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## Cognitive Biases Incidence in College Students of a Midwestern Institution

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## **Abstract**

Cognitive biases, including the misinformation effect, cognitive dissonance, and confirmation bias, are misleading ways of reasoning that can alter our perception of reality. Using questionnaires, this study investigated the extent to which these biases are present in the student community of a Midwestern University. It was hypothesized that a moderate proportion of individuals would show cognitive biases based on the literature and previous experiments. Furthermore, it was expected that participants would employ multiple strategies to justify their behavior and thought processes. With a qualitative design, a total of 81 undergraduate students participated in the study. The research design was observational and statistical analysis included descriptive measurements. Results indicated that more than 70% of the students would engage in risky or unproductive behaviors despite knowing the consequences. Similarly, a high proportion of students tended to believe in the information presented on social media after an event had happened. Lastly, a smaller segment of students tended to look for information that supported their beliefs. These results indicate that college students at this institution are susceptible to the use of mental heuristics. Considering the potential adverse outcomes of such actions raises concerns about students' cognitive and physical well-being.

### **Key Words:**

Misinformation effect, cognitive dissonance, confirmation bias

## **Cognitive Biases Incidence in College Students of a Midwestern Institution**

Decision-making is part of everyday life, from simple decisions like what to eat for dinner to more complex decisions such as investing in stocks. However, when judging an action and its consequences (especially for a challenging task), people rely on heuristics that diminish the associated cognitive challenges (Tversky & Kahneman, 1973). Sometimes, these ‘mental shortcuts’ lead to a subjective perception of reality that is not accurate and erroneous. This phenomenon is known as cognitive biases (West, Toplak, & Stanovich, 2008).

Because of the high prevalence of cognitive biases among college students (Castro et al., 2019), this research explains and quantifies three cognitive biases (the misinformation effect, cognitive dissonance, and confirmation bias) in the undergraduate community at a Midwestern University. This is particularly apparent when considering that many scenarios that are encountered in college demand high levels of cognition, such as drug use, academic honesty, and personal care (Wolff & Crockett, 2011). Furthermore, it is deemed relevant as studies have shown cognitive biases might impact adults’ mental health and well-being by altering the effectiveness of their emotional regulation strategies (Schudy et al., 2020).

The misinformation effect is the susceptibility of memories to be altered after post-event information is presented (Szpitalak & Polczyk, 2019). One of the founding studies to build upon this idea was performed by Elizabeth Loftus in 1975. In the first part of the experiment, 150 undergraduate students were shown a recording of a car turning right without stopping at a stop sign and thus causing the collision of 5 cars. Half of the students were asked how fast the car was going when it ran the *stop sign*, and half were asked how fast it was going when it *turned right*. Subsequently, all students were asked whether they had seen the stop sign or not.

A higher proportion (20%) of participants in the “stop sign” group responded “yes” to the latter question, compared to the “turned right” group. Put differently, integrating the words “stop sign” into the question increased the number of participants who *saw* the sign. Therefore, it was concluded that post-event information might cause memories to be altered (Loftus, 1975).

Individuals subject to the misinformation effect are prone to suffer negative repercussions (Loftus, 1995). For example, people required to testify about a crime may be at high risk of changing their memory based upon the wording and information presented after the event (Gabbert et al., 2003). Given the risks and negative consequences associated with the misinformation effect, it is necessary to understand the reasons people tend to modify their views based on post-event information.

According to the literature, there are two dominant explanations for why views may be modified. Individuals may suffer from various memory complications or do not trust enough in their memory (Szpitalak & Polczyk, 2019). One theory is memory reconsolidation. According to Hubcach and colleagues (2009), every time memories are retrieved, they are capable of being changed; thus, post-event information can reconstruct or alter memories by modifying the original perceptions. Researchers have subsequently found that semantic and emotional memories are highly susceptible to change (Drexler & Wolf, 2018).

