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The Values of Psychological Science: Student and Faculty Perspectives on Research Ethics

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ABSTRACT. In this editorial, we encourage readers to consider how ethics are involved in every aspect of research including collaboration, mentoring, and analyzing data. We explore the values of psychology which motivate the creation of ethical standards and help people make decisions even when no formal codes are present. Finally, we argue that the values of psychology are more than just good behavior, they are a necessary part of a productive and effective science. As we address the various aspects of the research process, we incorporate the perspectives of student and faculty researchers.

Keywords: ethics, human subjects protections, authorship, student research

What is the first thing that comes to mind when psychological scientists hear the term *ethics*? Informally, we have found that their initial responses usually relate to human subjects protections. Similarly, for undergraduate students in a research methods class, *ethics* typically invokes discussion of infamous studies like the Milgram experiments in which participants unwittingly exposed themselves to intensely stressful situations. Ask an instructor and the term *ethics* is likely to lead to talk about plagiarism or cheating on exams. And for clinicians, the term is likely to elicit responses about confidentiality and dual relationships with clients. In other words, researchers, students, instructors, and clinicians all tend to focus on protecting others, even if they do so in different ways. There are distinct, formalized ethical codes and policies for research, teaching, and practice. The fact that many academic psychologists work in all three contexts described above (i.e., researcher, instructor, and clinician) illustrates how psychology relies on multiple systems of ethics. Students, too, can find themselves engaged in research, the classroom, and in clinical internships. In the United States where we work and study, these systems are formally written and go by well-known acronyms. We work with the institutional review board (IRB) on research, Health Insurance Portability and Accountability Act (HIPPA) in the clinic, and Family Educational Rights and Privacy Act (FERPA) at the university.

Our first goal in this editorial is to explore how ethics of psychological research reach far beyond protecting human subjects, even if they are the most salient ethics. Research involves collaboration, decision making, and literature reviews. Each of these present their own opportunities to behave ethically. In these situations, the ethics are often designed to protect collaborators, peers, universities, and the integrity of our discipline.

When focusing on human subjects protections, ethics can seem like boundaries—a list of things that you must do and another you must not. Certainly, psychological scientists have codified ethics which do just that, and IRBs enforce them. Our second goal in this editorial is to explore what leads scientists to create these formal codes of ethics. In other words, why not just expect people to behave well? Ethics has come to be viewed as the instantiation of the values of psychology. Returning to human subjects protections: As psychologists, and as individuals, we value the well-being of others. However, professional and intellectual pursuits can lead researchers to adjust their values or even lose sight of them. A code of ethics works to keep each person in line with their values. We see a trajectory that begins with values, passes through the code of ethics, and extends into scientific work. In summary, values underlie the ethics that psychological scientists can read and practice.

The third and final goal is to say that ethics are not just nice things to do, they are essential

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for good science. Unethical behavior can produce invalid results, mislead others, and promote weak, incomplete, or just plain false ideas. It can harm relationships, stunt professional growth, and end careers. Finally, it can allow some to get ahead while others who play fair might get overlooked. For all these reasons, ethics should be an intentional component to all research activities.

Values in Psychological Research

What are the values of psychological science? A good starting point is the American Psychological Association's *Ethical Principles of Psychologists and Code of Conduct* (APA, 2017). See Table 1, in which the APA identifies five principles.

This list provides clear evidence of our first two goals in this editorial. First, these address behavior that extends well beyond human subjects protections. Second, none of these items is a specific ethical principle; rather, these are values that motivate people to create and abide by formal ethics. Finally, these standards—especially integrity—remind psychological scientists that their ethics are not just boundaries, they are essential to productive and effective science. To address these goals, we will examine four aspects of research including those in which ethics are not often discussed or formalized: human subjects, collaboration, statistics, and writing. Because many contributors to this journal are students, we also want to acknowledge that values are not going to look the same from all perspectives. For the purpose of this editorial, we hope to shed light on what these ethics mean to us as a student researcher and faculty researcher.

Human Subjects

In scientific circles, *human subjects protections* include the ethics of how to treat the people being studied and the data they provide. The values of beneficence and nonmaleficence dictate that the welfare of the participants should be scientists' primary concern, not the benefits to the discipline or to any individual's career. To act on these values, researchers rely on formal ethics codes. In the United States, these are established by the Department of Health and Human Subjects and administered through IRBs at each university. We assume our readers already know that researchers and IRBs carry out ethical principles by weighing the risks to participants and the benefits to science, society, or the participant. Risks include physical harm, social harm, psychological harm, and risk of punishment or liability. Against these risks are benefits that, in professional work, may affect clinical practice, strengthen theories, or improve applications of psychology to all aspects of life. For student researchers, there are educational and vocational benefits as well.

How might other values inform the way scientists work with their participants? Thinking critically about fidelity and responsibility reveals that the amount of benefit versus risks change depending on the status of the researcher. For student-led projects, the limited training and experience, access to resources, and other constraints reduce the likelihood of clinical, theoretical, or practical benefits. For professional projects, student research assistants are often tasked with collecting measurements and handling data. In these roles, a student's limited experience may actually increase risks. In addition, the values of fidelity and responsibility mean that students must be faithful to their role, remaining open to guidance and supervision, ensuring that they understand and comply with procedures, and avoiding research duties and responsibilities for which they are not confident. Meanwhile, being responsible and faithful to the role of mentor means assigning only responsibilities that can be safely and ethically carried out by the student. The idea to be mindful of skill level makes sense to most researchers. Nonetheless, it would be easy to omit this step when preparing or evaluating an IRB proposal. The result would be the IRB making ethical decisions without a full understanding of the risks and benefits.

Here is one example: A professor designed a study of intrusive, traumatic thoughts among individuals experiencing PTSD. In preparing his IRB proposal, he clearly identified the psychological risks involved—thought intrusions are intense, emotional, and can lead to very serious consequences. He also described the safeguards

Table 1

Values Underlying the Ethics of Psychological Science

Beneficence and nonmaleficence:	Do good, avoid causing harm
Fidelity and responsibility:	Demonstrate professionalism and fulfill obligations. Work according to your role and within the scope of your training.
Integrity:	Be honest and forthright. Others should be correct in trusting your professional work.
Justice:	Your work should not benefit some people at the expense of others.
Respect for people's rights and dignity:	Uphold individual rights to privacy, safety, and to determine their own actions.

in place: fully informed consent, participant's right to withdraw, and so on. However, he neglected to tell the IRB that undergraduate assistants would collect data—they would be involved in face-to-face interaction with participants as they experience the psychological risk. Because of their limited experience, the students researchers most likely would not be prepared to respond effectively to crisis. If that is the case, the status of the researcher actually increases the risk even with all the other safeguards in place (something the IRB should certainly consider). Responsibility and fidelity to obligations should lead that professor to reconsider his plan or, at the very least, describe to the IRB how the students' experience may affect the risks vs. benefits assessment.

Beneficence and nonmalificence are clearly part of the risk-benefits assessment, but for further exploration, one might consider justice (do research incentives benefit or motivate some types of people more than others?) and integrity (how much can you change your protocol without informing the IRB?).

Collaboration

Science is rarely a solo project. Students work together in lab groups, faculty share and develop ideas through conversation and debate, and students very often collaborate with or are mentored by faculty. Collaboration can prove to be rewarding in many ways. It can be the source of recommendation letters for graduate school or promotion to tenure. Successful research leads to opportunities for internships or new jobs. However, collaboration can lead to the opposite outcomes as well. Collaborators and mentors are in positions where they might even sabotage a career.

Psychology's values provide a framework for maintaining productive, ethical relationships for students and faculty alike. For example, beneficence and nonmalificence promote cooperation, collegiality, and fairness. Fidelity, responsibility, and integrity should encourage all collaborators to do their share of work, put forth effort, and remain within their skill level. Integrity means accountability to each other. An effective group would be able to work together with synergy, trusting each other to follow the established protocols, hit goals, be accurate in data collection and analysis, and so on.

Any student involved in a group research project just groaned. Everyone knows that group work falls apart; it happens among professionals too. Difficulties in collaboration do not necessarily constitute breaches of ethics, although they certainly can. In general, clear, open and frequent communication is important for setting expectations, and it should begin before a project even starts.

One important area of collaboration is determining authorship, which in science, often reflects leadership. The first author listed on a poster or article is generally thought to be the leader and the person who generated the main hypotheses. For this reason, there is a real benefit to being first author, and the drive to gain this benefit can lead to unethical decisions. This has led to three formal ethics related to authorship (APA, 2017): Psychologists take responsibility and authorship credit only if they have contributed substantially to the work; Principal authorship and other credits should reflect scientific or professional contributions of the individuals, not the position or status of the individual; And a student should be listed as the principal investigator if it is greatly based on the student's doctoral dissertation.

Violations of these standards can be particularly harmful to students or pretenure faculty. In these cases, it might seem difficult to negotiate authorship because the collaborations are inherently unequal in power. Two ethical dilemmas that can arise from this scenario. The first issue can come from a faculty member claiming authorship based on seniority despite minimal contributions. This hinders the professional development of the deserving researcher. Other times, the junior researcher (particularly in the case of a student author) might purposefully add the mentor to authorship in order to have increased recognition in the work, even if the mentor only signed off on official documents. This misrepresents the relationship and gives the individual an unfair advantage over the other, more ethical students.

Authorship is only one area of ethical concern, but the underlying values and resulting consequences are the same in other aspects of collaboration. For example, there have been a number of cases recently where a team member engaged in misconduct, fabricating data. This is often discovered after publication, meaning that the innocent collaborators have lost significant time for no benefit and are likely to experience damage to their reputations.

Statistics

Statistics and research design make good science possible. To put it bluntly, without statistical analysis,

we would have boring and unreliable results. It is ironic, then, that ethics of statistical practice are largely ignored, misunderstood, or treated with ambivalence, as are the underlying values of integrity and responsibility. In fact, unethical statistical practices may even be the norm in some cases—a claim we will explore in a moment. This is most likely due to the myopic view of what is right and wrong during analysis. Ask any student about statistical ethics, and most will say "don't make up fake data." That is a great start! But there is so much more.

We claimed that statistical ethics are often ignored in practice. To back this up, we point to a self-report survey of around 2,000 researchers in psychology. According to the authors, when given a checklist of "questionable" statistical decisions, a high number of researchers admitted to making those choices (John, Loewenstein, & Prelec, 2011). The actions were not necessarily malicious; they almost certainly resulted from the researchers' drive to turn the raw data into a statistically significant *p* value. This goal and its attendant pressures led to the ignoring, misunderstanding, and ambivalence we mentioned earlier.

So what are people doing that is so wrong? Reanalysis of published articles points to the statistical decisions researchers make, a concept known as "researcher degrees of freedom" (Simmons, Nelson, & Simonsohn, 2011). Table 2 presents a few examples that represent the most common ways researchers take advantage of these degrees of freedom to produce statistical significance. According to the survey described above, 63% of authors have published papers based on the first of these decisions, 56% the second, and 38% third (John et al., 2011). These are not uncommon decisions, yet these choices create bad science. In our example, the majority of the tests were not significant, yet the resulting article claimed there was an effect. That article then spread a claim that is likely to have been exaggerated by the statistical manipulations or perhaps was even completely false. Based on this, we argue that manipulating but not reporting researcher degrees of freedom disregards the fundamental values of integrity and responsibility.

Writing

The ethics of writing, like statistics, is almost always summarized as "don't make stuff up," meaning that researchers should avoid plagiarism or citing nonexistent articles. These are important because violating the ethics perpetuates weak hypotheses and false ideas, not to mention taking credit from other researchers. But, returning to the underlying values in science and the purpose of scientific writing, there are other issues that are equally important.

To begin, we considered the purposes of writing an introduction to a manuscript to include describing the area of research, the current state of the science, questions or debates that remain open, and a specific hypothesis that attempts to resolve the question or debate. When readers approach a work, they are likely to assume that the writing is thorough, balanced, and accurate. There are at least three behaviors during a literature review that can mislead readers. See Table 3 (the terms we provide are our own).

It is easy to understand why authors might be guilty of these actions. Being thorough and accurate require a lot of time and effort. Being balanced often means writing statements about supporting ideas that an author might not appreciate. However, readers rely on an author's writing for all of these things. Therefore, in the interest of openness, nonmaleficence, and good science, ethical writing is a must.

Table 2

Typical Misuse of Researcher Degrees of Freedom

A group of researchers designed a study with a difficult-to-measure dependent variable. Consequently they employed three different self-report instruments.

This same research team collected data from 30 participants. A *t* test produced a *p* value of .09 for one of the measures. The team collected data from an additional 20 participants and found a *p* value of .06 on that measure. By adding 10 more participants, they finally had a *p* value they liked: $p < .05$.

When writing their manuscript for publication, they accurately reported the results of their final t test but not the gradual increase in sample size nor the fact that they selected a dependent variable measure that fit their needs while ignoring two others.

Table 3

Three Literature Review Behaviors That Can Mislead Readers

1. Convenience reviews: A thorough introduction should reflect a thoughtful, purpose-driven review of the literature. If authors simply grab a collection of articles that are easy to find and free to access, they have deliberately left out significant literature, some of which is bound to be relevant and important.

2. Selective reviews: A balanced introduction should reflect the state of the science, not your opinion. For example, if the field is experiencing a debate over whether A or B is a better theory, authors should base their review and introduction section on articles that support both sides of the issue. The time to expand on the authors' opinions is when they explain their hypothesis.

3. Inaccurate citations: It is important for authors to understand what they are citing and that they cite correctly. This means that their citation should be based on a reading of the article they just cited, not just a scan of the abstract. Or, if authors find an interesting point in a review article, it is best to refer back to the original empirical paper to make sure the review got it right.

Summary

Research is a complex, evolving process and so we have only selected four areas to explore in this editorial. However, we hope that statistics and collaboration in particular demonstrate how ethics should be applied beyond protecting participants and how important values are to good science. In our experience, we have found it beneficial to begin a research project by discussing our values and ethics. What do we expect from our collaborators, students, or mentors in terms of time commitment, accuracy, and integrity? What should be the order of authorship on resulting posters or papers? How will we handle breaches of ethics or other undesirable behaviors? Engaging in ongoing conversations throughout a project helps us think about ethics in new ways, sometimes seeing conflicts we had overlooked before. By preventing and correcting ethical conflicts, we can be better researchers and produce better research.

