Assessing the Potential Influence of Anti-Transgender Bias on Memory and Judgements

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Abstract

Decades of prior research have shown that our memory is susceptible to a variety of influences that can distort the accuracy of what we remember. For example, false memories can be implanted into an individual's mind and top-down factors like expectations and prejudicial biases can sway what we do and don't remember about an event. The current study was designed to assess the potential memory-modifying influence of an understudied, yet important, type of bias - anti-transgender bias. Although prior research has documented the prevalence of anti-transgender bias in today's society, no study has yet examined how these biases may shape our memory and judgements of an event. To that end, we asked participants to read a set of short stories centered on an individual's day at an amusement park and later recall details from those stories and make judgements regarding specific events that took place. One of these stories involved the main character helping a child wash their hands in a restroom. Critically, we manipulated the gender of the main character (cisgender man, transgender man, cisgender woman, or transgender woman) as well as the gender of the restroom (men's or women's room). Participants also completed an anti-transgender bias scale. Results will shed light on the potential influence of anti-transgender bias on memory and judgements, as well as if that influence varies between transgender men and transgender women.

Assessing the Potential Influence of Anti-Transgender Bias on Memory and Judgements

Today, there are an estimated 1.1 million individuals in the US who identify as transgender and likely even more who are not open about their identity (e.g., Herman et al., 2022). Unfortunately, it is not uncommon for these individuals to be discriminated against because of their identity. For example, 450 anti-transgender bills have been introduced in the United States in just the first three months of 2023 alone – more than in the past five years combined (Trans Legislation Tracker, 2023). Prior research has shown that transgender individuals, particularly transgender women, are likely to face implicit bias from others regardless of their gender and sexual identity (Wang-Jones et al., 2018). The current study aims to understand whether anti-transgender bias potentially influences event memory and later judgements, like the effects that other biases have been shown to have on memory encoding and retrieval (e.g., Leffers & Coley, 2021; Van Knippenberg et al., 1999).

Our memory is an incredibly complex yet helpful tool for everyday use and survival. Despite its usefulness, our memory is also susceptible to distortions (Loftus, 1979; Roediger & McDermott, 2000). For example, false memories can be implanted into a person's mind if they are told an event happened in their life, even if that event never actually occurred (Hyman et al., 1995). Additionally, factors unrelated to the specific memory can also lead to errors, such as the length of the retention interval between encoding and retrieval (Loftus, 2005) as well as internal states like stress (Payne et al., 2006; Pezdek et al., 2021) and mood (Bower, 1981; Levine & Pizzaro, 2004).

Our memory system also relies on heuristics that allow for quick encoding and recall at the expense of accuracy, such as using prior knowledge to aid in encoding the overall gist of a scene rather than every single detail (Schacter, 1999). However, heuristics can also lead to

problematic inferences and inaccurate stereotypes (Kleider et al., 2008). Memory for other-race faces is typically worse than memory for same-race faces (e.g., Leffers & Coley, 2021) and participants are more likely to remember aggressive details from a previously read story if the main character is black, rather than white (Levinson, 2007). In addition to racial bias, gender biases can also influence our memory. For example, Mickes et al. (2012) had participants read over captions written by men and women and later recalled the gender of who had written each caption. The researchers found that participants were more likely to misattribute humorous captions to men and non-humorous captions to women, reflecting the influence of one type of gender bias on later recall (Mickes et al., 2012). In addition, Lenton et al. (2001) found that when participants were given words to study that were either stereotypically gendered (e.g., nurse for women, detective for men) and non-gendered (e.g., earnest), participants were more likely to falsely recall stereotypically gendered words compared to the non-gendered words on a later memory test. One bias that hasn't been researched regarding its potential influence on memory is anti-transgender bias.

The term "transgender" refers to an individual who identifies as a gender that is different than their biological sex and assigned gender at birth (American Psychological Association, 2023). Research indicates that transgender individuals experience discrimination in a variety of everyday contexts. Transgender individuals are more likely to be harassed and experience violence than cisgender individuals (Lombardi et al., 2002), and they lack the support and acceptance given to cisgender individuals in both workplace (Dietert & Dentice, 2009) and medical settings (Grant et al., 2010). Surveys show that anti-transgender biases and stereotypes may arise from the implication of less-rigid gender categories and the perceived threat to heteronormative ideology (Rad et al., 2019). Transgender individuals are also often conflated

with being mentally ill and in-need-of therapy (Gazzola & Morrison, 2014). One of the most common situations in which anti-transgender biases manifest are gender-specific spaces, such as restrooms and locker rooms (White & Jenkins, 2017). Prior research has shown that transgender individuals face backlash when entering a gendered space matching their gender identity (e.g., a transgender man using the men's restroom; Beemyn, 2005), with transgender women often experiencing even greater discrimination than transgender men (White & Jenkins, 2017).

