Wise & Hyde, 2012; see Burks et al., 2015), and are more likely to have mental health issues such as depression (Lothwell et al., 2020; Willging et al., 2006). This may lead to an increased awareness of threat and influence memories for traumatic events such as mass shootings, especially when sexual minorities are the target of gun violence (e.g., the Pulse nightclub shooting in 2016). Future research can help address the influence of mental health and sexuality on memories for negative events such as mass shootings.

The multinomial logistic regression analysis indicated that members of the HR HF and HR LF groups both appear to be more likely to report getting their information about mass shootings using the internet than the LR LF group. Based on these findings, repetitive media usage serves to facilitate and maintain the presence of FBMs for public events (Talarico & Rubin, 2018). Our prompt asked how much participants use the internet to get or exchange

information about mass shootings, essentially asking how often they used the internet as a tool to gain knowledge or understanding of these events that they may have an inclination toward knowing about (i.e., rehearsal). Thus, one possible conclusion is individuals who get their news from the internet may be more informed or active in their interest in these events, although this awareness does not necessarily translate into memory accuracy for these events (i.e., being more likely to have memories of mass shootings but not distinguish real from false events, see O'Connell and Greene, 2017). One possible explanation for this difference may be interest and engagement in news media and public events. Individuals who are less likely to use the internet to seek out information about public events like mass shootings may also be less likely to remember them, whether they be real or false events. Future studies may benefit from a more nuanced assessment of internet news media consumption, examining what specific online media outlet individuals get their news information from (e.g., CNN, Twitter, Facebook, Fox News website).

Members of the HR LF FBM group tended to also have higher social desirability scores than the other two groups. This provided partial support for the fourth hypothesis, which predicted increased social desirability would be associated with greater true and false FBMs. One possible explanation for our findings that individuals with high social desirability may be more conscientiousness in reporting FBM in experimental studies (see Soubelet & Salthouse, 2011; Peterson et al., 2011). The impact of social desirability and related factors (e.g., OCEAN personality traits) on memory for events such as mass shootings can be examined further in future studies. Future studies may benefit from examining how conscientiousness and other personality traits may influence both real and false FBMs, as well as how these traits relate to gun ownership and political conservativism.

Taken together, it appears the most salient variables that predict real and false FBMs of mass shootings relate to the perceived threat or consequence of these events. Of note, several variables (i.e., gun ownership, being Hispanic, Spanish, or Latino, increased homosexuality, greater conservative political views) made participants less likely to be in the HR LF group, the most accurate group. Gun owners may be more attune to media outlets discussing mass shootings and potential legislation that gun owners may view as impeding on their rights or an aspect of their identity. Members of groups disproportionately targeted for hate crimes, including mass shootings, such as LGBT individuals may have a greater perceived threat of mass shootings being able to affect them and thus be more attune to these events. This increased awareness of mass shootings can lead to greater encoding and retention of these events when they occur, as well as being more likely to identify false mass shootings that fit the narrative of an increased threat to their identity, their lives, or the lives of their children. Individuals in these groups may be more prone to overestimate these threats, which in turn may influence how they respond to these mass shootings. Identifying new ways to promote more accurate perceptions of these tragedies may be important for developing evidenced-based policies to reduce the frequency of mass shootings.

The present study makes a significant contribution to the literature on FBM, as well as memory more broadly, with the examination of memory for real and false shootings with the same group of participants, enabling us to address problems inherent in the methodology of self-reported FBM (e.g., presence of significant memory distortions, controlling for memory of events that did not occur). However, it should be noted that self-report through surveys, while more cost effective, allows for less nuance in participant responses compared to alternative methods such as interviewing. Additionally, the study relied on subjective self-report measures