As mentioned earlier, memories are also prone to change even when individuals recall accurate information. Studies have shown that people tend to distrust their memory, thereby answering inaccurately when asked about an event (Szpitalak & Polczyk, 2019). In an experiment done by Polczyk (2017), participants were shown a video clip about a robbery and then instructed to read a narrative that presented the event again, but with misleading information; subsequently, participants had to complete two tests. Both tests had the same

questions regarding what had happened about the event; however, instead of being open-ended as the first one, the second test required participants to report whether they had found differences between the video and the information in the narrative. The results indicated that some participants, despite identifying discrepancies, still reported inaccurate information (Polczyk, 2017).

Post-event information is not the only mechanism whereby perceptions are altered. For instance, individuals have several prejudices and biases that shape memory consolidation and retrieval (Ariely, 2008). A good case in point, Confirmation bias is the inclination to look for information that supports one's beliefs, ideas, or knowledge (Nickerson, 1998). To illustrate the concept, suppose one believes that people who wake up late are more intelligent than those who wake up early. One day, in the news, one finds out that Albert Einstein woke up late, which helps support one's preexistent beliefs. The concept of confirmation bias originated in a research experiment by Peter Wason in 1960. Although he did not coin the term as such, his investigation explained the tendency generally. Wason recruited undergraduate students and gave them a set of three numbers, for example, 2, 5, 8. Their objective was to find a rule that Wason had created related to all three numbers. To do so, students had to write groups of three numbers that they thought fit with the rule and subsequently explain its reasoning. The researcher would then tell participants whether they were correct or not until they had found the appropriate answer. The experiment results suggested that most participants tended to modify the description of their perceptions rather than the perceptions per se (Wason, 1960). Put differently, subjects tended to confirm the rules that they already had in their mind before attempting to find new explanations. For example, if someone thought the rule implied the distance between the numbers, they would modify it (e.g., 2-4-6 and 2-5-8) rather than trying another idea.

Currently, confirmation bias is considered inherent to the human condition and is thus present in all human interactions, whether face-to-face or on the web (Morales, 2019). A recent thought experiment created by Pines (2006) attempted to indicate how this bias can happen in the health care field. The situation is as follows. Think of a busy emergency room at 2:45 am in which a 51-year-old patient is being seen due to lower back pain that has been persisting for more than seven days. The patient had come the day before and was examined by Doctor S, who prescribed some painkillers and diagnosed his problems as not severe. When Doctor J evaluates him on the next day, his results are very similar to Doctor S'; moreover, when the nurse arrives, she tells Doctor J that many patients are waiting outside to be seen and thinks the patient is showing drug-seeking behaviors. All this information confirms Doctor J's initial opinion, and hence he releases the patient from the hospital. In that sense, Doctor J refused to explore additional options because he succumbed to confirmation bias.

An issue that may lead to confirmation bias is cognitive dissonance (Harmon-Jones & Harmon-Jones, 2007). Dissonance is the experience wherein two or more beliefs, and thoughts seem to contradict one another (Festinger 1957). To reduce cognitive dissonance, individuals engage in behaviors or attitudes that either gather information to support their decisions or avoid information contradicting their choices (Harmon-Jones & Harmon-Jones, 2007).

When cognitive dissonance occurs, individuals usually experience a state of stress that triggers behaviors intended to reduce the dissonance (Westen et al., 2006). For example, suppose a student is failing a class and is left in the professor's office with a copy of the key for a final examination in front of them. They have two options: one of them is to not look at the key, fail the class, and be forced to retake it during the next semester. As an alternative, looking at the exam would help the student pass the course and avoid these unpleasant consequences, but it

would also go against their self-concept of being a moral person and make them feel bad afterward. What will the student do?

In an attempt to understand how people behave when dealing with cognitive dissonance, Festinger and Carlsmith (1959) performed one of the classic experiments on the subject. Participants at Stanford University were recruited to perform a tedious activity for one hour; afterward, they were paid either 20 dollars or 1 dollar to lie and tell other students the task was enjoyable. Participants who were paid less did not have enough incentive to lie and hence experienced more dissonance. The participants of the other group, in contrast, received enough money not to feel dissonant about it. In addition, individuals who were paid 1 dollar changed their attitude towards the task, and they assessed it as more enjoyable than they did at the beginning. Thus, some participants attempted to reduce their cognitive dissonance and stress by modifying their current actions, integrating new behaviors, and attributing value to an outcome they had strived for (Festinger, 1962). This paradigm is known as effort justification (Aronson & Mills, 1959).