Despite wide documentation of these biases in recent years, very little research has been conducted on how they may affect memory. This is important to understand because it could affect eyewitness accounts of transgender individuals going into gendered spaces and memory for details that occurred in those spaces. The current study seeks to understand the potential influence of anti-transgender bias on memory for events as well as later judgements made about the individuals involved in those events. Participants read four short stories each followed by a true/false recognition memory test and a judgment question about specific details that occurred in those stories, before completing an anti-transgender bias rating scale. In each story, participants read about "Sam", whose gender was manipulated across four between-subjects conditions, and their recent trip to an amusement park. Each story involved a problematic situation (e.g., accidentally cutting in front of someone in line) and participants later judged the amount of blame each person involved in the situation should receive. The third story featured the critical manipulation, in which Sam helps a child wash their hands in a restroom that matched or didn't match their gender identity.

Based on prior research focused on other types of memory-modifying biases, we predicted that recognition memory performance would be lower (and blame judgements for Sam would be higher) in the critical third story when Sam was transgender vs. cisgender (e.g.,

Callahan et al., 2019; White & Jenkins, 2017). We also predicted that the difference in story

three blame judgements between Sam and the other people involved would be greater when Sam

used the wrong (or mismatched) restroom. Critically, we predicted that Sam would receive

similar amounts of blame in story three when they were transgender and used the correct

restroom as when they were cisgender and used the wrong restroom, a pattern that may be even

more apparent when Sam was identified as a transgender woman (i.e., a similar amount of blame

when Sam was a cisgender man using the women's restroom vs. a transgender woman using the

women's restroom). We also expected to find a positive correlation between the amount of

blame given to Sam in the third story and participant's score on the attitudes towards transgender

individuals scale completed at the end of the experiment (Billard, 2018). Importantly, these

predicted differences for memory and judgements for the critical third story should not emerge in

the other three stories that didn't feature a gendered space.

Methods

Participants

Undergraduate students at Union College participated in this experiment either for course

credit ($n = 36$) or monetary compensation ($n = 28$). Currently, only 64 of the 120 intended

participants have fully completed the experiment (with about nine participants per each between-

subjects condition as described below). A majority of participants identified as female ($n = 46$,

17 as male, and one as nonbinary) and white ($n = 39$, ten as Asian, five as Hispanic, three as

Black, two as Jewish, one as Indian American, one as mixed, and one did not provide this

information), and were about 20 years old ($M = 19.6$, $SD = 1.33$, $Range = 18$ to 23).

Materials and Design

The survey was created using Qualtrics survey software and distributed via Union College's SONA systems website. Participants read four short stories describing Sam's day at an amusement park. Stories were about 175 words each ($M = 178.25$, $SD = 29.69$, $Range = 150$ to 220) with only Sam's gender and the gender of the restroom they used in the critical third story varying between each between-subjects condition (see the Appendix for the specific texts used in each story).

The critical independent variables were Sam's gender identity (cisgender man vs. cisgender woman vs. transgender man vs. transgender woman) and the gender of the restroom in the critical third story (men's restroom vs. women's restroom), both manipulated between-subjects, resulting in six overall conditions (note that transgender conditions were not paired with mismatched restrooms, i.e., there was no transgender man + women's restroom condition nor a transgender woman + men's restroom condition). Memory for details in each story was assessed via a set of eight true/false recognition memory questions, while judgments regarding the amount of blame different individuals should receive were recorded on a 0% (no blame) to 100% (full blame) scale specific to each individual.