of memory and emotional impairment, an inherent limitation of most FBM research. More detailed cognitive assessments of memory functioning would be useful in future studies. Future research can address memories for mass shootings using interviews to address components of FBMs (e.g., compare categories across shootings) in more detail. Of note, sexuality was measured on a continuum, which does not account for identities outside the range of homosexuality and heterosexuality (e.g., pansexual, asexual). More comprehensive measures of sexual orientation may be helpful in future studies aimed at identifying links between sexuality and memories of mass shootings. Data was also collected in an online survey. Results regarding the accuracy of online survey methods have been mixed, with some studies supporting the use of this methodology (Evans & Mathur, 2006) and other studies challenging the validity of online surveys (see Andrade, 2020). Participants in the current study passed our validity checks. However, it may be interesting in future studies to compare results when collected in person in lab settings. Finally, it is important to recognize that gun owners are not a monolithic group. Gun owners can range from casual gun owners who support greater gun control regulations to second amendment advocates who view any regulations as an assault to their personal liberty. Future studies may benefit from a more nuanced view of how these important differences among gun owners may relate to differences in memories of mass shootings.

Despite these limitations, this study demonstrates a number of factors contribute to the inaccuracy of FBM and highlight the importance of taking these factors into consideration when researching FBM. We encourage researchers to utilize accuracy checks like the ones we enacted to better recognize and address potential for false FBMs. It is also important to elucidate differences between real and false memory to determine if true events are misremembered for certain groups. Future research can examine if these higher rates of false memories impact the

amount of true memories (e.g., if more false memories lead to higher endorsement of memories for true events), lending further support to the importance of accuracy checks and nuance in investigation of autobiographical memories. As research on mass shootings is limited, it is our hope that future work will expand on these issues and continue to address FBM for these events. In addition, it may be interesting to evaluate how real and false memories of these shootings shape emotional adjustment, interpersonal functioning, political voting/involvement, and other factors over time.

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Appendix

Table 1.
Demographic Information for Variables of Interest

Variable		Percentage	Variable		Percentage
Ethnicity			Race		
	Hispanic, Latino, or Spanish	16.5		White	77.9
	Not Hispanic, Latino, or Spanish	80.9		Black	12.9
Gun Ownership				Native	1.5
	Own Gun	38.7		Asian	4.8
	Not Own Gun	60.6		Other Race	3
Political Affiliation			Sexuality		
	Republican	29.5		0 (Heterosexual)	45.1
	Democrat	46.5		1	9.1
	Independent	16.6		2	3.3
	None	3.8		3 (Bisexual)	16.3
	Other Party	3.3		4	7.7
Diagnosed with Any Mental Illness				5	11.7
	Yes	19		6 (Homosexual)	6.3
	No	81			

Table 2.

Cumulative Percentage of Participants with One or More FBMs of Mass Shootings

Amount of Shootings	Cumulative Percentage Real FBM	Cumulative Percentage False FBM
At Least One Shooting	42.7%	20.9%
At Least Two Shootings	28.0%	16.9%
At Least Three Shootings	20.1%	12.9%
At Least Four Shootings	14.7%	10.4%
At Least Five Shootings	11.9%	9.1%
At Least Six Shootings	9.1%	7.3%
At Least Seven Shootings	6.8%	6.6%
At Least Eight Shootings	4.8%	
At Least Nine Shootings	3.2%	
At Least Ten Shootings	5.7%	

Note: 57.3% of participants did not report any FBM with five or more categories for any real shootings and 79.1% of participants did not report any FBM with five or more categories for any false shootings