Besides understanding effort justification is fundamental to understand why inconsistency produces stress and discomfort. According to the action-based model by Harmon-Jones and Harmon-Jones (2009), dissonance does not allow individuals to act and behave as they would ideally intend. For instance, consider the hypothetical situation of a college student who went to sleep at 1 am doing homework and promised to go to the gym at 6 am. When they wake up, the feeling of tiredness is overwhelming, but the will of being self-accountable is also present. Based on the idea of cognitive dissonance and previous research on the topic, a mental conflict would originate, thereby complicating the decision-making process of the student;

because individuals tend to reduce and avoid dissonance, the choice which leads to less stress would be favored by the student.

Considering the extensive literature research on cognitive biases, the potential mechanism whereby it affects mental processes and well-being, and its incidence in different populations, the current study examined the extent to which the misinformation effect, cognitive dissonance, and confirmation bias were present in the student population at a Midwestern University. Multiple studies have previously examined the prevalence of these mental heuristics in other populations. For example, one study showed that 10% of adults suffered the misinformation effect when exposed to a story and a description with misleading information (Calvillo, 2014). Furthermore, there is evidence that individuals exposed to misleading information tend to report less accurate data than those presented with correct information (e.g., Nastaj et al., 2019). Regarding cognitive dissonance, empirical evidence suggests that younger and older adults experience tension when their actions contradict their attitudes (Cooper and Feldman, 2019). Lastly, a contemporary study examining confirmation bias in selective exposure to online political information indicated that individuals spend more time attending information consistent with their attitudes (Westerwick et al., 2017). Thus, it was hypothesized that a moderate proportion of participants would exhibit the misinformation effect, cognitive dissonance, and confirmation bias. Furthermore, it was expected that participants would justify their thoughts and behaviors with multiple strategies.

## **Method**

### **Participants**

Students from an introductory psychology class at a Midwestern University were invited to participate in this study. All students were given extra credit to participate in the experiment.

A total of 81 students participated in the study. The majority reported being female (52), nineteen years old (45), white (41), freshmen year classification (65), and politically moderate (32). Table 1 presents detailed demographic data for this sample.

**Table 1**

*Demographic characteristics of participants*

Characteristic	<i>n</i>	%
<b>Gender</b>		
Male	52	64.2
Female	28	34.6
Not provided	1	1.23
<b>Year classification</b>		
Freshmen	65	80.2
Sophomore	13	16.1
Junior	2	2.5
Senior	1	1.2
<b>Ideology</b>		
Very conservative	3	3.7
Conservative	20	24.7
Moderate	32	39.6
Liberal	12	14.8
Very Liberal	3	3.7
Declined to answer	11	13.5

The IRB of the University approved the study protocol, and all participants were provided informed consent before participation. Prior to completing the online questionnaires, participants were informed about the aim of the study and their right to withdraw at any moment. Additionally, participants were ensured about the anonymity of the data collected. An independent groups design was used in this experiment. Because researchers could not have Sona utilize random assignments for the experimental condition, participants were allowed to choose the experiment of their choice after reading the instructions and providing informed consent. To have a similar number of participants completing experiments A (42) and B (39), 50 responses were permitted for each experiment in Sona Systems. Experiment A and B only differed by the narrative participants would have to read during the first part of the study and the questions associated with this story (described in the subsequent section). Participants were not informed about any details regarding the differences between experiments A and B.

### **Materials & Measures**

Participants were asked to complete an online survey to better understand cognitive biases for students at a Midwestern University. The online survey was prepared in Sona Systems® and was open for one month. Students from the introductory class of psychology who sought to participate in the study were able to access the online questionnaire at any time, during the thirty days.

### ***Misinformation Effect***

For both experiments, participants were first told that they would read a short news story and that memory for this story would be tested later. This initial portion of the study primarily assessed the misinformation effect and supplemented the confirmation bias assessment (described in the subsequent section). The stories participants read varied by experiment:

(Experiment A) Last Monday, it was reported that the Ku Klux Klan organized a march in which they had a banner supporting a prominent Republican. The protest took place in downtown Pulaski, Tennessee, at around 10 am. News sources like NBC, Fox News, and CNN were present at the event, and they reported that more than 9,250 civilians, including college students, were present at the event. Several social/political groups showed up to protest the Ku Klux Klan demonstrators, and police had to be called to the event to maintain peace.