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An Experimental Study of Prejudice Toward Drivers With Political Bumper Stickers

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ABSTRACT. In this experiment, we tested whether a political sticker would affect prejudice toward a hypothetical driver. An online survey was made available to MTurk workers and a small convenience sample in October 2016. Participants were shown 1 of 3 randomly assigned pictures of a car with 5 nonpolitical bumper stickers or the same car with a Trump or Clinton campaign sticker added. Participants were asked: (a) how likely they would be to vandalize the car (*1 = extremely likely to 5 = extremely unlikely*), (b) how much money they would put in a timed out parking meter (*$0.00 to $1.00*), and (c) whether they could be friends with the driver (3 = *yes*, 1 = *no*, 2 = *maybe*). Although 214 people completed the study, only those with plans to vote for 1 of the 2 major parties were included for analysis. Thus, results were based on 180 participants (106 Clinton/Kaine voters and 74 Trump/Pence voters). As expected, Trump and Clinton supporters were significantly more generous, $F(2, 174) = 9.57$, $p < .001$, $\eta_p^2 = .099$, and friendly, $F(2, 174) = 9.6$, $p < .001$, $\eta_p^2 = .10$, toward the hypothetical owner of the car with a sticker supporting their candidate of choice and were more likely to say they would vandalize the car promoting a candidate they did not support, $F(2, 174) = 4.4$, $p < .001$, $\eta_p^2 = .048$. The results confirm what was expected based on previous research on impression formation, group identity bias, and prejudice.

Keywords: bumper sticker, impression formation, prejudice, group identity

In May 2016, a tow truck driver refused to tow a woman's car because she had a Bernie Sanders bumper sticker. The man explained his prejudice against supporters of Bernie Sanders, "And I said, you know, I'm not going to associate with them, and I'm not going to do any business with them," (Surles, 2016). A more recent incident involved a man who caused a woman to wreck her car after he brandished a gun in response to her political bumper stickers. Fortunately, there were no injuries. The man acknowledged that he made a bad choice but said the woman's bumper stickers were "stupid" (Londberg, 2017). Such prejudice is not altogether surprising given what social psychologists have uncovered about prejudice and group identity. It is even less surprising considering the current political polarization. However, these examples are just anecdotal. Without experimental evidence that bumper stickers affect attitudes and behavior toward other drivers, researchers are left to merely speculate about their impact on drivers. In the present study, we took advantage of one of the most contentious presidential elections in recent history to see if political campaign stickers could affect people's attitudes toward a hypothetical driver.

Existing Research on Bumper Stickers

Surprisingly little empirical research has been conducted on bumper stickers. Despite an extensive search of major databases, such as PsycINFO and Google Scholar, a relatively small number of

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published studies were identified. Some were simple content analyses of the most common sticker themes or their semantics (Al-Momani, Ahmad Jaradat, Bani-Khair, Mohammad, & Alshaboul, 2017; Case, 1992; Endersby, & Towle, 1996; Jaradat, 2016; Stern & Solomon, 1992). Other studies went beyond simple classification and included speculation about the symbolic meaning of stickers for issues such as gender (Noble & Baldwin, 2001), religion (Chiluwa, 2008), family identity (Doyle & Tranter, 2015), law (Doyle & Tranter, 2016), consumer perceptions (Belk, 1988), national identity (Kriznar, 1993), and political discourse (Bloch, 2000a, 2000b; Salamon, 2005). The studies were of limited value to the present study because empirical support for the interpretations was very limited or even nonexistent in some cases (e.g., Doyle & Tranter, 2015; Noble & Baldwin, 2001). In addition, many of these studies were conducted outside of the United States, notably in Australia (Doyle & Tranter, 2015; Doyle & Tranter, 2016; Noble & Baldwin, 2001), Israel (Bloch, 2000a, 2000b; Salamon, 2005), Jordan (Al-Momani et al., 2017; Jaradat, 2016), Nigeria (Chiluwa, 2008), and Slovenia (Kriznar, 1993).

The number of discourse and semiotic studies on bumper stickers far exceeded those on the psychological effects. In fact, only three published social psychological investigations involving bumper stickers were identified. First, Turner, Layton, and Simons (1975) used bumper stickers as a priming stimulus to explore aggressive driving and helping. Findings from their field experiment indicated that drivers were more likely to become aggressive when the car in front of them had a sticker with the word "vengeance," particularly if there were other aggressive stimuli (e.g., a rifle hanging in the rear window) and when the driver was not visible. Bumper stickers were not the primary focus of the study, however. A second study by Newhagen and Ancell (1995) investigated the emotional tone of more than 5,000 bumper stickers in Washington, D.C. in 1992. They attempted to determine if the use of bumper stickers varied by race and tested the hypothesis that increased income would be associated with more intense and positive stickers. Their hypothesis was supported. Finally, a more recent study by Morrison and Miller (2008) examined the relative proportion of Republican and Democratic campaign stickers on vehicles in both predominantly blue and red counties in California in order to test a theory about descriptive and prescriptive deviants. They also surveyed the owners of the cars to confirm a hypothesis that those who display political stickers would be more partisan than the average voter. Their findings supported their theory that people with more extreme attitudes were more likely to express those attitudes in the form of bumper stickers, especially when those opinions were shared by the majority of people in a county (descriptive deviant) than when they were in the minority (prescriptive deviant).

Despite their ubiquitous presence, the available literature on bumper stickers is quite thin. The scarcity of empirical studies on the psychological effects of bumper stickers was especially surprising given the obvious ways they are likely to affect perceptions of other drivers, especially when they pertain to polarizing issues or political candidates. Several social psychological processes seem particularly relevant such as impression formations, stereotyping, and numerous ingroup-outgroup biases.

Impression Formation and Stereotyping

Impressions of other people are formed automatically and easily. According to Anderson's (1981) Information Integration Theory, impressions are formed by considering the weighted average of information about a target person in conjunction with one's own personality and current state. Anderson's theory was influenced by the now classic study on impression formation conducted by Solomon Asch (1946), which showed that not all information is weighted equally when forming impressions. His study showed that some traits (e.g., warmth, competence) have more effect on the overall impression than others. Subsequent research has shown that negative information influences perceptions more than positive information (Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001). In addition to this negativity bias, the first information about another individual tends to have a greater impact than information acquired later (Anderson, 1965). Thus, bumper stickers, which often convey simple, single-trait associations, are likely to affect impressions, especially if they convey negative information about a driver and there is no other information available to mitigate the judgment. This is likely to be true for people who may be able to see divisive messages on a tailgate but are unable to determine anything else about the driver such as gender, age, or race.

People are able to form impressions automatically with only the barest amount of information, but knowing someone's race, gender, age, or membership in a familiar social group expands the impression to include a broad array of stereotypes (Carlston & Schneid, 2015). Thus, bumper stickers may lead to a general impression about another

driver's disposition (e.g., funny, jerk), but they can also lead to stereotypes based on presumed or confirmed membership within a specific group (e.g., race, political party, religion). The stereotypes held about members of a group can lead to hostile prejudice such as intentionally harming another person, but they are even more likely to lead to ingroup favoritism toward people who share the same group identity. Thus, seeing a bumper sticker that provides a clue about group membership (e.g., Christians) may activate stereotypes held about members of that group, which could lead to hostility or favoritism depending on the viewer.

Group Identity and Ingroup-Outgroup Biases

A fundamental principle of social psychology is that people categorize themselves and others in terms of social groups. According to Social Identity Theory (Tajfel & Turner, 2004), people strive to enhance their self-esteem through the social identities of groups to which they belong. However, one's identity as a member of a particular social group is made more salient by the situation according to self-categorization theory (Turner, Hogg, Oakes, Reicher, & Wetherell, 1987). Therefore, when someone is reminded of their membership within a social group, they are more likely to act in ways that support other members of that social group including complete strangers. In one naturalistic experiment of this phenomenon, participants were much more likely to help an injured jogger when the jogger wore a shirt showing support for a football team favored by the participants than someone with a neutral or rival shirt (Levine, Prosser, Evans, & Reicher, 2005). The participants did not especially dislike the jogger wearing a rival T-shirt; they just really favored him more when he was a fan of their favorite team. The pervasive nature of this kind of ingroup favoritism was summarized in a meta-analysis of more than 200 studies, which showed that most prejudice comes in the form of ingroup favoritism rather than hostility toward outgroups (Greenwald & Pettigrew, 2014).

Favoritism toward one's ingroup and hostility toward those outside may be moderated by a number of factors such as the degree of identification with a group and biased perceptions of outgroups, particularly when in conflict or under threat. According to Swann and Buhrmester (2015), identity fusion is the "oneness" felt toward a group. The more someone's identity is fused with a social group, the more motivated they are to help other members of that group and to guard against possible threats to the group's identity. Prejudicial treatment toward others is further justified by biased perceptions of group members such as the outgroup homogeneity effect (Linville & Jones, 1980) and the fundamental attribution error (Ross, 1977). Finally, prejudice is more likely as the threats to one's mortality or even just the survival of cultural values or norms goes up, according to terror management theory (Greenberg, Landau, Kosloff, Soenke, & Solomon, 2016).

In summary, bumper stickers should provide cues about other drivers that shape perceptions and activate stereotypes, especially when little else is known about the driver to mitigate these first impressions. To the extent that bumper stickers indicate membership or identification with particular social groups, they may serve as justification for prejudice in the form of ingroup favoritism or outgroup hostility toward the driver, particularly if the viewer identifies strongly with those social groups. In addition, the presence of some bumper stickers may be more salient than others if they signify a threat against favored social groups. So, for example, the presence of a political campaign sticker should pose considerable threat to partisans around the time of an election, and thus be particularly noticeable. Furthermore, prejudice toward the owner of the vehicle with the campaign sticker should be moderated by the viewer's own political preference.

Present Study

The highly polarized U.S. presidential election of 2016 was an opportunity to test some of these predictions about bumper stickers. The Democrats and Republicans both framed the election as a battle for control of government and thus, the very survival or expansion of policies and values central to each party. Therefore, we expected that the presence of a political campaign sticker for the two major party nominees would be especially salient near the end of the election, and that prejudice toward the hypothetical driver would be moderated by the partisanship of the viewer. We tested this prediction by showing participants photos of a car with five neutral bumper stickers or the same car with either a Donald Trump or Hillary Clinton campaign sticker added. This was followed by measures of the respondents' willingness to help, harm, or befriend the hypothetical driver.

The following hypotheses were tested in this experiment. First, we predicted that participants would show ingroup favoritism by offering significantly more help to a hypothetical driver if they both identified with the same political candidate than

those shown a car with a rival candidate. Helping was operationalized as a monetary pledge toward a timed-out parking meter, presumably to prevent the hypothetical driver from getting a ticket. We also predicted that respondents would show more willingness to be friends with the driver if they were planning to vote the same way. Finally, we predicted that participants would display more outgroup hostility toward hypothetical drivers with a rival sticker than those shown a campaign sticker for the preferred candidate. Hostility was operationalized as the likelihood of vandalizing the hypothetical car with another bumper sticker.

Method

Participants and Procedure

After following IRB protocol, a Qualtrics survey was posted as a job paying $0.35 for adults working through Amazon's Mechanical Turk (MTurk; see Paolacci & Chandler, 2014). It took participants less than 5 minutes to complete the study after reading the informed consent and accepting the invitation to participate. The survey was first launched on October 3, 2016 and received 154 responses. Because there were more participants who identified themselves as Democrats than Republicans, a second survey link was sent to a convenience sample of associates of the authors who were known to be politically conservative. This added only 25 more participants between October 4–9, and due to an error in our survey delivery settings, these participants only received the control condition. The survey was redeployed in Mechanical Turk on October 11 to a targeted sample of MTurk workers who had self-identified as politically conservative. This time, 35 more participants randomly received the Trump or the Clinton condition.

FIGURE 1

Figure 1. Image of the car showing both neutral bumper stickers and the Trump sticker. The same image was used in all three conditions with the only difference being the presence or absence of a political campaign sticker in the upper right corner. The Clinton condition featured a Hillary for President 2016 sticker of similar size and color.

The final sample included 214 respondents (111 women, 103 men) representing 42 states and Washington DC. The sample was predominantly White (87.9%), followed by African American (3.7%), Asian (3.3%), mixed race/other (2.8%), American Indian or Alaska Native (1.9%), and Native Hawaiian (0.5%). Participants ranged in age from 19 to 69 with a mean age of 37.8 (*SD* = 12.1). The sample was well-educated: no high school diploma (0.9%), high school diploma or GED (8.9%), some college (21%), associate degree (13.1%), bachelor's degree (38.8%), and graduate degree (17.3%). When asked how they generally thought of themselves, 32.7% identified as Republican, 34.1% as Democrat, 27.6% as Independent, 3.3% as Libertarian, and 2.3% as other.

Experimental Manipulation

Participants were shown a picture of a car with one of the following sticker assortments: (a) five neutral bumper stickers only, (b) five neutral stickers plus a Donald Trump campaign sticker, or (c) five neutral stickers plus a Hillary Clinton campaign sticker. In every picture, the bumper stickers were placed on the back of a silver Honda civic owned by an associate of one of the authors. This make, model, and color of the car was selected because it was in the top five most common cars on the road in 2016 (www.motortrend.com). Figure 1 shows a photo of the Trump condition. The Clinton condition was identical except that the Trump sticker was replaced with a "Hillary for President 2016" sticker. The control condition did not include a campaign sticker in the upper corner and was included to see if the political sticker conditions would evoke more prejudice as a result of shared or nonshared group identity. The five neutral stickers were also added to all three conditions because a political sticker by itself would likely have made our expected findings too easy to guess and could have produced a response bias to avoid looking prejudiced. Furthermore, the neutral stickers would presumably give participants additional information about the driver upon which to justify any prejudicial behavior.

Although the five control condition stickers were not value-free or neutral in a strict sense, they were selected because they were deemed to be mostly apolitical, diverse in theme and fairly subjective in terms of the stereotypes they might activate concerning the race, gender, age, or socioeconomic status of the driver. The "Sorry I'm driving so closely in front of you!" sticker was selected because of the ambiguous attributions that could be ascribed to

it by other drivers. Thus, if someone were inclined to like the other stickers, they might interpret this one as witty, harmless humor, but it could just as easily be viewed by someone else as sarcastic and confrontational.