Table 3. Amount of Participants with Real and False FBM per Shooting

Shooting	Date	Percent of Participants
Santa Fe HS in Santa Fe, TX	5/18/2018	5.3%
Marjory Stoneman Douglas HS in Parkland, FL	2/14/2018	9.6%
Las Vegas Strip in Las Vegas, NV	10/1/2017	10.4%
Pulse Nightclub in Orlando, FL	6/12/2016	7.4%
Inland Region Center in San Bernadino, CA	12/2/2015	5.1%
Umpqua Community College in Roseburg, OR	10/1/2015	6.6%
African Methodist Church in Charleston, SC	6/17/2015	4.6%
Washington Navy Yard in Washington, D.C.	9/16/2013	7.1%
Sandy Hook Elementary in Newtown, CT	12/14/2012	13.0%
Film Theater in Aurora, CO	7/20/2012	12.7%
Salon Meritage in Seal Beach, CA	10/12/2011	4.5%
Hartford Distributors in Manchester, CT	8/3/2010	6.8%
Fort Hood in Fort Hood, TX	11/5/2009	6.9%
American Civic Association in Binghamton, NY	4/3/2009	5.9%
Virginia Tech in Blacksbury, VA	4/16/2007	5.8%
Goleta Postal Office in Goleta, CA	1/30/2006	7.2%
Red Lake HS in Red Lake, MN	3/21/2005	4.5%
Wedgwood Baptist Church in Fort Worth, TX	9/15/1999	4.1%
Atlanta Day Trading in Atlanta, GA	7/29/1999	7.1%
Columbine HS in Littleton, CO	4/20/1999	12.2%
Zuccolo Recreation Center in Providence, RI		4.1%
Menasha Packaging Company in Neenah, WI		4.6%
Valley View Food Mart in Ashtabula, OH		3.6%
Des Moines UPS in Des Moines, IA		5.9%
Hoover HS in San Diego, CA		3.8%
Stoby's Restaurant in Conway, AR		3.8%
Towne Center Shopping Mall in Webster, NY		6.6%
LifeBridge Church in Savannah, GA		3.4%
Fort Huachuca in Sierra Vista, AZ		7.9%
Pine Brook Elementary in Manalapan, NJ		5.9%

Table 4.
Means and Standard Deviations for Participant Variables of Interest

	Mean	*SD*
Use the Internet for information about mass shootings	1.4	0.98
Sexuality	1.93	2.11
Political Ideology	5.98	2.81
Memory Impairment	22.56	14.68
Anxiety	50.39	12.74
Stress	18.87	6.76
Depression	9.01	4.96
Political Engagement	12.77	4.93
Social Desirability	19.41	2.57
How Much COVID-19 Impacted Daily Life	2.22	1.2

Table 5.

Correlation Matrix of Total Real and False FBM	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. Total Real FBM	-																	
2. Total False FBM	.757**	-																
3. Race (White=1, not White=0)	0.055	0.008	-															
4. Hispanic (Yes=1, No=0)	.217**	.217**	-.183**	-														
5. Age	-0.033	-0.077^	0.042	-0.062	-													
6. Use Internet Mass Shootings	.263**	.283**	-0.074^	.199**	-.199**	-												
7. Memory Impairment	.318**	.367**	0.016	.294**	-.312**	.538**	-											
8. Gun Ownership	.242**	.257**	.097*	.228**	-0.049	.242**	.365**	-										
9. Political Affiliation (Rep=1, Dem=0)	0.015	-0.037	0.057	.135**	.126**	-0.007	0.074	.176**	-									
10. Political Ideology (higher=more conservative)	.166**	.188**	.145**	.175**	-0.002	.230**	.364**	.349**	.436**	-								
11. Presence of Mental Illness (Yes=1, No=0)	.130**	0.061	0.048	.215**	-0.025	-0.023	0.04	0.053	0.052	0.02	-							
12. Anxiety	0.062	0.058	0.026	0.07^	-.285**	.141**	.328**	0.034	0.03	-0.032	.238**	-						
13. Stress	.107*	.170**	0.021	.097*	-.291**	.242**	.521**	.111**	0.012	0.08^	.182**	.691**	-					
14. Depression	0.058	0.08^	0.018	.154**	-.236**	.266**	.479**	.197**	0.054	.158**	0.024	.335**	.508**	-				
15. Political Engagement	-.168**	-.155**	-0.053	-0.016	.154**	-.278**	-.197**	-0.038	.178**	-0.035	.111**	0.042	-.084*	-.088*	-			
16. Social Desirability	-0.069^	-.090*	-.090*	-0.052	.142**	-.147**	-.259**	-.109**	0.054	-0.003	-0.053	-.372**	-.360**	-.244**	.134**	-		
17. Sexuality (higher=more homosexual)	.243**	.272**	0.068^	.236**	-.225**	.350**	.547**	.325**	0.014	.309**	.154**	.149**	.332**	.308**	-.089*	-.133**	-	
18. Impact of COVID-19 on Daily Life	.148**	.111**	-0.054	.098*	-0.039	.208**	.274**	0.069^	-0.019	0.065	0.065	.158**	.214**	.125**	-.154**	-.108**	.162**	-