(Experiment B) Last Monday, it was reported that the Black Lives Matter movement organized a march in which they had a banner supporting a prominent Democrat. The protest took place in downtown Boston, Massachusetts, at around 10 am. News sources like NBC, Fox News, and CNN were present at the event, and they reported that more than 9,250 civilians, including college students, were present at the event. Several social/political groups showed up to protest the Black Lives Matter demonstrators, and police had to be called to the event to maintain peace.

After presenting the above story, students were asked whether they had seen the YouTube video of Kobe Bryant's helicopter crashing and if they believed it was true. This question served as a "real-life" check of the misinformation effect, as a "fake" video of this event was widely disseminated on social media following the actual events. Some Twitter posts had more than 3 million views alleging they showed the helicopter crash video (Quintero, 2020). However, the Associated Press confirmed days later that all the content circulating on social media was inaccurate (Lajka, 2020).

### ***Cognitive Dissonance***

The primary assessment of cognitive dissonance was presented when students were assigned to read and answer a questionnaire with the following scenarios (these questions were presented in each experiment):

Suppose you have been having relationship problems with your significant other. You deeply care for them, but you are concerned that they do not feel the same way about you. As you are driving down a busy highway, you receive a call on your cell phone from your significant other. Would you answer the call? Why or why not?

Do you use your cellphone in class for reasons other than those sanctioned by the instructor (i.e., don't include uses in which you were asked to "look something up," do something on Canvas, or play a Kahoot!)? Why or why not?

Do you cram before taking exams in college (e.g., you do not study throughout the time before an exam, you "pull an all-nighter" before an exam, etc.)? Why or why not?

Immediately after answering these three questions, participants were asked whether they knew that research shows that any kind of distraction negatively affects a driver's capacity to drive. They were also asked if they knew that research has demonstrated cell phone use in class affects concentration and academic performance. Lastly, they were asked if they knew that research has demonstrated cramming is not helpful because it is associated with higher levels of stress and the tendency to forget the material much faster compared to studying that is done more regularly.

### ***Confirmation Bias***

Confirmation bias was tested by asking students questions that supported various statements based on fictitious research or polls. After students had read the information, they had to answer whether they agreed with the fictional information, disagreed with the fictional statement, or needed more information before agreeing or disagreeing. The questions given to participants in both experiments were:

According to a recent poll done by the American Council on Education, Missouri Western State University is rated as a better school than Northwest Missouri State University in graduation rates and affordability.

The American Journal of Psychology reported that individuals who participate in research studies are thoughtful and brave.

Lastly, participants were reminded of the story they read at the beginning of the experiment. Participants were asked a series of questions, with the first three questions serving as attention check questions (those that were presented in both experiments) and one question serving as a test of the misinformation effect:

Which movement was present at the event in question?

Which news agencies were present at the event in question?

Approximately how many individuals were present at the event in question?

Do you remember reading about the sign which endorsed Donald Trump? (Experiment A only)

Do you remember reading about the sign which endorsed Joe Biden? (Experiment B only)

Demographic questions were included at the end of the study in which gender identification, college classification, ethnicity, age, and political ideology were collected. The latter was measured with a Likert scale ranging from 1 (very conservative) to 7 (very liberal); this scale was reversed for half of the participants.

### *Coding Categories*

In order to identify and analyze participants' behaviors and mental processes, coding categories for the misinformation effect and cognitive dissonance were created by the researcher to serve as a grouping mechanism derived from the analysis of their responses. Because of the plethora of peer-reviewed research regarding the potential causes and explanations for cognitive biases, the current study did not develop coding categories in advance. Note that possible reasons to explain participants' cognitive processes based on the literature could have been extensive and potentially inaccurate since it would not have considered the background and demographic characteristics of the sample. Instead, coding categories were inductively developed and analyzed using conventional content analysis (Hsieh & Shannon, 2005). For this purpose, the researcher read all participants' responses and derived codes based on keywords and concepts obtained therein. Initial coding schemes were later classified until four or fewer categories remained for each cognitive bias question and scenario.