Each participant was unaware that there was another form of the survey other than the one they received. We included three questions to ensure participants attended to the stickers. First, they were asked to click on the stickers they liked and disliked using Qualtric's "hotspot" survey tool. This step was taken to ensure that participants looked at each sticker on the car. Second, they were asked how many bumper stickers were on the car to ensure they were paying attention and not just rushing through the survey. Participants who entered an incorrect number were prompted to try again. Finally, participants were asked to think about the owner of the car who freely chose to display this set of bumper stickers and to describe the owner of the car using a single word or phrase.

Measures

Demographics. Prior to seeing the photos, participants were asked to state their identified race and gender. They were also asked age, level of education, and political party affiliation. The final demographic question asked participants if they had any bumper stickers on their car and if so, to describe one of them.

Helping and harming. Three questions were used to measure prejudice for or against the hypothetical driver. First, participants were asked, "Imagine that you saw this car parked next to a parking meter with no time left. How much money, if any, would you put in the timed out meter to save this person from a possible ticket (you can give between $0.00 and $1.00)?" The question was framed this way because putting money in a timed out meter would likely be viewed as a safe and realistic means of helping out another person without having to imagine interacting or seeing the driver. In other words, if this were a real situation, the information available to a passerby would be similar to that of the respondent looking at the picture. Second, they were asked, "How likely would you be to put a conflicting bumper sticker on this vehicle if you could be sure you would not get caught?" Respondents selected from a 5-point Likert-type scale (*extremely likely* to *extremely unlikely*) and were asked what sticker they would put on the car if they indicated "extremely likely." Given that we wanted to know how likely they were to harm a hypothetical driver, we selected an act that did not require imagining interactions with a driver or unsafe and unrealistic acts of violence. In a pilot test for a separate study on bumper stickers, we learned that asking about vandalism resulted in more response variability, whereas almost no one would admit to a willingness to engage in more extreme forms of aggression (e.g., slashing tires, tailgating). Finally, participants were asked if they thought that they would be friends with the person (3 = *yes*, 1 = *no*, 2 = *maybe*).

Voter condition. The last page of the survey asked participants, "If the 2016 presidential election were being held TODAY, who would you vote for?" This question was purposely left until the end of the survey in order to prevent response bias, but it was necessary to accurately group respondents for data analysis as described below. After this question, participants were thanked for their time and invited to make any final comments before exiting the survey.

Results

Manipulation Check

One way to assess the degree to which participants noticed and responded to the campaign stickers above and beyond the others, was to see what one-word label they assigned to the hypothetical driver. Results of this manipulation check indicated that the two campaign conditions produced strong partisan responses that were not found in the control condition. In the control condition, only 4 participants (5%) described the driver in terms of political party affiliation (3 liberal and 1 conservative labels) and just 12.3% of the descriptions could be classified as obviously negative (e.g., loser, obnoxious). The majority of descriptions (87.7%) were benign or positive in tone (e.g., funny, nerd). Within the campaign sticker conditions, the percentages of positive, negative, and neutral labels were very similar and many of the same labels were found across all three conditions (e.g., sarcastic, outspoken, responsible). However, partisan labels were far more common. In the Clinton condition, 30% labeled the driver either a liberal or a Democrat, whereas in the Trump condition, 22.5% labeled the driver either a conservative, Republican, or a Trump supporter.

Data Analysis

Although 214 people responded to the survey, only those who indicated plans to vote for one of the two major parties in the 2016 election were

included for analysis in order to create two groups likely to respond more strongly to the campaign stickers. Party affiliation would not have been an accurate indicator of candidate preference, in part, because 33% of the sample identified with neither the Republican nor Democratic Party. In addition, 24% of the self-identified Republicans in the sample said they planned to vote for someone other than Trump and 12% of Democrats were planning to vote for someone other than Clinton. Therefore, only respondents who said they were planning to vote for either Clinton or Trump were included.

Table 1

Amount of Money Given (*$0.00* to *$1.00*)

Sticker Condition	Voter Plans	*n*	*M (SD)*	95% CI
Neutral Stickers	Trump	25	0.41 (0.32)	[.30, .52]
	Clinton	37	0.24 (0.21)	[.15, .33]
Trump Sticker	Trump	24	0.38 (0.38)	[.26, .49]
	Clinton	34	0.13 (0.26)	[.03, .22]
Clinton Sticker	Trump	25	0.13 (0.21)	[.02, .24]
	Clinton	35	0.31 (0.28)	[.21, .40]

Table 2

Likelihood of Putting a Conflicting Bumper Sticker (1 = *Extremely Unlikely,* 5 = *Extremely Likely*)

Sticker Condition	Voter Plans	*n*	*M (SD)*	95% CI
Neutral Stickers	Trump	25	1.64 (0.95)	[1.21, 2.07]
	Clinton	37	1.81 (1.24)	[1.46, 2.17]
Trump Sticker	Trump	24	1.33 (0.82)	[.89, 1.77]
	Clinton	34	1.94 (0.82)	[1.57, 2.3]
Clinton Sticker	Trump	25	2.16 (1.25)	[1.72, 2.59]
	Clinton	35	1.57 (1.01)	[1.21, 1.94]

Table 3

Would You Be Friends With This Person (1 = *No*, 2 = *Maybe*, 3 = *Yes*)

Sticker Condition	Voter Plans	*n*	*M (SD)*	95% CI
Neutral Stickers	Trump	25	2.08 (0.64)	[1.84, 2.32]
	Clinton	37	2.11 (0.57)	[1.91, 2.30]
Trump Sticker	Trump	24	2.12 (0.54)	[1.88, 2.37]
	Clinton	34	1.59 (0.56)	[1.38, 1.79]
Clinton Sticker	Trump	25	1.64 (0.70)	[1.40, 1.88]
	Clinton	35	2.09 (1.01)	[1.88, 2.29]

Participants who indicated they were voting for the Green party ($n = 4$), Libertarian party ($n = 18$), or a write-in candidate ($n = 12$) were excluded from further analysis. Thus, the following results were based on 180 participants (106 Clinton/Kaine voters and 74 Trump/Pence voters). A 2 x 3 factorial analysis was conducted on each of the three dependent variables to compare the voter conditions (Trump x Clinton) and sticker conditions (control, Trump, Clinton).

Helping

Results from the two-way factorial Analysis of Variance (ANOVA) showed no effect of the sticker condition, $F(2, 174) = 2.36$, $p = .098$, $\eta_p^2 = .026$, on the amount of money donated. The main effect for voter group was also not significant, $F(1,174) = 3.58$, $p = .06$, $\eta_p^2 = .020$. There was, however, a significant sticker condition by voter interaction $F(2, 174) = 9.57$, $p < .001$, $\eta_p^2 = .099$. This interaction shows that both Trump and Clinton supporters were more generous when the driver had a sticker showing support for the same candidate. Means, standard deviations, and confidence intervals for the amount of money offered to each group are shown in Table 1.

Harming

Results from the two-way factorial ANOVA showed no effect of the sticker condition on vandalism, $F(2, 174) = 0.64$, $p = .53$, $\eta_p^2 = .007$. The main effect for voter group was also not significant, $F(1,174) = 0.15$, $p = .70$, $\eta_p^2 = .001$. There was, however, a significant group by voter interaction $F(2, 174) = 4.4$, $p < .001$, $\eta_p^2 = .048$. This interaction shows that both Trump and Clinton supporters were less likely to vandalize when the driver had a sticker showing support for the same candidate. Means for each group are shown in Table 2.

Friendship

Results from the two-way factorial ANOVA showed that the main effect for voter group was not significant, $F(1,174) = 0.05$, $p = .82$, $\eta_p^2 = .000$. There was a significant main effect for sticker condition, $F(2, 174) = 2.99$, $p = .053$, $\eta_p^2 = .033$. This main effect, however, was qualified by a significant sticker by voter interaction $F(2, 174) = 9.6$, $p < .001$, $\eta_p^2 = .10$. This interaction shows that both Trump and Clinton supporters were more likely to be friends with the driver when the driver had a sticker showing support for the same candidate, whereas those in the control group were equally likely to be friends with the driver regardless of their own political

group. Means for each group are shown in Table 3.

Discussion

More than 15 million political bumper stickers are printed every year ("Bumper stickers," 2016) and there is evidence that their presence affects other drivers, including increased risk of road rage (Szlemko, Benfield, Bell, Deffenbacher, & Troup, 2008). The purpose of the present study was to test the effect of a political bumper sticker on prejudice through a randomized experiment. Specifically, we expected to find differences in someone's intentions to help, harm, or befriend a hypothetical driver based on the presence of a political campaign sticker and its relevance to the social identity of the viewer. The results of the study showed that interactions between the political sticker and the participants' partisan views were significant for all three dependent variables. Not surprisingly, participants who said they were voting for Clinton and were shown the car with the Trump sticker were less likely to help the driver, more likely to say they might vandalize the car, and less likely to indicate they could be friends with that person. The same partisan effect was found in participants who said they were voting for Trump but were shown the car with the Clinton sticker. However, responses from participants in the control group (no partisan stickers) were unaffected. These results support assumptions that the presence of a political sticker can affect attitudes toward other drivers. Of course, *thinking* about harming or helping another driver is not tantamount to *acting* on such impulses, and these findings are not altogether surprising. Nevertheless, this study offers a new approach to investigating social psychological processes such as impression formation, social identity, group conflict, and ingroup favoritism.

First, these results support research on impression formation and Anderson's information integration theory (Anderson, 1981), in particular. According to this theory, impressions formed by participants would be a combination of their partisan views and the weighted average of the information about the hypothetical driver. Participants in our study had no information about the driver, other than the car and its assorted stickers, and they had to rely on that information to make their judgments. We intentionally used a combination of nonpartisan and varied stickers in all three conditions so that participants would have plenty of "material" to support a variety of opinions about the driver including some socially responsible (Don't text and drive), whimsical (Wookies need love), and one slightly hostile (Sorry I'm driving so closely in front of you). We hypothesized that the presence of a single political sticker would significantly shift perceptions of the driver in much the same way that the presence of one trait altered impressions formed by participants in Asch's now-classic study (1946). The results did support this conclusion. The striking similarity of attitudes toward the driver in the control condition indicates that the nonpartisan stickers had very little impact, at least when comparing participants by their politics. The addition of the political sticker seems to be the factor that pushed partisans to behave differently toward the hypothetical driver. This also supports the negative trait bias (Baumeister et al., 2001) because the negativity from just the single political sticker outweighed any potential positive traits the driver might have possessed (e.g., caring about animals or the safety of others).

Second, these results support what is already known about social identity and group conflict. Identifying with a group increases people's sense of belonging, control, meaningfulness, and self-esteem (Tajfel & Turner, 2004). Political identity is an important social group for many people, and the presence of political stickers indicates strong partisan identification or identity fusion (Morrison & Miller, 2008; Swann & Buhrmester, 2015). Moreover, if the viewers of such stickers also identify strongly with a political party, they should be more motivated to help or harm the driver, especially when there is a threat to that identity (Greenberg et al., 2016). In an election as contentious as 2016, the threat of losing control of the White House and/or Congress would be the ultimate threat against one's political party, thus justifying prejudice.

Although outgroup hostility is one way of confirming commitment to important social groups (Knapton, Bäck, & Bäck, 2015), most prejudice comes in the form of preferential treatment toward members of an ingroup rather than from hostility toward an outgroup (Greenwald & Pettigrew, 2014). This phenomenon was demonstrated in the present study. In terms of helping, the amount of money increased substantially from that of the control condition when the hypothetical driver shared the political views of the participant and dropped off sharply when the driver did not. Harm for the driver was measured as the likelihood of vandalizing the car, and although the results were statistically significant, the number of people who said they would be *extremely likely* to do so was very small. The

effect sizes for helping ($\eta_p^2 = .099$) and befriending the driver ($\eta_p^2 = .10$) were also larger than the effect size for harming ($\eta_p^2 = .048$). Thus, ingroup favoritism may be the most likely consequence of seeing bumper stickers, especially because it is also easier to imagine being a friend toward those with a shared identity.

Strengths and Limitations

The present study appears to be one of the first attempts to study the social psychological effects of bumper stickers. The results indicate that bumper stickers do have the ability to shape perceptions and behaviors toward other drivers, although the study is not without limitations. The sample size was relatively small and homogenous. In addition, a more representative sample of Trump and Clinton supporters would have been ideal. Although the use of Amazon's Mechanical Turk as a source of participants is preferable to college samples, it is not a representative sample of eligible voters in the United States (Paolacci & Chandler, 2014). Our sample was highly educated, relatively young, and more liberal, which are all characteristics that have been noted about this sampling source (Paolacci & Chandler, 2014). Arguably, different samples could lead to different results, especially if factors like age, education, and race are predictive of different levels of partisanship. Failing to control for these factors was a limitation in the present study. Moreover, because this was a first-of-its-kind study, it was designed without the benefit of prior research protocols to follow, so the methodology could certainly be improved upon. For example, there was room to include more questions in the survey, which could have provided more information such as the stereotypes held about the driver. It would also be helpful to test assumptions made concerning the need for additional stickers, as well as the content, number, and valence of the ideal assortment of stickers.

Future Research

In many ways, this study raised more questions than it answered, both about political stickers in particular and bumper stickers in general. For example, how does additional information about the driver (e.g., gender, race, age) moderate the effect of stickers on stereotypes and prejudice? What effect might the make, model, and condition of the vehicle have on those effects? What makes some bumper stickers more salient than others and how does the combination of stickers work together to shape impressions? Furthermore, what characteristics of viewers will predict their attention to stickers or their understanding and interpretation of what they see?

The focus of this study was on political stickers, and a number of additional questions seem worth investigating along those lines. For example, would campaign stickers have a similar or reduced effect after an election is over? Presumably, group conflict is reduced and the immediate threat is over (the preferred party either won or lost), but there may still be lingering effects, especially among those with strong partisan views. Replicating this study after an election would be useful, especially because people often keep campaign stickers long after an election. It would also be helpful to replicate the study in the next presidential election to see if the same pattern of results would be obtained regardless of who is running in that election.