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

Table 6.
Multiple Regression for Predictors of Total Real FBMs

Predictor	*B*	*B* 95% CI	*Beta*	*t-value*	*p-value*
(Constant)	1.108	[0.62, 1.6]		2.261	0.024*
Ethnicity	0.671	[0.36, 0.98]	0.095	2.146	0.032*
Use Internet Mass Shootings	0.265	[0.13, 0.4]	0.1	2.026	0.043*
Own Gun	0.665	[0.43, 0.9]	0.128	2.789	0.005**
Memory Impairment	0.03	[0.02, 0.04]	0.171	2.703	0.007**
Political Ideology	0.003	[-0.04, 0.04]	0.003	0.076	0.939
Diagnosed with Mental Illness	0.79	[0.5, 1.08]	0.122	2.765	0.006**
Stress	-0.026	[-0.09, -0.05]	-0.07	-1.42	0.156
Political Engagement	-0.064	[-0.09, -0.04]	-0.125	-2.895	0.004**
Sexuality	0.053	[-0.01, 0.12]	0.044	0.863	0.389

Note: R^2 *adjusted* = .162. CI = Confidence Interval.

Table 7.
Multiple Regression for Predictors of Total False FBMs

Predictor	*B*	*B* 95% CI	*Beta*	*t-value*	*p-value*
(Constant)	-0.1	[-0.39, 0.19]		-0.34	0.735
Ethnicity	0.59	[0.45, 0.74]	0.17	4	0.0001**
Use Internet Mass Shootings	0.11	[0.05, 0.17]	0.09	1.76	0.079^
Own Gun	0.01	[0.01, 0.02]	0.15	2.4	0.017*
Memory Impairment	0.3	[0.18, 0.41]	0.12	2.59	0.01*
Political Ideology	0.02	[0, 0.04]	0.05	0.99	0.321
Stress	-0.001	[-0.01, 0.01]	-0.01	-0.15	0.878
Social Desirability	-0.0002	[-0.02, 0.02]	-0.0004	-0.01	0.993
Political Engagement	-0.02	[-0.03, -0.01]	-0.09	-2.01	0.045*
Sexuality	0.06	[0.03, 0.09]	0.1	2	0.046*

Note: R^2 *adjusted* = .201. CI = Confidence Interval.

Table 8.

ANOVA Analyses for FBM Categories

	High Real & High False HR HF Mean	High Real & Low False HR LF Mean	Low Real & Low False LR LF Mean	*F* or *Welch's F* statistic	Significant Relationships
COVID Impact Daily Life	2.56	2.23	2.09	F = 6.80**	HR HF > LR LF
Stress	22.64	17.93	18.06	*F* = 17.636***	HR HF > HR LF, LR LF
Depression	10.13	8.19	8.97	*F* = 4.71**	HR HF > HR LF
Memory Impairment	34.21	18.76	20.01	*Welch's F* = 73.74***	HR HF > HR LF, LR LF
Social Desirability	5.85	6.98	6.33	*Welch's F* = 6.81**	HR LF > HR HF, LR LF
Sexuality	4.14	2.53	2.68	*F* = 25.53***	HR HF > HR LF, LR LF
Political Ideology	7.36	5.49	5.69	*Welch's F* = 22.78**	HR HF > HR LF, LR LF
Political Engagement	11.08	12.3	13.64	*F* = 12.493***	LR LF > HR HF, HR LF

** Significant at the .01 level

*** Significant at the .001 level

Table 9.