Participant's negative bias towards transgender individuals was measured using the Attitudes Towards Transgender Men and Women (ATTMW) scale (Billard, 2018) given at the end of the experiment. The scale contained two sets of statements: 12 statements about attitudes toward transgender men and 12 statements about attitudes towards transgender women (with set presentation order counterbalanced across participants). Participants rated their agreement with each statement using a 7-point scale, ranging from 1 (strongly disagree) to 7 (strongly agree), with higher scores reflecting greater negative attitudes towards transgender individuals.

Procedure

Participants were first given a consent form and overview of the study, as well as several demographic questions. This was followed by more specific instructions related to the stories and subsequent memory tests and judgment questions. Before reading the first story, participants were given some basic information about Sam (i.e., gender, age, and race) and had to recall that information to indicate they were paying attention. Participants then read four short stories, each detailing a specific event from Sam's day at an amusement park. After each story, participants completed a 1-min math distractor task before answering eight true/false questions about details from the story. They were then asked to rate the amount of blame each individual in the story should receive for their role in the described situation (e.g., accidentally cutting in front of someone in line, helping a child wash their hands in a restroom). After answering questions about the fourth story, participants completed the ATTMW scale before being debriefed and compensated for their participation. The entire study took about 30 min to complete.

Results

Testing Prediction 1

Our first key prediction was that story three memory performance would be lower (and judgements against Sam would be higher) when Sam was transgender vs. cisgender.

Memory

Overall proportion correct on the memory recognition test for the critical third story (see Table 1) was first analyzed using a two-way ANOVA, with Sam's gender (cis vs. trans) and the gender of the restroom (men's vs. women's) both manipulated between-subjects (excluding the two cisgender conditions paired with a mismatched restroom). Contrary to our predictions, the main effect of Sam's gender identity, $F(1, 37) = 1.49$, $p = .23$, $\eta^2_p = .04$, and the main effect of

restroom gender, $F(1, 37) = 0.24$, $p = .63$, $\eta^2_p < .01$, were both non-significant. The interaction was also non-significant, $F(1, 37) = 0.21$, $p = .71$, $\eta^2_p < .01$.

Judgements

Judgements against Sam were calculated relative to the other people involved in the situation (Table 1). Specifically, we subtracted the amount of blame assigned to the other person (or people in the case of story three, i.e., the parent and child) involved from the amount of blame assigned to Sam (thus a positive number indicates greater blame given to Sam vs. the others involved and vice versa for a negative number). Contrary to our predictions, both the gender of the restroom, $F(1, 31) = 0.56$, $p = .46$, and Sam's gender, $F(1, 31) = 1.01$, $p = .32$, had no significant effect on the amount of judgement assigned to Sam vs. the others. The interaction was also non-significant, $F(1, 31) = 0.02$, $p = .90$.

Testing Prediction 2

We also predicted that for the critical third story, participants would blame Sam more than the parent and child in conditions in which Sam entered the incorrect restroom (e.g., cisgender man in the women's restroom) than the conditions in which Sam entered the correct restroom. To investigate the potential influence of restroom match, we conducted two t-tests to: (1) compare the cisgender match and cisgender mismatch conditions and (2) compare the transgender match and cisgender mismatch conditions (both averaging over the gender of the restroom). Contrary to our predictions, the amount of blame given to Sam vs. others when they were a cisgendered person using the correct restroom ($M = -.73$, $SD = .31$) did not differ from when they were a cisgendered person using the incorrect restroom ($M = -.54$, $SD = .56$), $t(41) = 1.37$, $p = .18$. There was also no difference when Sam was a transgendered person using the

correct restroom (M = -.65, SD = .47) and when Sam was a cisgendered person using the incorrect restroom (M = -.54, SD = .47), $t(42)$ = 0.67, p = .51.

Testing Prediction 3

　　To further investigate the potential influence of gender identity and restroom match, we conducted additional t-tests comparing the cisgender + mismatching conditions to the transgender + matching conditions separately for each restroom gender condition (Table 1). Similar to the prior results, the amount of blame given to Sam vs. others when they were a cisgender woman using the men's restroom did not differ from when they were a transgender man using the men's restroom, $t(21)$ = 0.81, p = .43. There was also no difference when Sam was a cisgender man using the women's restroom and when Sam was a transgender woman using the women's restroom, $t(19)$ = -0.07, p = .95. Although this indicates that Sam was given as much blame when they were transgender and used the correct restroom as when they were cisgender and used the incorrect restroom, there was also no difference between the cisgender matching conditions and the cisgender mismatching conditions (when looking specifically at the men's restroom, $t(19)$ = -1.02, p = .322, or at the women's restroom, $t(20)$ = 0.83, p = .42, nor between the cisgender matching conditions and the transgender matching conditions (for both the men's restroom, $t(18)$ = -0.20, p = .85, and the women's restroom, $t(19)$ = -.99, p = .34).