In the present study, we excluded those who were not voting for one of the two major party candidates in order to maximize the effect of social identity on reactions to the hypothetical driver. It would be worth investigating further how identity fusion among drivers affects their reaction to stickers. In other words, do drivers with stronger political views react more to political bumper stickers? Furthermore, does ownership of the same political bumper sticker or number and valence of political bumper stickers matter? Evidence has suggested that the more stickers one has on a car, the more susceptible that person may be to road rage (Szlemko et al., 2008), so it stands to reason that seeing someone with an equally large number of stickers for the same or opposite values would produce an even stronger ingroup or outgroup response. In addition, it would be worthwhile to investigate differential effects of highly partisan stickers versus more inclusive stickers or their absence. In one study, Democrats and Republicans both experienced less threat and more positive outgroup attitudes when their shared identity as Americans was made salient compared to when their partisan identities were accentuated (Riek, Mania, Gaertner, McDonald, & Lamoreaux, 2010). Therefore, it stands to reason that stickers that appeal to a wider social group (e.g., Americans) may be a safer alternative if the goal is to garner favoritism from fellow drivers.

This study was a first step toward understanding the conditions that give rise to prejudice toward other drivers based on political identity. Given that many other types of stickers convey social identity and communicate shared and nonshared values,

there is much left to explore. In addition, there is no empirical research, to date, on what motivates people to display stickers in the first place or what factors may predict that decision process. Nevertheless, the choice of whether to display bumper stickers and what kinds to include can have real consequences. Although some drivers may benefit from the occasional gesture of goodwill from fellow drivers who share their worldview, they also face the risk of discrimination or even death if the stickers offend the wrong person (Londberg, 2017). For this reason, more research is needed on all aspects of bumper stickers.

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Social Distancing Individuals With Depression: The Impact of Symptom Severity

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ABSTRACT. People with depression experience stigma more than their nondepressed counterparts. Two studies focused on how symptom severity of depression affects stigmatization, operationalized as how people socially distance themselves from depressed individuals. In Study 1, college students and older adults (N = 316) read vignettes of depressed individuals and rated how socially close they would like to be with that person. Vignettes ranged in depressive symptom severity. Using a repeated-measures within-subjects design, we found that vignettes with a higher number of depressive symptoms correlated with greater social distancing, $F(2, 314) = 6.14$, $p = .002$, $\eta^2 = .020$. This finding was consistent for both college students and older adults. Participants higher in depression were also more likely to socially distance themselves from other depressed individuals with many symptoms. In Study 2 (N = 110), we increased participant knowledge of depression to reduce social distancing with a video intervention. The control group and intervention group showed similar stigmatizing behavior. Future research should test for other mechanisms to reduce social distancing acknowledging the role of participants' mental health.

Keywords: depression, social distancing, stereotypes, stigma, mental health literacy

Open Data and Open Materials badges earned for transparent research practices. Data are available at https://osf.io/4dau5/ and materials can be accessed at https://osf.io/6e7tb/, respectively.

Depression, or major depressive disorder (MDD), is the most common mental disorder within the United States of America (National Institute of Mental Health, 2019). In 2017 alone, around 17.3 million adults age 18 or older experienced at least one major depressive episode. Unfortunately, people with depression often experience stigma. People may develop stigmatizing attitudes by believing myths such as "All people with mental disorders are dangerous" or "People with mental illness can just 'get over' their ailment" (Anderson, Jeon, Blenner, Wiener, & Hope, 2015).

Stigmatization includes using stereotyping, prejudice, and discrimination, all of which degrade the individual who is being stigmatized (Hinshaw, 2005). Stigmatization of mental illness is expressed among medical workers and can lead to differentiated, lower quality care of patients with mental illness in a hospital setting (Cheng, Poon, Nguyen, Woodman, & Parker, 2013; Liekins et al., 2012; Minas, Zamzam, Midin, & Cohen, 2011) and self-stigmatization (Overton & Medina, 2008). Self-stigmatization in turn leads to more depressive thoughts and shaky self-confidence (Kao et al., 2016). Consequently, people with depression who tend to stigmatize their own condition have a higher likelihood of rejecting help from therapists or other treatment approaches (Campbell et al., 2016).

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Social Distancing

A common consequence of stigmatization is social distancing, in which people with mental illness are less socially desired than those who do not have a mental illness (Follmer & Jones, 2017; Lauber, Nordt, Falcato, & Rössler, 2004; Link, Cullen, Frank, & Wozniak, 1987; Wang, Smith, & Locke, 2014). Several factors contribute to social distancing (Lauber et al., 2004). For example, the perception of the depressed person being dangerous led representative samples to socially distance more frequently (Anderson et al., 2015; Liekens, Smiths, Laekeman, & Foulon, 2012; Marie & Miles, 2008). Other attitudes or perceptions that lead to social distancing is the supposed "cause" of the depression, with the belief that depression is caused by personal failure (Cleveland et al., 2013; Cook & Wang, 2011; von dem Knesebeck et al., 2013). Another factor leading to social distancing is exposure to depressed individuals; less exposure leads to more social distancing (Dietrich, Mergl, Rummel-Kluge, 2014). Furthermore, social norms and negative stereotypical beliefs about the mentally ill lead to further social distancing (Norman, Sorrentino, Windell, & Manchanda, 2008). Social distancing is especially deemed harmful for mentally ill individuals due to their need for social support from others (Davidson, Dowrick, & Gunn, 2016).

Social distancing is measured with a scale that includes common scenarios where participants report how they would approach that scenario (Link et al., 1987). The scale has been used in different settings such as in the assessment of attitudes toward children with autism (Thibodeau & Finley, 2016), and stigmatization toward depressed people of different ethnicities and socioeconomic statuses (von dem Knesebeck, Kofahl, & Makowski, 2017). Speerfork, Schomerus, Matschinger, and Angermeyer (2016) used the scale to assess how the public feels about certain mentally ill people receiving certain types of treatments.

The Role of Mental Health Literacy

Depression is more recognized than other mental illnesses such as social anxiety disorder, schizophrenia, or general psychosis (Coles et al., 2016; Melas, Tartani, Forsner, Edhborg, & Forsell, 2013; Michel, Schimmelmann, & Schultze-Lutter, 2017). Research on the recognition of depression has focused on assessing public knowledge of the diagnosis, including how to seek help for depressive disorders (Hogg, 2011; Lauber, Nordt, Falcato, & Rössler, 2003; Swami, 2012). Some studies found that the average person has a clear and unbiased knowledge of depression (Hogg, 2011). Other studies examining depression literacy in specific locations such as residential care facilities and schools have shown that reducing stigmatization by increasing literacy also increases care workers' capacity to help depressed individuals (Townsend et al., 2017; Winsor & Mclean, 2016).

Mental health literacy (MHL) is an important factor in social distancing (Lauber et al., 2004). Several studies have found evidence that the higher the level of MHL people hold, the less likely they are to socially distance themselves from depressed individuals (Dietrich et al., 2014; Svensson & Hansson, 2016; Swami, 2012; von dem Knesebeck et al., 2013). However, literacy can also increase distancing. People who use their mental health knowledge to identify that someone is ill are more likely to socially distance from that person (Lauber et al., 2004). We explored how MHL relates to social distancing.

Reducing Social Distancing

In addition to MHL, we also examined the role of age in social distancing. Past research has shown that participants socially distance themselves from mentally ill people. However, one may wonder if social distancing from depressed individuals varies with age. Findings on older adults' attitudes toward mental health are mixed. In one study on generational differences in mental health attitudes, younger adults held more positive attitudes toward mental illness and seeking help for mental health issues (Currin, Hayslip, Schneider, & Kooken, 1998). In contrast, two other studies found that older adult participants had an overwhelmingly positive response to seeking professional help to improve their mental wellness (Currin, Hayslip, & Temple, 2011; Mackenzie Scott, Mather, Sareen, 2008).

Education can help reduce mental illness stigmatization by replacing mental illness myths with accurate conceptions (Arboleda-Flórez & Stuart, 2012). A meta-analysis by Yamaguchi, Mino, and Uddin (2011) identified three mental health interventions: an educational condition in which participants learned about mental illness, a condition in which participants watched an educational video, and a condition in which participants had direct contact with someone who has a mental illness. In general, improvement in mental health knowledge improved attitudes toward individuals with mental illness, reducing social distancing. Direct contact worked more effectively than the

other two education interventions for reducing social distancing. The researchers concluded that video interventions may need to be more explicit in their content such as adding more descriptive details on the presented characters' personal backgrounds and life successes instead of overemphasizing symptomology.

Although many studies have examined the link between depression and social distancing, few have examined if symptom severity changes perceptions of depressed individuals. This is an identified gap in the contemporary mental health literature. There are a wide range of depressive disorders and symptoms. Some common symptoms of MDD are change in eating patterns, change in sleep pattern, hopelessness, anxiety, and feeling of emptiness (NIMH, 2018). We hypothesized that vignettes with higher numbers of depressive symptoms would be more socially distanced than individuals portrayed with fewer symptoms (Study 1). We also hypothesized that participants' level of depression and MHL would influence social distancing (Study 1). Given the mixed findings regarding age in past research, we recruited samples widely varying in age to examine if older adults would stigmatize depressed individuals more given that, for many years in the past, depression was stigmatized. Finally, we hypothesized that an informative video intervention on depression would lower participants' social distancing (Study 2).

Study 1

Method

Participants. Participants included consenting college students at a midsized Midwestern university (n = 79) and members of the local community recruited through the university's Lifelong Learning Institute (n = 237). Psychology and human development students received course credit for participating in the research. In total, there were 316 participants (77% women and 23% men). Most of our sample was White (94%). Other ethnicities included Hispanic/Latino (3%), Asian/Pacific Islander, Native American, and other (3%). Ages ranged from 18 to 88 (M = 55.66, SD = 22.81).

Measures. We adapted vignettes from past studies presenting individuals with depression (Lauber et al., 2004; Swami, 2012; Wang et al., 2014). Two vignettes portrayed individuals with MDD. Two vignettes portrayed individuals with some depressive symptoms but who did not meet criteria for MDD. One vignette portrayed an individual with little to no major depressive symptoms, which acted as a control. Research assistants provided construct validity by correctly identifying which vignettes were categorized as high depressive symptoms, low depressive symptoms, and which had little to no symptoms. All study materials are provided at https://osf.io/6e7tb/.

We used the Social Distancing Scale (SDS; Link et al., 1987) to measure perceptions of the individuals presented in the vignettes, acting as the dependent variable. The SDS used a 5-point Likert scale, ranging from 1 (*strongly agree*) to 5 (*strongly disagree*). Participants answered seven questions on the scale relating to the person they just read about in the vignette. The SDS contained items that measured how socially desirable participants perceived the individuals in the vignettes. Scale scores for this sample showed strong reliability, Cronbach's α = .849.

We assessed knowledge and current attitudes toward mental illness using the Mental Health Literacy Scale (O'Connor & Casey, 2015). The first part of the scale had 20 items on a 5-point Likert scale ranging from 1 (*strongly agree*) to 5 (*strongly disagree*) with questions ranging from overall thoughts about mental illness to how comfortable participants would be asking for help for a mental illness. This first portion of the scale measured perceptions that participants had about mental illness in general. The second part of the scale contained 15 items and a 4-point Likert-type scale; this section measured participants' knowledge of mental illness. An example of a question from this section is, "To what extent do you think it is likely that Personality Disorders are a category of mental illness?" with a rating from 1 (*very likely*) to 4 (*very unlikely*). Certain items were reverse scored. Scale scores for this sample showed strong reliability, Cronbach's α = .87.

We used the Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977) to assess the participants' own levels of depression. The CES-D contains 20 self-report items on a 5-point Likert scale ranging from 1 (*strongly agree*) to 5 (*strongly disagree*). An example of an item on the CES-D is, "I felt depressed," with a rating from 1 (*not at all or less than 1 day last week*) to 5 (*nearly every day for two weeks*). Scale scores for this sample showed strong reliability, Cronbach's α = .94.

Procedure. Student participants took the opportunity to sign up for the study using the departmental participant pool. Participants received credit to satisfy a course research requirement. We invited community member participants

via e-mail. Community members were part of a campus Lifelong Learning Institute.

In the online survey created with Qualtrics software, participants first read the consent form and gave consent before starting the survey. Participants answered demographic questions regarding age, ethnicity, sex, and year in school. Next, participants read all five vignettes (with order counterbalanced) and answered SDS items after each. Then, participants answered general questions about their personal encounters with depression and the Mental Health Literacy Scale (MHLS). Finally, we debriefed the participants and provided a list of possible resources for those who are personally impacted by depression and/or mental illness in general.

Results

We averaged the two high symptom and two low symptom vignettes to create a single score for each. We then used a repeated-measures Analysis of Covariance with vignette as the within-factor variable (high, low, no symptoms); social distancing as the dependent variable; and age, MHL, and CES-D as covariates. There was a significant main effect of vignette, Hotelling's Trace $F(2, 248) = 5.17$, $p = .010$, $\eta^2 = .040$. Participants socially distanced the most from people with highest depressive symptoms ($M = 10.27$, $SD = 0.77$), followed by people with low symptoms ($M = 9.44$, $SD = 0.70$) and people in the control vignette ($M = 9.21$, $SD = 0.77$). Simple within-subjects contrasts showed the strongest effects for Level 1 versus Level 3 contrasts, $F(1, 249) = 9.63$, $p = .002$, $\eta^2 = .037$. Level 2 versus Level 3 contrasts were not significant, $F(1, 249) = 3.61$, $p = .059$, $\eta^2 = .014$. Given that not all participants completed all measures, the sample size dropped with all variables in the equation. We conducted a paired-samples test on only social distancing. Results showed that all pairs were significantly different from each other, high and control, $t(314) = 25.66$, $p < .001$, high and low, $t(313) = 21.54$, $p < .001$, and low and control, $t(313) = 5.38$, $p < .001$.

Participants' level of depression was a significant covariate of social distance ratings, Hotelling's Trace $F(2, 248) = 4.66$, $p = .010$, $\eta^2 = .036$. An examination of bivariate covariations showed that participants with higher scores on the CES-D reported lower social distancing of targets in vignettes with high symptoms, $r(299) = -.18$, $p = .001$. Mental health literacy, $F(2, 248) = 0.35$, $\pi = .705$, $\eta^2 = .003$, and age, $F(2, 248) = 1.73$, $p = .179$, $\eta^2 = .014$, were not significant covariates. An analysis controlling for number of individuals with major depression known by participants as a covariant was also not significant, $F(2, 240) = 0.80$, $p = .450$, $\eta^2 = .007$.