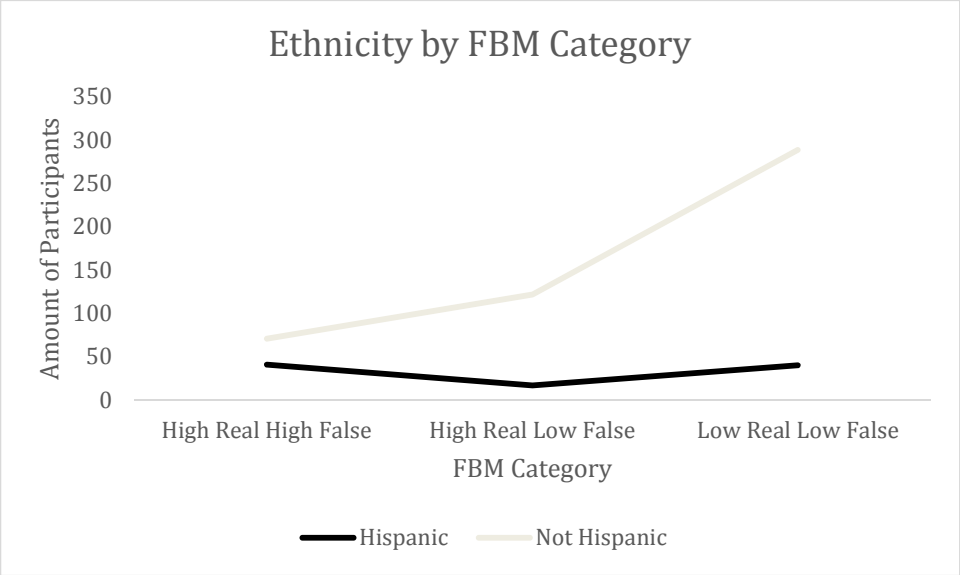

Ethnicity by FBM Category
Amount of Participants
350
300
250
200
150
100
50
0
High Real High False
High Real Low False
Low Real Low False
FBM Category
Hispanic
Not Hispanic

Table 10.

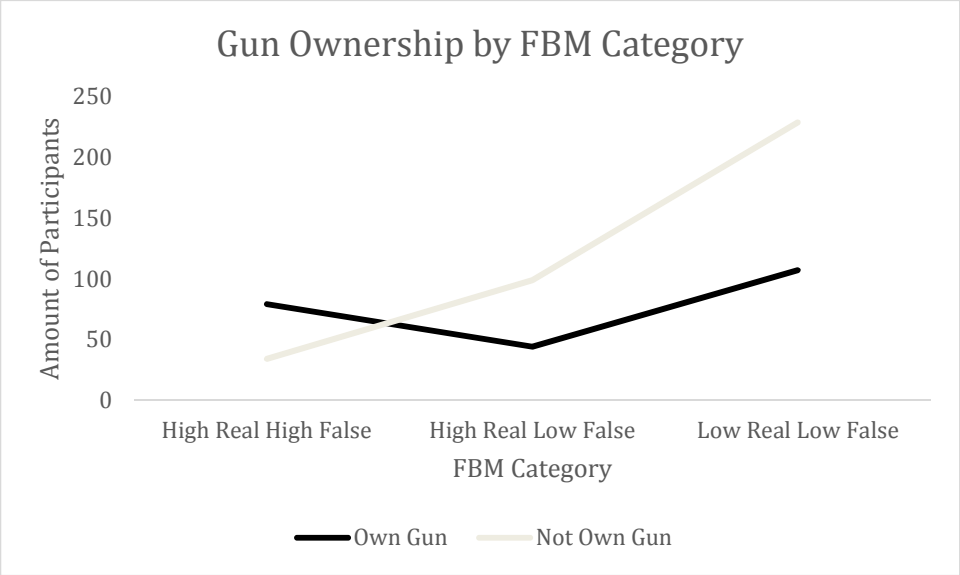

Gun Ownership by FBM Category
Amount of Participants
250
200
150
100
50
0
High Real High False
High Real Low False
Low Real Low False
FBM Category
Own Gun
Not Own Gun

Table 11.