Testing Prediction 4

　　We also expected to find a positive correlation between the difference in blame assigned to Sam (when they were transgender) vs. the other individuals in story three and participant's score on the attitudes towards transgender men and women (ATTM/W) scale completed at the end of the experiment (Billard, 2018). Although there was a significant correlation between the amount of blame given to Sam and scores on the ATTM scale, $r(20)$ = .41, p = .032, there was

no correlation with scores on the ATTW scale, $r(20) = .25$, $p = .13$. Further, due to small sample sizes, there were no correlations when comparing each scale to its corresponding restroom gender condition (i.e., no correlation between blame and score on the ATTM scale in the men's restroom condition, $r(10) = .35$, $p = .14$, nor between blame and score on the ATTW scale in the women's restroom condition, $r(9) = .39$, $p = .13$). Thus, there does not seem to be a relationship between scores on the ATTM/W and the amount of blame given to Sam when they were transgender vs. the other individuals in the story.

Testing Prediction 5

We predicted that the effects found in story three would not replicate in the other stories, as story three occurred in a gendered space whereas the others occurred in gender neutral spaces. However, because there were no effects seen in the third story, we did not do these analyses.

Discussion

This study sought to understand how anti-transgender bias could potentially affect memory and judgements of events, similar to the memory-modifying effects of other-race biases (Leffers & Coley, 2021). Anti-transgender bias is becoming more prevalent as conservative politicians across the world work towards banning facets of transgender life (e.g., Wade & Reis, 2023; Akinwotu, 2023). In the United States, more anti-transgender bills have been introduced in 2023 than there are days in the year, all working to stop transgender visibility and support (Trans Legislation Tracker, 2023). However, very little research has been conducted on the cognitive effects resulting from this type of bias, which could have important implications if it is found that people misremember details from events involving transgender individuals and/or assign them greater blame than cisgender individuals. To assess this potential issue, we had participants read stories that only differed in terms of the gender of the main character ("Sam") and the

gender of the restroom discussed in one of the stories. In the critical story, Sam encounters a

child in a restroom who asks for help washing their hands and, after Sam reluctantly agrees, the

child's parent comes out of a stall and yells at Sam not to touch their child. After each story,

participants completed a true/false memory test and indicated the amount of blame each person

in the story should receive. Participants were also given two attitudes towards transgender

individuals scales (Billard, 2018) at the end of the experiment to measure their level of bias

against transgender men and women.

Interestingly, there was little-to-no evidence of an effect of anti-transgender biases on

memory and judgements. Memory accuracy and the amount of blame assigned to Sam vs. the

others involved (in this case, the parent and child in the restroom) was similar between cisgender

and transgender conditions in all comparisons. Further, this lack of a difference was similar for

both transgender men and women. In all but one potentially spurious case (i.e., when averaging

over restroom gender conditions and only using the ATTM scale; Billard, 2018), scores on the

anti-transgender bias scales were also not correlated with the amount of blame assigned to Sam

vs. the others involved (and were extremely low in general). It is worth mentioning that

consistent with prior research (e.g., White & Jenkins, 2017; and Wang-Jones et al., 2018), we

found that participants were more likely to have greater bias against transgender women ($M =$

2.17, $SD = 1.50$) than transgender men ($M = 1.93$, $SD = 1.42$) on the ATTM/ATTW scales, $t(64)$

$= -4.70, p < .001$.

Limitations and Future Directions

A few limitations of the current study also warrant discussion. First, our sample size was

less than half of what we had intended on using. The sampling method we used provided higher

quality responses at the cost of lower quantity, as there are only so many students at Union

College who are willing to sit down and take a 30-minute survey for either class credit or $5.