Discussion

As hypothesized, participants showed stronger social distancing behaviors toward people who displayed more depressive symptoms. Social distancing behaviors toward the control vignette were lowest. We note that the effect sizes were not large. The participants' level of depression affected their social distancing decisions, suggesting that personal experiences with the mental illness influenced views of others with the illness. Instead of wanting to provide support to targets by reducing social distancing, our results suggest that the more severe symptoms alerted participants to the mental illness and increased self-reported distancing. Knowing more about mental illness did not seem to predict social distancing perhaps because depression is a well-known mental illness and there was not enough variance in MHL to influence perceptions.

Counter to our hypothesis, participant age was not a significant factor. It is possible that widespread public media campaigns to raise awareness of depression and mental illness apply equally to individuals across the lifespan.

Given the strong differences found in viewing different vignettes, we next wanted to see if we could reduce social distancing. We hypothesized that an intervention to change the level of participants' knowledge about depression may be salient enough to reduce social distancing behavior. In Study 2, we used a commonly accessible video as an intervention to increase knowledge about depression and tested if it would decrease social distancing.

Study 2

Method

Participants. Participants included consenting college students ($N = 99$, 89% women, 11% men) in psychology and human development classes. Students received course credit for participation to satisfy a research requirement. Most participants were White (87%). Other ethnicities were Asian/Pacific Islanders (8%), African American (2%), Hispanic/Latino (2%), and other (2%). Participants' ages ranged from 18 to 56 ($M = 20.30$, $SD = 5.01$).

Measures. Participants watched one of two videos, accessed on YouTube. The intervention featured a video entitled "I Had a Black Dog; His Name Was Depression" published by the World

Health Organization (2012). The video describes depression as a black dog that debilitates the main character's life. The video provides information about therapy and treatment, and mentions that depression can make people with the illness worried that they may experience stigma for having depression. The video also mentions that having depression can make people feel isolated from everything and everyone. Participants in the control condition watched a nature video entitled "Anatomy of a Hunt: Speed, Strategy, and Survival" published by Nature Video (2018). This video was about the speed and anatomy of cheetahs. The two videos were similar in length, each of them being a little over four minutes. Participants rated the video on enjoyable, informational, well-made, sad, eye-opening, engaging, colorful, boring, long, and inaccurate, using a 5-point Likert scale ranging from 1 (*strongly agree*) to (*strongly disagree*).

We used two of the adapted vignettes from Study 1 to both reduce the length of the study and fatigue, and utilize the two extreme ends of the range of symptom options. We used one high symptom (MDD) scenario and the control vignette. Participants completed the SDS (Link et al., 1987) for each vignette. They also completed the Mental Health Literacy Scale (O'Connor & Casey, 2015) and the CES-D Scale (Radloff, 1977).

Procedure. As in the previous study, college participants signed up for the study for research credit and completed the study online. We first asked participants to read the consent form and give consent before starting the survey. Participants answered demographic questions regarding age, ethnicity, sex, and year in school and were randomly assigned to watch the intervention video or nature video. Participants then read the vignettes and answered the SDS based on the vignettes they just read. Participants answered general questions about their personal encounters with depression and completed the MHLS and CES-D. Finally, we debriefed the participants with the purpose of the study. The debriefing also included a list of possible resources for those who are personally impacted by depression and/or mental illness in general.

Results

As a manipulation check, we first analyzed ratings of the videos across conditions using a multivariate Analysis of Variance. The multivariate test, Hotelling's Trace for condition was significant, $F(10, 86) = 4.89$, $p < .001$, $\eta^2 = .36$. Tests of between-subjects effects showed that the experimental group rated the video less enjoyable ($p = .013$, $\eta^2 = .06$), but more eye-opening ($p < .001$, $\eta^2 = .14$), and sad ($p < .001$, $\eta^2 = .22$). Participants' CESD and MHL scores did not vary across conditions suggesting the video intervention did not influence the reporting of these scores.

We tested the effectiveness of our intervention using a repeated-measures Analysis of Covariance with vignette as the within-subjects variables, condition as the between subjects variable, and participants' MHLS and CESD scores as covariates. The intervention did not significantly influence social distancing. Scores on social distancing did not vary across conditions, Hotelling's Trace $F(1, 95) = 1.09$, $p = .298$, $\eta^2 = .01$. Similar to Study 1, we found a main effect for vignette with participants distancing more from the high symptom vignette than the low symptom vignette, $F(1, 95) = 10.25$, $p = .002$, $\eta^2 = .10$. Only MHLS acted as a significant covariate, $F(1, 95) = 10.32$, $p = .002$, $\eta^2 = .10$. Participants with higher MHL scores reported less social distancing. CES-D was not a significant covariate, $F(10, 86) = 1.43$, $p = .235$, $\eta^2 = .02$.

General Discussion

Our results showed that individuals with more depressive symptoms are more likely to experience social distancing than those who have fewer depressive symptoms. This finding stayed consistent within the two studies. Our findings align with numerous other studies that have found that individuals with mental illness are socially distanced and stigmatized (Follmer & Jones, 2017; Lauber et al., 2004; Link et al., 1987; Wang et al., 2014).

In line with previous studies, we found partial support for the hypthesis that participants' own level of depression (Study 1) and MHL (Study 2) affects social distancing behaviors toward other depressed individuals. The higher the depression in participants, the less they socially distanced themselves from highly depressed individuals in the first study. The higher the MHL, the less likely they distanced themselves in the second study. It is likely that a person's knowledge and feelings of relatedness to a target can shape that person's worldview regarding the mentally ill. Individuals higher in depression may better understand how lonely and isolating depression is, which reduced social distancing. Whether participants knew someone with depression personally did not significantly affect social distancing as it has in other studies (Dietrich et al., 2014).

Age was not a significant predictor of outcomes.

The general level of stigmatization was similar across ages. We predicted that members of an older generation would show more stigmatization toward depressed individuals. However, age was not a significant covariate.

The video intervention did not decrease social distancing. This is consistent with past findings that video interventions can be limited in effectiveness (Yamaguchi et al., 2011). Although a video intervention is an easy way to convey information to large numbers of people, it is possible that an individual's past exposure and knowledge of mental illness is relatively resistant to change. Watching a video provides a buffer between the subject matter and the person, especially when the video is animated. Creating and testing the effects of a video featuring live action and people similar to the participants may be more likely to create change. Research has shown that there are more effective ways of breaking stigma such as direct contact with mentally ill individuals (Yamaguchi et al., 2011), and creating videos to more closely mirror such experiences may be better investments of time for the future.

Our study has two major limitations. Our samples did not contain much variance in gender or ethnicity, which limits the generalizability of our findings. The primary ethnicity of participants in both studies was White. Also, our samples included a much higher proportion of women than men. Second, we did not utilize all three levels of vignettes in Study 2, limiting levels of contrast. We did not test the effect of the video on low depression symptoms, only high, and the "no symptom" control.

There are several implications for future research. First, this study should be replicated to firmly establish the findings. Also, more studies should be conducted that look at the symptom severity of depression and social distancing. Many studies compare the stigmatization of different disorders, but there is a gap in literature that focuses on symptom severity. Future researchers could replicate the format of this study, focusing on symptom severity, but using different dependent variables. Although social distancing is a common stigmatization measurement, there are other scales that would broaden the understanding of attitudes toward mentally ill individuals. Good candidates for future work include providing social support or the measurement of other prosocial behaviors such as sharing coping skills.

Finally, future research directions could build off the current research by focusing on other mental disorders. Perhaps there are different degrees of stigmatization based on the symptom severity of OCD or ADHD. Perhaps there is a difference between the social distancing of individuals with major depression and those with severe schizophrenia. Future research should examine the difference between disorders that have a strong impact on social functioning and social behavior (e.g., Autism spectrum) with disorders that have a lesser detrimental impact on social functioning (e.g., some anxiety disorders).

Although we did establish a clear link between social distancing and symptoms of depression, we note that distancing did not consistently vary with MHL, participants' own depression, or age. Study 1 suggests that experiencing symptoms of depression may influence how people see others with depression, and Study 2 suggests that MHL is associated with social distancing behaviors toward depressed individuals. The challenge for researchers is to determine the best way to reduce negative attitudes toward individuals experiencing mental illness.

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The Effect of a Fabricated Stereotype Threat on Sex Differences in Object Location Memory

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ABSTRACT. Monitoring a negative stereotype coupled with the fear of conforming to it poses the risk for targeted groups to underperform when completing a relevant task. We investigated the impact of a fabricated (empirically invalidated and not socially instilled) stereotype threat on an object location memory task, which tends to show a sex difference in favor of women. The threat stated that women tend to perform worse than men; thus, we tested if a fabricated negative stereotype would decrease performance of an advantaged group. Contrary to expectations, the negative stereotype improved women's performance: women under threat actually performed better than when not under threat ($p = .007$, $d = 1.094$). Discussion focuses on the "mere effort" account and the impact of stereotype salience.

Keywords: stereotype threat, fabricated stereotype, sex differences, object location memory

Stereotype threat occurs when a person's awareness of a negative stereotype about their group makes them wary about confirming it (Steele & Aronson, 1995). Under some conditions, this wariness is intense enough to interfere with one's ability to demonstrate competence on tests, in social interactions, and in other situations where performance anxiety is disruptive (Steele, 2010). For example, in early experimental tests of stereotype threat, Steele and Aronson (1995) found that African American college students performed worse on a standardized test of verbal ability when reminded of their race (and thus the stereotype of African American mental abilities), or alternatively, when led to believe a test was diagnostic of their intellectual ability (and thus capable of confirming the stereotype about intelligence). Stereotype threat has been studied for two decades and shown to be operative in a variety of situations and experienced by individuals with a range of social identities (Aronson & Dee, 2012; Inzlicht & Schmader, 2012; Reardon, Atteberry, Arshan, & Kurlaender, 2009; Rydell, Van Loo, & Boucher, 2017).

Like earlier work demonstrating the lability in test performances of poor and minority students (Katz, Epps, & Axelson, 1964; Zigler & Buttefield, 1968), Steele and Aronson's aim was to shed light on the role of context in the IQ test score gap and the college learning gap between White and Black American students (Steele, 1997; Steele & Aronson, 1998). The logic in all of these studies is that, by making stereotypes salient or seem especially relevant, subtle cue differences in context can lead to impaired cognitive performance, learning, or social interaction of individuals to whom the stereotypes apply. As a society, we tend to assume that intellectual performance is stable from one situation to another, but stereotype threat is one of many cases that show that this is quite fragile, particularly for groups with a reputation of intellectual weakness in some domain (Aronson & Steele, 2005; Beilock & Carr, 2001).

Although studies have shown stereotype threat effects among various groups in many situations (e.g., Shapiro & Williams, 2012), the effect has been studied most extensively with women in situations involving performance in math and hard science domains. For example, in an early study,

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Spencer, Steele, and Quinn (1999) found that women underperformed compared to men when solving difficult math problems but performed significantly better when assured that the test did not discriminate against women. The take-home message of all this work—from Katz's early studies (Katz et al., 1964) to more recent ones (Pansu et al., 2016)—is that even subtle shifts in context can produce large differences in performance (Beliock, Rydell, & McConnell, 2007) or learning (Appel, Kronberger, & Aronson, 2011), most often by negating the working assumption that a person is at risk of underperforming and confirming a negative stereotype in a high-stakes situation.

The tasks in most stereotype threat situations are cognitive and rely on working memory. However, it has been shown that stereotype threat can also affect skills that are procedural in nature (Beilock & Carr, 2001). Stone, Lynch, Sjomeling, and Darley (1999) reported that, when an athletic task is explained as being diagnostic of athletic ability, White athletes underperformed, but when the same task was framed as being diagnostic of strategic ability, Black athletes underperformed. This indicates that stereotype threat can apply to a wide variety of circumstances and performances (Beilock & Carr, 2001).

Research on the causes of stereotype threat has suggested that people under threat perform more poorly due to cognitive and affective factors involving both automatic and controlled processes such as stereotype avoidance and automatic vigilance (Schmader & Beilock, 2012). Schmader and Johns (2003) proposed that the mechanism behind the impact of stereotype threat is working memory capacity. Working memory capacity was defined as "the ability to focus one's attention on a given task while keeping task-irrelevant thoughts at bay" (p. 440). If a stereotype threat were to be present while completing an assessment, the working memory capacity for the task would be diminished because of competing demands such as focusing on the threat and fear of conforming to the threat. Schmader and Johns (2003) used a working memory capacity assessment coupled with a quantitative assessment to determine if women under threat have a reduced working memory capacity. They found that, when women were told that the quantitative assessment showed sex differences, they did indeed present lower working memory capacity compared to men (Schmader & Johns, 2003). This resulted in lower scores on the quantitative task. Further evidence has supported a causal link between working memory and stereotype threat, as described by Beilock, Jellison, Rydell, McConnell, and Carr (2006).

Other factors can account for the effect of stereotype threat by offering an explanation of performance differences across a variety of situations and could eventually be used to alleviate the impact of stereotype threat. These include, but certainly are not limited to, anxiety, individuation tendencies, evaluation apprehension, performance expectation, explicit stereotype endorsement, self-efficacy, and motivation (Pennington, Heim, Levy, & Larkin, 2016). Considering motivation, for example, it has been suggested that the presence of a stereotype threat incentivizes individuals to improve their performance on a task at hand, strengthening their prepotent response (the most likely response to be produced; Jamieson & Harkins, 2007). This can be beneficial to individuals if the prepotent response is successful. However, it can also be detrimental to performance if the prepotent response is incorrect. It seems that a stereotype threat is particularly beneficial in motivating if the person is engaged in a difficult task with which they do not strongly identify (Keller, 2007).

To our knowledge, nearly all of the published research on stereotype threat involves a stereotype with some accuracy. For example, in the race studies by Steele and Aronson, national statistics confirm that Black students graduate with grades two-thirds of a letter grade lower than their White counterparts (American Council on Education, 1990). National test score data likewise indicate that Asians score better than their White counterparts on tests of mathematics, and that White male students perform better than White female students on tests of calculus and other measures of advanced mathematics (Benbow & Stanley, 1983). Thus, the stereotypes can be thought to be threatening because they are both salient and, to some extent, accurate, which magnifies the risk of behavior or performance.