Subsequently, two research assistants blind to the purpose of the study classified participants' responses into the different categories previously designed. Both coders were trained to take note after each response they read, annotating keywords from the text and inferring potential thought-processes (e.g., reasons to justify their actions) of the participants to categorize them (Hsieh and Shannon, 2005). The researcher analyzed initial ratings (first round),

and additional categories were created as previously discussed (i.e., by reading and inferring from participants' responses) (*percent agreement* = 64%,  $\kappa = 0.65$ ). The second round of ratings was then conducted, and all disagreements were resolved via discussion, resulting in interrater reliability of the response category of 100% (*percent agreement* = 100%,  $\kappa = 1$ ).

Statistical analysis of the results consisted of descriptive measures such as count data (e.g., how many participants reported cognitive dissonance) and proportionality of a particular response compared to others in the same category (i.e., percentage). For instance, in the group of participants who observed Kobe Bryant's video and believed it was real (see Table 2), there are four coding categories with a percentage associated that sum together equal one-hundredth percent.

## Results

### Confidence

Regarding the fake helicopter crash video, a significant percentage of those who viewed or not the video believed in its veracity due to confidence. For those who watched the video (34), confidence in sources (57%) and confidence based on sympathy (13%) were reasons to support their viewpoint. Similarly, for those who did not view the video (24), confidence based on sympathy (47%) and in sources (20%) were common arguments (see Table 2). Interestingly, 22% of the latter group had confidence on their own judgement and hence did not believe in the veracity of the clip.

**Table 2**

#### *Misinformation Effect*

	<i>n</i>	% within category
Viewing of video, belief in the video, and justification for beliefs		
Viewed the fake Kobe Bryant helicopter crash video	34	

Believed it was real	23	68
Confidence in sources	13	57
Confidence based on sympathy	3	13
Realistic setting	3	13
Other	4	17
Didn't believe it was real	11	32
Distrust in the sources	8	73
Distrust in possibilities	1	9
Other	2	18
<hr/>		
Did not view the fake Kobe Bryant helicopter crash video	24	
Believed it was real	15	63
Confidence in sources	3	20
Confidence based on sympathy	7	47
Other	5	33
Didn't believe it was real	9	38
Distrust in sources	1	11
Distrust in possibilities	2	22
Confidence in own judgment	2	22
Other	4	44
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With respect to cognitive dissonance, some individuals were aware of the dangerous and non-recommended behaviors, but still performed these behaviors due to confidence. For instance, 15% of the participants would answer the phone while driving because they believe in

their ability to multitask (see Table 3). Note that 15% is equivalent to 9 students considering that among the 80 participants who responded to this question , 61 reported they would answer the phone while driving, and 59 exhibited dissonance. In a similar way, 28% of the students who would cram before an exam and recognize it as an unproductive strategy would do it because they deemed it as a helpful strategy.

The results obtained for the confirmation bias experiments indicated some participants agreed with and trusted in the positive or negative statements about groups they belonged to. In the first statement related to Northwest Missouri State University, while 61 participants (82.7%) showed no bias, 14 exhibited confirmation bias (17.3%), which implies they agreed with the statement that Missouri Western is a better university than Northwest Missouri State University. In the second statement about research participant bias, 27 demonstrated confirmation bias (33%) which indicates they agreed with the claim that individuals who participate in research studies are thoughtful and brave. Interestingly, 43 students (53.09%) showed no preference.