Second, the range of scores on the 7-point ATTM/W scales (Billard, 2018) was very restricted

and much lower than one might expect (i.e., averaging about a two out of seven across all

conditions). Not only are restricted ranges problematic for measuring correlations in general, but

the lack of anti-transgender biases in the current sample is also an issue for assessing any

potential effect of those biases on memory. It might be argued that participants' low bias scores

were influenced by desirability effects (e.g., responding with what they thought would make

them look good to the researcher, Fisher, 1993), which would imply that participants were in fact

more biased than the scales indicated. However, these college students also likely differ from the

average college student as Union College is a fairly progressive, small liberal arts school in New

York. Future studies using a more representative sample of the U.S. college population (or

overall population) are needed to investigate the apparent lack of bias in our sample. Prior uses

of the ATTM/W scales for undergraduate students found generally higher averages (Billard,

2018), though other populations appear to have lower bias. López-Sáez et al. (2023) found that

adults in Madrid ranging from 19 to 80 years old had generally low bias scores for the ATTM (M

$= 1.5$, $SD = 0.8$) and the ATTW ($M = 1.4$, $SD = 0.8$). Amsalem et al. (2022) also found similar

low scores averaged across both scales among U.S. adolescents ranging from ages 14 to 18 ($M =$

1.44, $SD = 0.96$).

Third, the use of a younger sample may have also been problematic because of how Sam

was described in the stories (i.e., as a 25-year-old going to an amusement park). This could

possibly lead to participants' empathizing with Sam in the critical third story as they relate to

Sam much more than the parent with a young child. Future work using a different sample or

materials is needed to verify if this was the case. Additional studies using other measures of

memory, such as free recall (e.g., Levinson, 2007), would also provide more insightful information into what participants do vs. don't remember and avoid any issues stemming from giving participants those statements for true/false recognition.

On the other hand, if we interpret the results at face value, this indicates that if people have little-to-no anti-transgender bias, memory and judgements are not influenced by that bias in a similar way as biases related to race, for example. This optimistic result should be interpreted with caution however, due to the small sample size in the current study. Therefore, we plan to continue with data collection until the full planned sample size has been reached and will update these results accordingly. It may be that this type of bias does affect memory and judgements when looking at a sample that has actually shows the needed level of anti-transgender bias. Before assessing the effect of some bias on a cognitive process, it is first necessary to determine that this bias actually exists in the population of interest.

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Tables

Table 1.

Critical Story Memory (Proportion Correct) and Judgments (Against Sam): M (SD).

	Memory	Judgments
Condition: Men's Restroom		
Sam: Cisgender Man	.91 (.13)	-.44 (.55)
Sam: Cisgender Woman	.70 (.15)	-.57 (.45)
Sam: Transgender Man	.89 (.12)	-.61 (.23)
Condition: Women's Restroom		
Sam: Cisgender Woman	.96 (.08)	-.71 (.31)
Sam: Cisgender Man	.73 (.14)	-.67 (.30)
Sam: Transgender Woman	.89 (.17)	-.67 (.33)

Note. Judgements were calculated as the difference in blame assigned to Sam vs. the other individuals.

Appendix

Stories

Story 1

Sam arrives at the park and, after paying to get inside, heads towards the line for their favorite ride, the Speed Demon. Unfortunately, it quickly becomes clear that the line is incredibly long and that they will have to wait for a while to get on the ride. After 20 minutes of waiting, Sam finally approaches the last stretch and, after a quick head count, is now 13th in line. Suddenly, the person in front of Sam steps out of line and appears to run back toward the cubbies at the very start of the line. After 15 seconds, the person is still gone and the ride attendant calls the next set of 12 people to board the roller coaster. Sam decides to board the roller coaster and take the spot of the person who just left. As the bar lowers across their lap, Sam notices that the person who left is now back and angrily staring at them as the ride starts to move away from the station.

Story 2

After going on a few more rides, Sam decides to get lunch. Two restaurants catch their eye: Rock n' Roll Hotdogs and Happy Wings. After a quick debate, Sam decides to get some chicken wings at Happy Wings. Upon entering the restaurant, Sam notices that there are different lines for ordering and picking up your food. At the first counter, Sam orders wings, fries, and a soda. A few minutes later, Sam is called over to pick up and pay for their food. As Sam reaches for their food, a different customer rushes over and starts to complain about a hair in their food. The employee points out that the hair is red, like the customer's hair, and no one working in the back has red hair. The customer starts to yell back at the employee and a heated argument breaks out. In the middle of all the craziness, the frustrated employee hands Sam their drink and storms

off in a huff to take a break. As Sam eats their food at a nearby picnic table, reflecting on the

wild argument that just took place, they realize that they aren't sure if they ever paid for their

food. Instead of going back inside to make sure they paid, Sam decides to avoid the angry

employee and not correct the mistake.