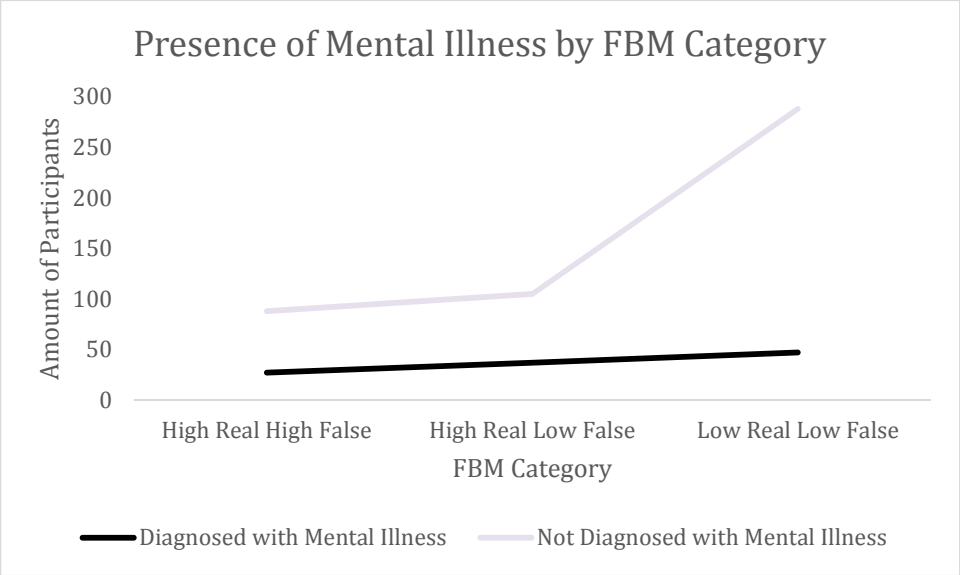

Presence of Mental Illness by FBM Category
Amount of Participants
300
250
200
150
100
50
0
High Real High False
High Real Low False
Low Real Low False
FBM Category
Diagnosed with Mental Illness
Not Diagnosed with Mental Illness

Table 12.
Multinomial Logistic Regression for FBM Categories

Category	Predictor	*B*	*B* 95% CI	*Wald*	*p-value*	*Exp(B)*	*Exp(B)* 95% CI
1 (HR HF)	Intercept	-1.956	[-2.64, -1.27]	8.1	0.004**		
	Memory Impairment	0.056	[0.04, 0.07]	16.125	0.0001**	1.058	[1.03, 1.09]
	Use Internet Mass Shootings	0.269	[0.08, 0.46]	1.998	0.158	1.309	[0.90, 1.90]
	Political Ideology	0.08	[0.02, 0.14]	1.674	0.196	1.083	[0.96, 1.22]
	Hispanic = 0	-0.861	[-1.25, -0.47]	4.828	0.028*	0.423	[0.20, 0.91]
	Gun Ownership = 0	-0.937	[-1.27, -0.61]	8.046	0.005**	0.392	[0.21, 0.75]
	Diagnosed with Mental Illness = 0	0.438	[0.06, 0.82]	1.351	0.245	1.55	[0.74, 3.25]
3 (LR LF)	Intercept	0.187	[-0.33, 0.70]	0.131	0.717		
	Memory Impairment	0.018	[0.01, 0.03]	3.713	0.054^	1.018	[1, 1.04]
	Use Internet Mass Shootings	-0.389	[-0.52, -0.26]	9.185	0.002**	0.678	[0.53, 0.87]
	Political Ideology	0.027	[-0.01, 0.07]	0.443	0.506	1.028	[0.95, 1.11]
	Hispanic = 0	-0.024	[-0.38, 0.33]	0.005	0.946	0.977	[0.49, 1.95]
	Gun Ownership = 0	0.002	[-0.24, 0.25]	0.0001	0.993	1.002	[0.62, 1.62]
	Diagnosed with Mental Illness = 0	0.827	[0.56, 1.09]	9.643	0.002**	2.287	[1.357, 3.85]

Note: The reference category is 2 (HR LF).