**Table 3**

*Cognitive dissonance*

Scenario	<i>n</i>	%
<b>Driving and talking</b>		
Exhibited dissonance	59	73.8
Did not exhibit dissonance	21	26.2
<b>Phone in class</b>		
Exhibited dissonance	49	60.5
Did not exhibit dissonance	32	39.51

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Cramming			
	Exhibited dissonance	35	43.3
	Did not exhibit dissonance	46	56.7

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## **Distrust**

Lack of trust was one of the main reasons for which several participants did not believe in Kobe Bryant's helicopter crash video. In the group of students who observed the video, 11 (32%) did not believe in its veracity due to distrust in sources (73%) or possibilities (9%). Regarding those who did not watch the clip, 9 claimed not to believe the video was real because of similar reasons: distrust in sources (11%) or possibilities (22%). Regarding the political scenario, only 3 participants reported seeing a specific candidate's name in the political candidate misinformation scenario: 1 for Donald Trump and 2 for Joe Biden. In other words, more than 95% of the participants did not trust in the statements presented in the questionnaire. Because of the lack of misinformation in this part of the experiment, an analysis was unable to be conducted. Thus, relevant conclusions were not made about this section of the misinformation effect.

Some responses for the confirmation bias scenario indicated a fraction of participants did not trust in the statements provided. Of the 67 participants who did not agree with the statement about Northwest Missouri rating, 6 showed opposite bias (i.e., agreed with the statement that Missouri Western is a better university). Additionally, 11 students exhibited opposite bias (i.e., disagreed) regarding the claim that individuals who participate in research studies are thoughtful and brave. Notably, the majority of participants (43) showed no bias.

## **Positive emotions**

Across the different scenarios, several participants exhibited cognitive biases and justified their behaviors based on seeking or feeling positive emotions. With respect to cognitive dissonance, 43% of the participants who would drive and talk in the phone argued they were caring for the person calling. In addition, 11% would reply because it might be an emergency that needed to be taken care of. Similar results were obtained about using a cellphone during class. Among the participants who exhibited dissonance (60%), seven percent (7%) would do it to relief anxiety and 43% to diminish feelings of boredom and lack of concentration. Interestingly, 23% would look at their phone for texting or looking for information. Among the 35 students who would cram and recognized it as an unproductive strategy, approximately 13% justified it because of a lack of interest or time. Other reasons unrelated to seeking positive emotions included having poor study habits (40%).

### **Discussion**

Based on Calvillo (2014), it was hypothesized that a moderate proportion of the participants would experience the misinformation effect. Results indicated that a high number of students believed in the fake helicopter crash video for those who had seen the video (68%) and those who did not (63%). In contrast, a lower number of participants (3.7%) validated the presence of a political candidate in the scenarios presented. One possible explanation could be the narrative rehearsal hypothesis proposed by Neisser and colleagues (1996). Participants may have believed more in the video because they could have watched it or heard about it several times on social media or news platforms. In contrast, the political scenario was read only once, and hence it was not rehearsed.

In addition, it is reasonable to think some participants could have been emotionally attached to the accident of Kobe Bryant but not to the political scenario. When memories are

attached to emotions, these events tend to be more easily remembered; thus, whether participants believed the video was accurate, they would have been more likely to remember it (Goldstein, 2015).

Another explanation for the misinformation effect in college students could be their tendency to trust sources that they consider accurate and authoritative. Consequently, participants were subject to a phenomenon known as authority bias (Juarez, 2019). In the present study, the authority figures were the social media platform where they saw the video and the news source presented to them. This would imply that participants believed more in social media because they use it regularly and obtain accurate information from their point of view. Moreover, reading other people's comments could have reinforced the idea that the video was true. Studies have shown external opinions significantly influence our own (Moussaid, et al., 2013; Campbell-Meiklejohn, et al., 2010).

One last consideration is the political ideology reported by participants. The majority of those who showed a political inclination (64 of 70) were not very conservative or liberal. Put differently, most participants identified as politically moderate individuals. Thus, students may not have suffered from confirmation bias because there was no strong identification between the participant and any particular political group.

Regarding cognitive dissonance, many participants would engage in risky or unadvised behaviors. These results are also in line with the findings of Harmon-Jones and Harmon-Jones (2007) because it indicates participants may have done something to reduce dissonance. For example, students claimed to have ignored the negative consequences of their actions and thus, implicitly reduced feelings of discomfort. Moreover, the fact that no student reported distress over their actions confirms that they must have done something to reduce it in the first place.

The elevated proportion of participants demonstrating cognitive dissonance could be explained by the concept of effort justification (Aronson & Mills, 1959). In a sense, participants may have supported their actions based on the context of the situation and hence argued that it was reasonable to behave in unadvised ways. For instance, in the scenario of answering a phone call while driving, participants claimed it was more important to talk with their significant other because the relationship was at risk. Some responses included statements like “I would answer the call because I deeply care for that person and feel it was worth the risk” and “Yes because it could be an emergency.”