Story 3 (Critical Story)

   A couple hours into their day at the theme park, Sam decides to head to the waterpark.

After navigating the crowded, noisy locker room, Sam looks for the bathroom area before

heading to the water slides. Despite the bustling crowd of people, Sam manages to find the

men's/women's restroom area and goes inside to use the facilities. As Sam is washing their hands

afterward, a child tugs at their shirt and asks for help reaching the soap dispenser. Sam looks

around for the child's parent, but no one is around. After another impatient tug, Sam decides to

help the child reach the soap and wash their hands. As Sam squirts some soap into their own

hand to give to the child, a stall door opens and the child's parent comes out. Before Sam can

explain, the parent starts screaming at them, yelling "Keep your hands off my child! Get out of

here!" Sam's face turns bright red from embarrassment and they run out of the bathroom without

getting a chance to dry their hands.

Story 4

   At the end of a long, eventful day at the theme park, Sam heads towards the exit to leave.

On their way out of the park, Sam starts looking through their bag for their car keys. After a few

seconds of searching, Sam collides with another theme park guest who was looking down at their

phone while walking. Although neither Sam nor the other guest fell to the ground, they both

dropped what they were holding. Sam picks their bag back up and starts to reach for the other

guest's phone to give it to them. As they do, the other guest swats their hand away, grabs the

phone off the ground, and mutters "Watch where you're going..." under their breath. Before Sam

can note that they were also not watching where they were going, the guest walks away

grumbling to themselves. Sam shrugs and continues to the parking lot.

True/False Statements

Story 1

1. The first thing Sam did after paying to get inside was head straight to a ride (**true**).

2. Sam's favorite roller coaster is the Speed Demon (**true**).

3. The ride attendant scolded Sam for taking the person's spot in line (**false**).

4. Sam lost their place in line after putting their jacket in a cubby (**false**).

5. The person in front of Sam asked them to save their spot in line (**false**).

6. Sam had to wait 20 minutes before getting on the ride (**true**).

7. The person who left the line came back right after Sam boarded the roller coaster (**true**).

8. Sam apologized to the person whose spot they took (**false**).

Story 2

1. Sam didn't pay for lunch (**true**).

2. Sam received the wrong lunch at the restaurant (**false**).

3. Sam ordered fries and a drink with their lunch (**true**).

4. The restaurant where Sam ate lunch had separate lines for ordering and picking up your

   food (**true**).

5. Sam decided to wait until the restaurant employee cooled off before going back in to pay

   for their food (**false**).

6. The employee told Sam to leave after handing them their drink at lunch (**false**).

7. A customer got into an argument with a restaurant employee about a hair in their food (**true**).

8. Sam ate lunch at Rock n' Roll Hotdogs (**false**).

Story 3

1. In the restroom, a child asked Sam to pick them up so they could reach the sink (**false**).

2. Sam yelled back at the child's parent before leaving the restroom (**false**).

3. Sam ran out of the bathroom without getting a chance to dry their hands (**true**).

4. A child's parent screamed at Sam to get out of the restroom (**true**).

5. When using the restroom, a child asked Sam for help reaching the soap to wash their hands (**true**).

6. Due to the crowded locker room, Sam accidentally used the wrong restroom (**dependent on condition**).

7. Sam looked for the child's parent before starting to help them wash their hands (**true**).

8. After washing their hands, Sam saw a confused child and asked them if they needed help (**false**).

Story 4

1. After colliding with another park guest, Sam told them to watch where they are going (**false**).

2. Sam tried to pick up the other park guest's dropped phone (**true**).

3. The collision with another park guest caused Sam to fall to the ground (**false**).

4. Sam bumped into another park guest because they were both looking down at their phones while walking (**false**).

5. The other park guest swatted Sam's hand away after the two collided (**true**).

6. Sam didn't apologize to the other park guest for walking into them (**true**).

7. The other park guest apologized to Sam for walking into them (**false**).

8. Sam had to search their bag for their keys on the way out of the theme park (**true**).