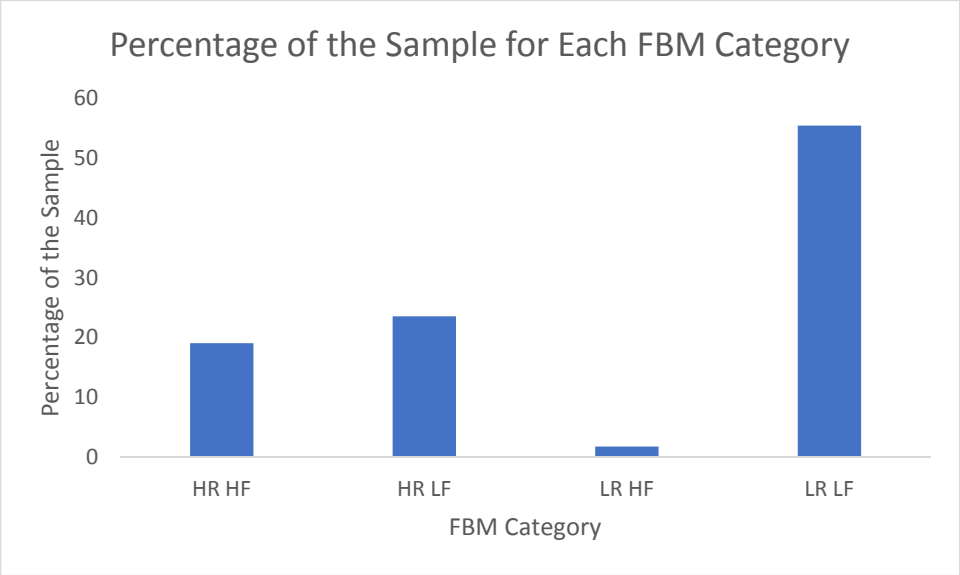
Table 13.

Second Multinomial Logistic Regression for FBM Categories

Category	Predictor	*B*	*B* 95% CI	*Wald*	*p-value*	*Exp(B)*	*Exp(B)* 95% CI
2 (HR LF)	Intercept	1.956	[1.27, 2.64]	8.1	0.004		
	Memory Impairment	-0.269	[-0.07, -0.04]	1.998	0.158	0.764	[0.92, 0.97]
	Use Internet Mass Shootings	-0.056	[-0.46, -0.08]	16.125	0.00006	0.945	[0.53, 1.11]
	Political Ideology	-0.08	[-0.14, -0.02]	1.674	0.196	0.923	[0.82, 1.04]
	Hispanic = 0	0.861	[0.47, 1.25]	4.828	0.028	2.366	[1.1, 5.1]
	Gun Ownership = 0	0.937	[0.61, 1.27]	8.046	0.005	2.553	[1.34, 4.88]
	Diagnosed with Mental Illness = 0	-0.438	[-0.82, -0.06]	1.351	0.245	0.645	[0.31, 1.35]
3 (LR LF)	Intercept	2.143	[1.52, 2.76]	11.9	0.0006		
	Memory Impairment	-0.658	[-0.05, -0.03]	14.109	0.0002	0.518	[0.94, 0.99]
	Use Internet Mass Shootings	-0.039	[-0.83, -0.48]	9.089	0.003	0.962	[0.37, 0.73]
	Political Ideology	-0.053	[-0.11, 0.003]	0.875	0.35	0.949	[0.85, 1.06]
	Hispanic = 0	0.838	[0.51, 1.17]	6.476	0.011	2.311	[1.21, 4.41]
	Gun Ownership = 0	0.939	[0.65, 1.23]	10.363	0.001	2.558	[1.44, 4.53]
	Diagnosed with Mental Illness = 0	0.389	[0.03, 0.75]	1.178	0.278	1.475	[0.73, 2.98]

Note: The reference category is 1 (HR HF).

Figure 1.


Percentage of the Sample for Each FBM Category
Percentage of the Sample
60
50
40
30
20
10
0
HR HF
HR LF
LR HF
LR LF
FBM Category