In addition, participants may have reasoned that the absence of accidents could justify the behavior. For example, one participant said, “Yes [I would answer the phone call] because I can multitask,” and another claimed something similar by saying, “Yes, it's not hard to drive and talk on the phone.” Besides disregarding the possibility of future accidents, these responses suggest that participants were suffering from overconfidence bias, which is the tendency of overestimating one's skills and judgment (Logg et al., 2018).

An error with these individuals' methods of reasoning is that evidence can support a conclusion, but it can never predict or guarantee it will always occur in the same way. Put in different words, an inductive argument only explains how probable an event might be. Thus, participants may have underestimated the consequences of their actions based on previous experiences, which do not guarantee the same outcome in the future. These errors in reasoning could also explain why more participants than initially predicted suffered from cognitive dissonance.

Confirmation bias was the last phenomenon to be analyzed. Unexpectedly, more students experienced this bias in the research participant statement compared to the NWMSU student

statement. One possible explanation for these results is that people, in general, tend to overestimate their abilities, virtues, and skills in a condition known as illusory superiority (Cohen et al., 2014). Therefore, even though participants were students attending the Midwestern University, the assertion that they were brave and thoughtful individuals had more relevance. Put differently, students were more interested in personal evaluations and hence were more prone to suffer from bias.

Based on the reasoning that people want to have a positive self-image, self-deception could explain why participants rated themselves positively. Self-deception is the phenomenon wherein people modify their beliefs, ideas, and thoughts to construct a biased perspective (Triandis, 2011). Thus, participants willing to rate themselves as brave and thoughtful were more likely to do it after reading the information in the study.

### **Limitations**

One experimental limitation was the sample size. A total of 81 undergraduate students was not large enough to ascertain the prevalence of cognitive biases on college students. Moreover, the sample was not representative of the Midwestern University student population because it only included undergraduate psychology students. Furthermore, factors like year-classification, political ideology, ethnicity, and gender could have been more diversely represented. Future studies should therefore increase the sample size and representativeness among student populations. The limitations associated with the lack of observed biases in the political scenario presented in the misinformation effect section are possibly related to the small sample size. Unexpectedly, the current study could not report or analyze significant cognitive biases associated with political inclinations.

Additional limitations to consider are the challenges associated with using conventional content analysis to develop coding schemes and categories to group participants' responses. This method limits how findings can be analyzed considering preexisting theoretical frameworks because it is based on the researcher's interpretation (Hsieh & Shannon, 2005). Furthermore, this process tends to be highly time-consuming and subject to increased error due to its subjective nature.

### **Conclusion**

Everything considered the students from the Midwestern University who were sampled largely experienced cognitive biases in the range predicted by the literature. These results could be helpful for policymakers, professors, parents, and the board of regents at the University and possibly other schools in the state of Missouri. The elevated proportion of students who would engage in unadvised behaviors and demonstrated dissonance exposes the need for having different policies, rules, and educational programs to secure their wellbeing. As previously reported in the literature, cognitive biases might influence the mechanisms whereby adults regulate their emotions (Schudy et al., 2020). Therefore, future studies should consider investigating the incidence of cognitive biases in college students while assessing their wellbeing. For example, studies could pursue whether there is a correlation between altered emotional regulation of the exhibition of mental heuristics. Similarly, higher education institutions should consider increasing awareness across their students about the existence of cognitive biases, help them identify their preferences, and open spaces of dialogue among peers.

Notorious among the study results is participants' inclination to believe in social media; notably, this trend exhibits the influence these platforms have on college students. Because of their popularity and impact, educating young individuals in critical thinking skills is fundamental

to avoid experiencing the misinformation effect. Finally, students' higher tendency to experience confirmation bias regarding personal judgments may suggest people are more interested in maintaining a positive self-image than a favorable opinion of an institution or organization to which they belong. One way to increase students' care for their organization could be to create an emotional connection with the school's history, infrastructure, or values.

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