In the present study, we examined the influence of stereotype threat without this confirmation of a known, and, somewhat accurate stereotype. Specifically, we asked about the effects of a fabricated stereotype—an allegation of a group difference previously unknown to a target. We use "fabricated" to refer to a stereotype that is not socially instilled, meaning that it is not a stereotype that the participants in the study would be aware of or identify with. This concept of a fabricated threat has, to the best of our knowledge, been untested in stereotype threat research. However, it is an important issue because not every cultural group is aware of stereotypes targeting them, and when changing cultural environment, the potential threat of a stereotype might

hinge not only on its negative connotation, but also on how instilled it is in the specific person. For example, when immigrants enter a new nation, there may be pre-existing stereotypes held by the cultures they are entering that they are not aware of (Deaux et al., 2007). It is important to know if immigrants can be impacted by the stereotypes targeting them when held by others in their new social context. If this is the case, then their performance in various domains could be diminished upon first exposure to a negative stereotype in the new environment.

Can a stereotype that suggests an ability difference undermine performance if it is created de novo in a laboratory, or must a stereotype contain some level of accuracy and be salient within a society? If the competition for working memory resources is at the core of the stereotype threat, then there should be a similar effect between a salient and a fabricated stereotype. Unlike the socially instilled stereotypes used in most of the literature, the targeted group in the present study was unfamiliar with the fabricated stereotype. However, if they were made aware of the group difference with an explicit statement, the existence of the stereotype, and the fear of conforming to it, should still occupy some of the finite working memory capacity that could be dedicated to the task at hand. Therefore, in the present study, it was reasoned that a fabricated threat would have the same impact of a typical stereotype threat: impaired performance of the targeted group.

The assessment chosen for this study was novel in that, to the best of our knowledge, it had not been used in stereotype threat research before. The assessment was an object location memory task, as described by Voyer, Postma, Brake, and Imperato-McGinley (2007). This task involves encoding the location of an array of objects on a piece of paper and, after a distractor, recognizing whether any of their locations had been changed or not. This task was chosen for two main reasons. First, unlike most spatial abilities, which tend to show no consistent sex differences or a male advantage (Voyer, Voyer, & Bryden, 1995), object location memory presents a sex difference in favor of women, as found in a meta-analysis that accounted for 86 studies (mean weighted *d* of 0.269; Voyer et al., 2007). In general, most of the literature on stereotype threat deals with assessments that favor men (e.g., mental rotation, advanced mathematics; see McGlone & Aronson, 2006; Moè, 2009), so it is important to add evidence from an opposite group difference. Furthermore, the sex difference in object location memory is not as commonly known in society because other group differences that have been considered previously, such as quantitative assessment; this allowed us to create a novel threat with little preconceived notion.

The stereotype threat was elicited by verbally stating: "Women tend to perform worse than men on this type of assessment." Therefore, the group difference presented was in the opposite direction from what literature had indicated (i.e., female advantage). As such, the goal of the present study was to explore whether a fabricated stereotype threat could decrease (rather than increase) a group difference by weakening the performance of the advantaged (rather than the disadvantaged) group, thus extending knowledge on the full possible impact of a stereotype. We hypothesized that, if a fabricated (empirically invalidated and not socially instilled) stereotype is sufficient to contend for working memory capacity with the task at hand, a stereotype threat should be elicited; this should result in women under threat performing more poorly than their unthreatened counterparts.

Method

Participants

A total of 60 undergraduate students from a small, public, Midwestern university were recruited for this study via convenience sampling. Participants were recruited in the Physical Science Building, meaning that most participants were enrolled in psychology, physics, or chemistry courses. Participants volunteered without any incentive as they walked around the building after class and were asked to complete a very brief study. Participants were only told that they would be completing a spatial task. Half of the participants were assigned to the control (not under threat) condition (10 men and 20 women); the other half to the experimental (under threat) condition (13 men and 17 women). All procedures were approved by the Eastern Illinois University IRB and followed the APA ethical standards for human research.

Materials

Testing occurred in a medium sized classroom on the first floor of the building. The assessment used was an object location memory task similar to the one developed by Silverman and Eals (1992). It consisted of a letter size sheet with an array of 30 objects; this is referred to as the encoding sheet (see Appendix). These images were random open source images. The test sheet contained the

same 30 objects, but 16 objects were in a different location. Participants had to circle the objects that had moved (see Appendix). The assessment was scored in the following manner: any object correctly circled (i.e., that had moved with respect to the encoding sheet) counted as +1 point, while any object incorrectly circled counted as -1 point. There were 16 objects that moved, so the maximum score that could be achieved was 16. The minimum score that could be obtained was -14.

A sheet for the distractor task was also used. This task was a maze that participants had to solve; it was generated from www.mazegenerator.net.

Testing Groups

Data were collected over the course of 4 days. Participants were tested in groups of different size and composition, and this was approximately balanced between the under-threat and control condition (see Table 1 for details on group composition). Each group was randomly assigned to either the control or under-threat condition. When a group entered the testing room, those participants were instructed to take a seat such that they would not be directly next to another participant. This meant that participants could sit in a vertical row (one behind the other), or they could sit a desk apart in a horizontal row.

Procedure

After participants entered the room and were seated, they read a brief information sheet with a summary explaining the procedure of the assessment. When they had finished, they read and signed the informed consent form before we proceeded with the assessment. The experimenters remained at the front of the room throughout the session, only going by the participants to exchange sheets for the assessment as necessary. There were always two experimenters present in any session to keep time and to exchange sheets. Two teams of experimenters, which alternated randomly throughout data collection, ran the study: one team was composed of two female experimenters, and the other team of a female and a male experimenter.

The assessment process began with one experimenter briefly re-explaining the procedure to the participants. Crucially, when a group of participants was in the under-threat condition, the experimenter ended the explanation by stating: "It's been shown that women actually perform worse than men on this type of assessment." Participants in the control condition were not presented with this statement and simply continued to the next step. This was the only difference between the conditions.

The participants were handed the encoding sheet (see Appendix) and given 60 seconds to study the encoding sheet before the researcher replaced the encoding sheet with a distractor task. Participants worked on the maze for 90 seconds. Next, they were given the test sheet (see Appendix) and reminded to circle any objects they thought had moved. After 60 seconds, the test sheets were collected.

At the end of the session, a debriefing statement was handed to the participants explaining the purpose of the study. The overall session took, on average, approximately 10 minutes.

Table 1

Group Composition

	No Threat	Under Threat	Total
Individually tested	1M, 1M, 1F, 1F	1M, 1M, 1F	4M, 3F
Homogenous Groups – All men (M)	2M, 2M	0	4M
Homogenous Groups – All women (F)	2F, 2F, 3F	2F, 2F, 2F, 4F	17F
Heterogeneous Groups	2M/4F, 1M/4F, 1M/3F	1M/2F, 2M/2F, 7M/1F, 1M/1F	15M, 17F
Total	10M and 20F	13M, 17F	23M, 37F

Note. Number and sex of participants in each group for the control (no threat) and under threat condition; each group is separated by a comma. For example, some participants were tested in groups which happened to be all women (Homogenous Groups – All females). Three such groups were tested in the "No Threat" condition (two women, two women, and three women), and four such groups in the "Under Threat" condition (two women, two women, two women, and four women). The total column/row reports the total number of participants collapsed.

FIGURE 1

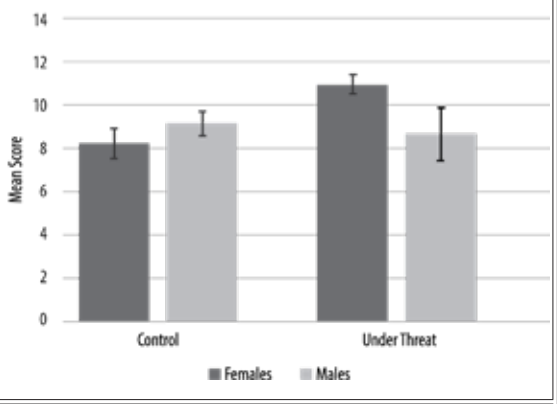

Figure 1. Average score in the task for men and women under threat and in the control condition. There was no significant main effect of sex or condition. However, the interaction was statistically significant. The error bars represent standard error of the mean.

Results

A 2 (condition: under threat or control) x 2 (sex) between-subjects factorial Analysis of Variance (ANOVA) was used with participants' scores as the dependent variable (see Figure 1). There were no significant main effects for condition, $F(1, 56) = 1.99$, $p = .164$, $\eta^2_p = .034$, or for sex, $F(1, 56) = 0.73$, $p = .397$, $\eta^2_p = .013$. However, there was a significant interaction, $F(1, 56) = 4.19$, $p = .045$, $\eta^2_p = .070$. A post-hoc power analysis was also completed, and the statistical power of the interaction was .52. See Table 2 for means and standard deviations of the participant groups and Table 3 for an ANOVA summary table.

Analysis of the simple effects (F-tests with the omnibus ANOVA error term) revealed that women ($M = 11.00$; $SD = 1.87$) performed significantly better than men ($M = 8.69$; $SD = 4.44$) when under threat ($p = .040$, $d = .662$), but the two sexes (Women: $M = 8.25$; $SD = 3.02$; Men: $M = 9.20$; $SD = 1.81$) did not perform significantly differently in the control condition ($p = .413$, $d = .394$). Furthermore, female participants performed significantly better when under threat ($M = 11.00$; $SD = 1.87$) than when not under threat ($M = 8.25$; $SD = 3.02$; $p = .007$, $d = 1.094$) and, as expected, there was no significant difference between the scores of male participants exposed to the threat condition ($M = 8.69$; $SD = 4.44$) and those in the control condition ($M = 9.20$; $SD = 1.81$; $p = .687$, $d = .150$).

Table 2

Participant Groups Means and Standard Deviations

	M	*SD*
Under Threat		
Women	11.00	1.87
Men	8.69	4.44
Control		
Women	8.25	3.02
Men	9.20	1.81

Table 3

Summary Table for Two-Way Analysis of Variance of the Effects of Sex and Experimental Condition

Source	*SS*	*df*	*MS*	*F*	*p*	η^2_p
Main Effect of Sex	6.45	1	6.45	0.73	.40	.01
Main Effect of Condition	17.60	1	17.60	1.99	.16	.03
Interaction Effect	37.14	1	37.14	4.19	.05	.07
Error	496.12	56	8.86			

Discussion

Women's scores in the object location memory task were significantly higher when confronted with a fabricated threat. Women led to believe that they generally performed worse on the task scored significantly better than those given no stereotyped expectation. Additionally, women performed significantly better than men when both sexes were presented with the stereotype.

These results did not support our hypothesis that a fabricated stereotype would act like a salient stereotype and undermine performance of the targeted group by contending for working memory capacity with the task at hand. As expected, men were not affected by the stereotype manipulation, as their social identity was not threatened. However, contrary to predictions, women performed significantly better—not worse—under the threat compared to controls. Interestingly, women's oft reported advantage in object location memory (Voyer et al., 2007) appeared under threat, but not in the control condition. This was unexpected, although it should be emphasized that the female advantage in this ability has not been reported in every individual study considered in the meta-analysis (Voyer et al., 2007). For our purpose, more remarkable is the fact that women's scores in the task improved significantly under threat. Considering that most of the literature on stereotype threat indicates a detrimental effect on the performance of the stereotyped individual, this result is noteworthy. Our findings suggest that a fabricated stereotype had the opposite effect—it improved performance.

One possible explanation for these findings is the "mere effort account" (Jamieson & Harkins, 2007), based on which motivation to do well is the major mediator in the impact of stereotype threat. When an individual knows that there is a potential for evaluation, there is additional motivation to perform the task, and the prepotent response is strengthened. If individuals are given the chance to practice the task or the task is simple, their prepotent response will improve their performance; otherwise their performance might be impaired. According to Jamieson and Harkins (2007), when stereotype threat is present, it operates similarly to an evaluation: individuals knows that their

performance will be monitored according to their social identity threatened by the stereotype, and it motivates them to do well on the task at hand. Evidence in support of this theory has been found in different contexts, from solving GRE quantitative problems (Jamieson & Harkins, 2009) to rhythmic motor tasks (Huber, Seitchik, Brown, Sternad, & Harkins, 2015). For example, in a simple visual motor (antisaccade) task, it was found that the presence of a stereotype threat improved performance. However, as the task became more and more difficult, the participant was no longer able to improve and instead the performance diminished under threat (Jamieson & Harkins, 2007). In order for the mere effort account to explain our results, it has to be assumed that the women performing the spatial memory assessment already had some skills in this task, or that the task was not difficult, meaning that their prepotent response would improve their performance. This could well be the case. First, in general, the task that participants completed in this study seems to be fairly easy: the average score for each condition fell between +8 and +11, with the possible range being from -14 to +16. Furthermore, in line with the sex difference in this type of spatial ability (Voyer et al., 2007), women might have found this task easier than men. Consequently, women could have been motivated by the presence of the stereotype threat, which in turn activated their prepotent response improving their performance in the task. Related to this, Keller (2007) found that an important moderator for the stereotype threat was domain identification. In that study, if the women solving a difficult math problem did not identify with math, they tended to perform better under threat than in a no-threat condition. This was ascribed to a motivating role of the threat without the disruption related to increased arousal/stress that one would expect if the participant actually identified with the task. A similar situation could have applied to our study. Women might not have particularly identified with the general domain of spatial skills. In this sense, the threat might have motivated them to succeed in the task without fear of not meeting expectations.

Another explanation is that inducing the threat motivated women to do better without the added threat of contending with stereotype accuracy. For example, Deaux and colleagues (2007) found that first-generation Black immigrants were less susceptible to stereotype threat effects than second-generation Black immigrants in the laboratory—in fact, their performance improved compared to their nonthreatened counterparts—because, although aware that Americans view Black people as less intelligent, the stereotype failed to resonate (and thus threaten them). Because they did not grow up with it, the threat felt fabricated. This is much like the stereotype presented in our study. However, second-generation immigrants who grew up in America and who were subject to American stereotypes about race from an early age did indeed underperform under stereotype threat conditions, as expected (Deaux et al., 2007). The improvement in performance for first-generation immigrants was theorized to be due to stereotype lift, a theory proposed by Walton and Cohen (2003), where performance improvement results when individuals are aware that an outgroup is being negatively stereotyped. In this case, the outgroup were the Black individuals in America, which is why the threat did not resonate with the immigrants. Our study presented a stereotype threat that, similarly, would not resonate with participants because it was fabricated: the sex difference in object location memory is not socially instilled. Although the threat was not about an outgroup, it raises an interesting question of whether a similar stereotype lift can occur when individuals are negatively stereotyped, as long as the threat does not resonate with the participants.

Admittedly, there are limitations to this study. First is the relatively small sample size and a low power (.52); future studies should try to replicate our findings with larger groups of participants. Second, the testing group composition and experimenters' sex composition were not consistent throughout the study. However, importantly, the testing group composition was approximately balanced between the two conditions (see Table 1), and the two teams of experimenters (two women in one team; a woman and a man in the other team) alternated randomly. Therefore, these procedures did not cause a systematic difference between conditions and their effects were approximately equal in the two conditions; for this reason, the difference in performance obtained is unlikely due to this. Third, we lacked a systematic manipulation check on the participants. However, anecdotally, responses of many participants indicate the activation of the stereotype. At the end of the experimental session, many women unsolicitedly reported to the experimenters that, upon hearing the fabricated threat, their initial thoughts were "I'm going to have to prove that wrong" or similar, which imply that they took it as a challenge. This suggests that the

threat was heard and processed by the participants. Additionally, no demographic information besides the sex of the participants was collected. Because of these limitations, this can be considered an exploratory study, and the evidence gathered may open the topic up for more thorough investigation.

In conclusion, a fabricated stereotype targeting women did not impair their performance on the task. Previous studies have indicated that a salient stereotype can diminish the performance of a vulnerable group. Conversely, here we addressed whether a fabricated, negative stereotype would weaken the performance of a group with an existing advantage in the task; our findings show that, on the contrary, it improved the performance of said group. This suggests that a stereotype threat has to resonate with the threatened individual in order to diminish their performance. When this is not the case, they are actually motivated to perform better on the task at hand, thus resulting in higher performance than their nonthreatened counterparts. However, our findings can be explained also by the mere effort account and by domain identification. To distinguish among these possibilities, future research should use a fabricated stereotype with tasks of different difficulty levels and with different levels of identification with the task. The effect of a fabricated stereotype can allow us to better understand how stereotype threat operates and whether a threat must be known and salient to undermine performance. Stereotypes are not always equally salient in different cultural groups, so this is a question worthy of further exploration.

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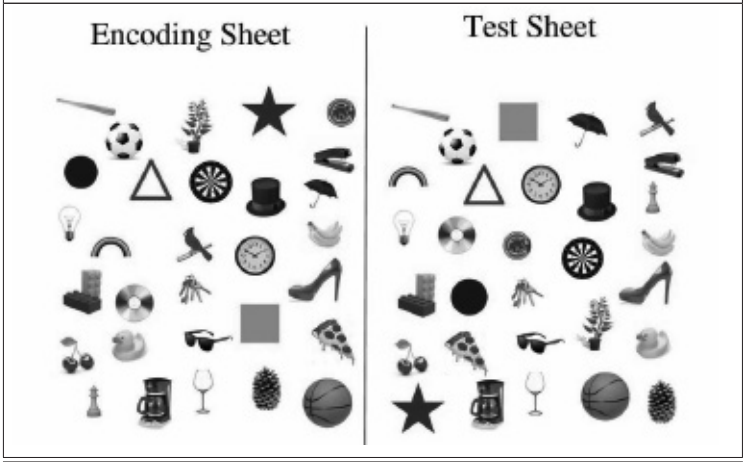
APPENDIX

Encoding Sheet and Test Sheet



Out of 30 objects, 16 had moved in the test sheet with respect to their position in the encoding sheet. The assessment consisted in circling the objects that had moved.

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Internal Representations of Interparental Conflict and Withdrawn/Depressed Symptoms: The Moderating Role of Mother–Adolescent Attachment

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ABSTRACT. Insecure mother–adolescent attachment is predictive of the internalizing symptoms of withdrawal and depression (Buirst, 2016; Constantine, 2006; Essau, 2004). Additionally, research on the emotional security theory (Davies & Cummings, 1994) has indicated that adolescents' feelings of emotional insecurity about interparental conflict may prospectively predict symptoms of withdrawal and depression (Cummings, Koss, & Davies, 2015). However, limited research has investigated the interaction between parent–adolescent attachment and emotional security. The present study investigated the role of adolescents' perceived mother–adolescent attachment security as a moderator between adolescents' emotional security measured through internal representations of interparental conflict and self-reported withdrawn/depressed symptoms (N = 225). The hypothesis was that mother–adolescent attachment security would serve as a moderator between emotional security about interparental conflict and adolescents' withdrawn/depressed symptoms. A moderation analysis, using a standard multiple regression, was conducted. The Security in the Interparental Subsystem Scale (Davies, Forman, et al., 2002) served as the predictor variable, and the Inventory for Parent and Peer Attachment served as the moderator variable, with the dependent variable consisting of withdrawn/depressed symptoms indicated on the Youth Self–Report. Mother–adolescent attachment security was a significant moderator between emotional security about interparental conflict and withdrawn/depressed symptoms, $F(3, 221) = 38.13$, $p < .001$, $f^2 = 0.52$. Findings support further investigation into the interaction of attachment and emotional security and its prediction of psychopathology.

Keywords: attachment, emotional security, adolescence, withdrawal, depression

Attachment is defined as an affectionate bond between an infant and caregiver, which endures over time (Ainsworth & Bell, 1970; Bowlby, 1969). Secure attachment is shown when children desire proximity to their caregivers and use them as a safe base to explore, whereas children with forms of insecure attachment (e.g., avoidant, resistant) reject their caregivers in times of need and ultimately have an increased risk for social and emotional maladjustment (Benoit, 2004; Raudino, Fergusson, & Horwood, 2013). Ainsworth and Bowlby's joint work on attachment theory has demonstrated the critical importance of a secure attachment bond throughout the life span (Ainsworth & Bell, 1970; Bowlby, 1969). Bowlby (1982) proposed the importance of internal working models derived from attachment relationships for children's emotional and cognitive development and involvement in future relationships. Moreover, extensive research has

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shown the link between attachment styles and psychopathology (Raudino et al., 2013). Although attachment history and future psychopathology are not related linearly, attachment history is an important aspect in the complex process of development (Erickson, Sroufe, & Egeland, 1985; Sroufe, 2005; Sroufe, Carlson, Levv, & Egeland, 1999).

The importance of attachment theory is also present in the developmental time period of *adolescence*. Because adolescence is a life transition involving a multitude of changes, the quality of parent–adolescent attachment remains theoretically significant for positive developmental outcomes for adolescents and emerging adults (Buirst, 2016). Importantly, adolescents who perceive a secure attachment to their parents have a better sense of well-being compared to those who do not perceive a secure attachment to their parents (Greenberg, Siegel, & Leitch, 1983). A longitudinal study on attachment in adolescence and later adjustment, measured outcomes including major depression, anxiety disorder, suicidal behavior, illicit drug use, and crime (Raudino, et al., 2013). Findings supported that the quality of parent-adolescent attachment and relationships were related to later psychosocial functioning (Raudino et al., 2013).

Adolescence is characterized as a time period involving transformations in behavioral, emotional, and cognitive systems, including the desire for autonomy (Devi, Baruah, Pradhan & Borah, 2017). Although the desire for autonomy is representative of adolescence, questionnaire measures of adolescents' peer and parent attachment found parental attachment to be more predictive of psychological health and well-being compared to peer attachment, which suggests that despite the desire for autonomy, parent–adolescent attachment is important to assess (Agerup, Lydersen, Wallander, & Sund, 2014; Greenberg et al., 1983; Sund & WichstrØm, 2002). In regard to parental differences with attachment, some research has found that only mother–adolescent attachment was significantly related to internalizing symptoms (DiFilippo & Overholser, 2000; Papini, Roggman, & Anderson, 1991). However, some research has found no difference when investigating mother–adolescent and father–adolescent attachment and the development of internalizing symptoms (De Minzi, 2006; Papini et al., 1991). Many studies have found mother-adolescent attachment security to be higher than father-adolescent attachment security, which may explain the mixed findings in regard to father-adolescent attachment security and the development of internalizing symptoms (Devi et al., 2017; Hellenthal, 2006; Parsa, Yaacob, Redzuan, Parsa, & Esmaeili, 2014). Overall, studies of parent–adolescent attachment have shown that insecure attachments may lead to specific adjustment outcomes, including the development of internalizing symptoms (Agerup et al., 2014; Brumariu & Kerns, 2010).

Specifically, parent–adolescent attachment predicts the internalizing symptoms of *depression*. In particular, various studies have found significant associations between insecure parent–adolescent attachment and depressive symptoms (Agerup et al., 2014; Constantine, 2006; DiFilippo & Overholser, 2000; Essau, 2004; Laible, Carlo, & Raffaelli, 2000; Rawatlal, Kliewer, & Pillay, 2015). Adolescents with insecure parent–adolescent attachment may feel incapable of being loved and may view their social environment negatively (Buirst, 2016; Sund & WichstrØm, 2002). Studies show that feeling unloved is a crucial part of the onset of depression (Kent, Vostanis, & Feehan, 1997). Additionally, Sund and WichstrØm (2002) performed a longitudinal study and found that initial levels of attachment were predictive of depressive symptoms one year later. With the use of a longitudinal model and large sample, their study is indicative of a strong relationship between insecure parent–adolescent attachment and levels of depression throughout adolescence. Conversely, those with secure attachments have lower scores on measures of depression (Rice, 1990). Adolescents with secure attachments may have stronger emotional regulation skills because they are able to seek out their parents in times of need, protecting against the development of depressive symptoms (Rawatlal et al., 2015).

In addition, research has found associations between attachment styles and social *withdrawal* in children and adolescents (Chen, 2012). Generally, research has found that secure attachments are predictive of social competence, whereas insecure attachments are predictive of withdrawal behaviors (Booth-LaForce & Oxford, 2008; Nunes, Faraco, Vieira, & Rubin, 2013; Shamir-Essakow, Ungerer, & Rapee, 2005). Adolescents may perceive themselves as unworthy of love and their caregivers as being unavailable, consequently rejecting exploration of the social world (McElwain, Cox, Burchinal, & Macfie, 2003).

Emotional Security Theory

Emotional security theory (EST) has been empirically tested and validated in various studies over the past 20 years (Cummings & Miller-Graff, 2015). EST is conceptualized as an extension of attachment theory because EST emphasizes the importance of security in multiple family relationships, not just the parent–child relationship (Davies & Woitach, 2008). Essentially, EST involves children's and adolescents' feelings of security in the complete family system, with utmost importance in the feelings of security during exposure to family and interparental conflict. Children and adolescents desire feelings of protection, security, and safety, especially during interparental conflict when their confidence in the interparental relationship might be threatened (Davies & Woitach, 2008). Moreover, children's and adolescents' feelings about potential threats to their sense of protection, security, and safety result in feelings of emotional insecurity in response to conflict and development of future adjustment problems (Davies & Cummings, 1994). Additionally, past experiences affect children's and adolescents' working internal representations, ultimately impacting future responding (Davies & Cummings, 1994).

Children's and adolescents' internal representations and feelings of emotional security are important to their adjustment over time. With prolonged efforts to regain emotional security, an individual uses psychological and physiological resources, which limits the amount of resources available for other developmental tasks, and may lead to maladjustment (Davies, Harold, et al., 2002; Thompson & Calkins, 1996). Longitudinal studies have shown mediating effects regarding emotional security for children's and adolescents' adjustment (Cummings, George, McCoy, & Davies, 2012; Cummings, Koss, & Davies, 2015; Davies, Harold, et al., 2002; Harold, Shelton, Goeke-Morey, & Cummings, 2004). When children and adolescents have high levels of emotional security, they are better able to cope with daily conflicts and express emotion regulation (Davies & Cummings, 1994). However, children and adolescents experiencing emotional insecurity cope ineffectively with daily conflicts.

Within the construct of emotional security, there are three subsystems, which promote the attainment of emotional security: emotional reactivity, regulation of exposure to parent affect, and internal representations of interparental relations (Davies, Forman, Rasi, & Stevens, 2002). High levels of emotional reactivity, poor regulation of exposure to parent affect, and negative internal representations of the meaning of interparental conflict are indicative of emotional insecurity. Particularly, through internal representations, individuals create a representation of the meaning interparental conflicts have for themselves and the family unit (Thompson, Flood, & Lundquist, 1995). Those with high interparental conflict present more hostile internal representations of the harmful, negative effects interparental conflict holds for both themselves and the family unit (Davies & Cummings, 1998).

Internal representations are conceptualized further into constructive and destructive family representations, and conflict spillover. Constructive conflicts include the display of verbal and physical affection, problem solving, and support, whereas destructive conflicts are hostile, angry, and include physical and verbal aggression, personal threats, and insults (Goeke-Morey, Cummings, Harold, & Shelton, 2003). Constructive conflict has a positive impact on children's and adolescents' emotional security by fostering a sense of confidence in their parents' conflict management, whereas destructive conflict has a negative impact on children's and adolescents' emotional security and may lead to worry, anxiety, and hopelessness, with the risk for development of internalizing and externalizing disorders (Cummings & Davies, 1994; Cummings & Davies, 2010). Conflict spillover consists of destructive interparental conflict, which spills over to cause difficulty within parent-child relationships (Erel & Burman, 1995).

Present Study

Conflict is unavoidable for married couples, and the link between destructive interparental conflict and adjustment problems in adolescents is well-established (Cummings & Davies, 2010; McCoy, Cummings, & Davies, 2009). Moreover, married couples are more susceptible to conflict during child-rearing years (Cox, 1985). For the present study, adolescents' emotional security about interparental conflict represents interparental conflict and provides adolescents' perceptions, rather than direct measurement of parental behaviors. Depression is experienced by 11% of children and adolescents, with rates of depression increasing significantly in adolescence (Avenevoli, Swendsen, He, Burstein, & Merikangas, 2015). Because the degree of interparental conflict and depression is substantial, it is critical to conduct research that

furthers our understanding of consequences of emotional insecurity about interparental conflict on adolescents' maladjustment.

In some cases, interparental conflict can negatively impact feelings of security in parent–adolescent relationships (Harold et al., 2004). However, although adolescents' emotional security and attachment may be interrelated, it is possible for adolescents to view parent–adolescent attachments as secure but feel insecurity about their parents' relationship. Due to the potential interrelation between adolescents' emotional security and attachment security, it is imperative to understand the predictability each security has on adjustment outcomes, and their interaction with each other. Emery (1982) proposed that secure parent–child attachments have the potential to serve as a buffer from interparental conflict. Furthermore, El-Sheikh and Elmore-Staton (2004) found that secure parent–child attachment was a protective factor for problems associated with interparental conflict. The present study differs in that it investigated adolescents' emotional security about interparental conflict, rather than the level of interparental conflict present. Moreover, in the present study we analyzed mother–adolescent attachment because there is limited literature that has focused on the interaction between attachment and emotional security, and the effects of mother–adolescent attachment on adjustment outcomes are more defined in extant literature compared to father–adolescent attachment. Overall, further understanding of the relationship between emotional security, attachment, and internalizing symptoms in adolescence is needed for advancements toward prevention of maladjustment.

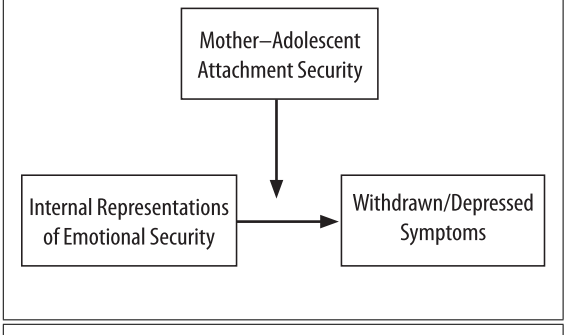
The purpose of the present study was to investigate the role of perceived mother–adolescent attachment security as a moderator between adolescents' emotional security about interparental conflict in the form of internal representations, and self-reported withdrawn/depressed symptoms. Overall, (a) it was predicted that mother–adolescent attachment security would predict fewer withdrawn/depressed symptoms in all contexts of emotional security about interparental conflict. Additionally, (b) it was hypothesized that the strength of the relationship between emotional security about interparental conflict and withdrawn/depressed symptoms would differ depending on mother–adolescent attachment security. Specifically, it was hypothesized that, in the context of emotional insecurity, the difference between withdrawn/depressed symptoms for those with secure internal representations and those with insecure internal representations would be smaller for insecurely attached adolescents than for securely attached adolescents (see Figure 1 for a visual representation of our model).

Method

Participants

The dataset used in this current study included baseline data collected from families involved in the Family Communication Project (FCP), a preventive, intervention program aimed to improve family communications among families with adolescents. Participants were recruited from the South Bend, Indiana area through flyers, booths at community events, and home mailings. Language on the forms indicated that families were needed for a research study focused on communication and family relationships, and that compensation would be provided. We did not seek out or identify families based on their current levels of conflict. Inclusion criteria consisted of a couple that was married or cohabiting for at least 3 years, with an adolescent between the ages of 11 and 17 years (M = 13.26, SD = 1.6). Of the father–mother dyads, 94.2% were married, and 5.8% were cohabiting couples. Of the mothers, 92% were biological birth mothers, 2% stepmothers, 4% adopted mothers, and 3% guardians. Fathers included 75% biological fathers, 13% stepfathers, 7% adoptive fathers, and 5% guardians. The total sample included 225 adolescents (50.2% women). As determined by one-way Analysis of Variance, male and female participants did not differ significantly on demographic measures of age and family income, $F(1,222) = 0.21$, $p = .65$, and $F = (1, 222) = 1.89$, $p = .17$, respectively. Participants were

Figure 1



Hypothesis: Mother–adolescent attachment will serve as a moderator between internal representations and withdrawn/drepressed symptoms.

demographically representative of the community, of which 83% were White, 14% were Black, and 3% were other ethnicities. The range for family income was less than $6,000 to $125,000 or over, with the average being between $55,000 and $74,999. Families indicated their highest level of education ranging from the completions of 7th or 8th grade to the completion of a doctoral degree. The average education level was the completion of an associate degree. The Institutional Review Board at the University of Notre Dame approved the project. In addition, all participants were compensated for their participation in the study with a check totaling $40.00 for parents and $15.00 for adolescents.

Procedure

The data used in the FCP study was collected at four time points. The specific data set used in the present study was collected prior to their first visit to the research center. Families were mailed questionnaire packets, and measures were completed at home. The mailings contained a letter that instructed all members of the family to complete their surveys privately. Upon the first visit to the lab, questionnaire packets were collected, and the participants completed the remainder of the study.

Measures

Emotional insecurity. Adolescents completed the Security in the Interparental Subsystem (SIS, Davies, Forman, et. al., 2002) Scale, which is a self-report measure that assesses adolescents' emotional security about interparental conflict. The SIS is divided into three component processes including emotional reactivity, regulation of exposure to parent affect, and internal representations with a total of 50 items. The present study examined the internal representations component solely, which includes three minor subscales: constructive representations (e.g., "When my parents have an argument the family is still able to get along with each other"), destructive representations (e.g., "I wonder if they will separate or divorce"), and conflict spillover (e.g., "I feel like it's my fault"). The SIS Internal Representations scale is comprised of 12 items. Participants were asked to rate how true statements were on a 4-point Likert-type scale (1 = *not at all true of me*, 4 = *very true of me*). Constructive family representations were reverse scored, so high scores overall indicated emotional insecurity. In the literature, internal consistencies above the .70 standard of acceptability have been reported, and the validity of the SIS has been supported through comparisons of SIS subscales to histories of interparental conflict and adjustment problems from multiple informants (Davies, Forman, et al., 2002). In the present study, the internal consistencies for each minor subscale were collectively above .82. For the entire component of internal representations, Cronbach's $\alpha = .88$.

Mother–adolescent attachment. The Inventory of Parent and Peer Attachment (IPPA) has been widely used to measure attachment in adolescents through self-report (Armsden & Greenberg, 1987; Jewell et al., 2019). Although mother, father, and peer forms are available, the present study only examined the attachment-to-mother form. The IPPA consists of 25 items and uses three dimensions (trust, communication, alienation) to measure the behavioral, affective, and cognitive aspects of attachment through a 5-point Likert-type scale (1 = *almost never or never true*, 5 = *almost always or always true*). Trust measures the security adolescents have about the understanding and responsiveness of their attachment figure (e.g., "My mother respects my feelings"). Communication measures the quality of verbal communication with their mother (e.g., "I tell my mother about my problems and troubles"). Alienation measures the extent to which adolescents feel anger and emotional detachment towards their mother (e.g., "When we discuss things, my mother cares about my point of view"). Negatively worded items were reverse-scored and a total score for each subscale was calculated, with high scores indicating a secure level of perceived attachment. Armsden and Greenberg (1987) have found high test-retest reliabilities over 3 weeks with $r = 0.93$ for parent attachment. Internal consistency coefficients have been reported for the mother version above $\alpha = 0.87$ (Armsden & Greenberg, 1987; Papini et al., 1991). Additionally, the IPPA measure has demonstrated convergent validity, correlating significantly with five other measures of family climate (Armsden & Greenberg, 1987). The Cronbach's α for the subscales of trust, communication, and alienation in the present study were 0.91, 0.89, and 0.80, respectively, with $\alpha = 0.95$ for the overall IPPA measure.

Withdrawn/depressed symptoms. The Youth-Self Report (YSR) has been widely used to screen for adolescent psychopathology (Achenbach & Rescorla, 2001). The YSR is a multidimensional questionnaire, which measures a broad range of mental health problems in adolescents. Although scores on the YSR correspond to clinical levels, the YSR is not a clinical tool in isolation (Aebi, Metzke,

& Steinhausen, 2009). The questionnaire consists of 112 items, which are answered in the context of the past five months and based on a 3-point Likert-type scale (0 = *not true*, 1 = s*omewhat or sometimes true*, 2 = *very true or often true*). The YSR yields a total problem score, and is often divided into two broad symptom scales, internalizing and externalizing. There are eight primary subscales labeled as withdrawn/depressed, somatic complaints, anxious/depressed, social problems, thought problems, attention problems, delinquent behavior, and aggressive behavior. This study examined solely the YSR Withdrawn/Depressed scale, which included items such as "There is very little that I enjoy" and "I would rather be alone than with others." The YSR Withdrawn/Depressed scale consists of eight items. This scale has shown high reliability and validity (Achenbach & Rescorla, 2001). Achenbach and Rescorla (2001) reported $r = .67$, $\alpha = .71$ for the YSR Withdrawn/Depressed scale. Convergent validity for the YSR is shown, with correlations of .69 when compared to the Behavior Assessment System for Children (Achenbach et al., 2008). In the present study, the internal consistency coefficient was $\alpha = 0.77$ for the YSR Withdrawn/Depressed scale.

Results

The predictor variable in the present study was emotional security about interparental conflict measured through adolescents' internal representations. Mother–adolescent attachment security was examined as the moderating variable, potentially buffering the effect of emotional security about interparental conflict on withdrawn/depressed symptoms. It was predicted that (a) mother–adolescent attachment security would be associated with fewer withdrawn/depressed symptoms. Specifically, (b) it was hypothesized that secure mother–adolescent attachment would moderate the effect of emotional security about interparental conflict on withdrawn/depressed symptoms.

Descriptive Statistics

The descriptive statistics for the measures used in this study, including means and standard deviations, are displayed in Table 1. Although the mean scores on the YSR indicate subclinical levels of withdrawal/depression, 10% of participants answered that they had deliberately tried to hurt or kill themselves on the YSR questionnaire. A correlation matrix of all study variables is displayed in Table 2. All correlations were significant, and those predicted to be negative were negative.

Table 1

Means and Standard Deviations for Scores on the SIS, IPPA-M, and YSR Scales

Scale	*M*	*SD*	*Maximum*
SIS	96.16	24.80	200
Internal Representations	20.43	7.71	48
IPPA-M	97.52	18.94	125
Trust	40.96	7.98	50
Communication	33.80	7.72	45
Alienation	22.75	5.24	30
YSR	45.08	26.05	210
Withdrawn/Depressed	3.85	3.07	16
Interaction Term (IPPA x IR)	1931.41	670.02	6000

Note. Higher scores on the SIS indicate emotional insecurity. Maximum = Maximum Possible Score. SIS = Security in the Interparental Subsystem Scale; IPPA-M = Inventory of Parent and Peer Attachment-Mother Version; YSR = Youth Self-Report; IR = Internal Representations.

Table 2

Correlation Matrix for Study Variables

Subsystem-Internal Representations;
IPPA-M = Inventory of Parent and Peer Attachment

Variable	1	2	3	4	5
1. SIS	1.00				
2. SIS-IR	.84**	1.00			
3. IPPA-M	-.39**	-.42**	1.00		
4. YSR	.56**	.55**	-.45**	1.00	
5. YSR-WD	.47**	.45**	-.49**	.76**	1.00

Note. SIS=Security in the Interparental Subsystem; SIS=IR=Security in the Interparental. Mother Version; YSR = Youth Self-Report; YSR-WD = Youth Self-Report Withdrawn/Depressed. ** $p < .01$ (two-tailed).

Table 3

Predictors of Withdrawn/Depressed Symptoms

Predictor	B	β	95% CI
IPPA-M	-.062	-.378***	[-.081, -.042]
Interaction Term (IPPAxIR)	.003	.182**	[.001, .005]
IR	.140	.353***	[.092, .189]

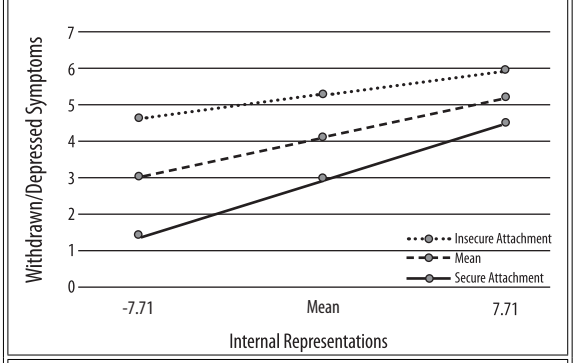
Note. N = 225. *B* = unstandardized beta; β = standardized beta; CI = confidence interval; IPPA-M = Inventory of Parent and Peer Attachment-Mother Version; IR = Internal Representations. Dependent variable = Withdrawn/Depressed symptoms. ** $p = .002$. *** $p < .001$.

Data Analysis

To test the hypothesis that mother–adolescent attachment security moderated the relationship between emotional security about interparental conflict and withdrawn/depressed symptoms, statistical software (SPSS) was used to conduct a standard multiple regression analysis. Preliminary analyses were conducted to check for violations of multicollinearity. After detecting multicollinearity among the predictors, the variables were mean-centered for subsequent analyses (Aiken & West, 1991).

As shown in Table 3, all predictor variables (mother–adolescent attachment, internal representations, interaction term) were significant predictors of withdrawn/depressed symptoms, $F(3, 221) = 38.13$, $p < .001$. Cohen's f^2 was utilized to measure effect size, and a large effect size ($f^2 = 0.517$) was indicated. After conducting the multiple regression, the unstandardized beta coefficients were used to create a regression equation to plot the relationship. Unstandardized beta coefficients were used in order to avoid removing the unit measurements from the output values. Internal representations scores were displayed by graphing one standard deviation below the mean and one standard deviation above the mean (see Figure 2). A higher internal representations score represents emotional insecurity. Examination of the interaction plot shows that adolescents experienced fewer withdrawn/depressed symptoms when they had attachment security. Importantly, moderation findings are demonstrated in Figure 2. Specifically, for adolescents with secure mother–adolescent attachment, the impact of insecure internal representations on withdrawn/depressed symptoms was greater than it was for those with secure internal representations. For adolescents with insecure mother–adolescent attachment, the difference between withdrawn/depressed symptoms was smaller when comparing secure/insecure internal representations. The difference in withdrawn/depressed symptoms between secure and insecure attachment for adolescents who had emotional security about interparental conflict (lower internal representations score) was much larger than the difference between secure and insecure attachment for adolescents who had emotional insecurity about interparental conflict (higher internal representations score).

Figure 2



Hypothesis: Mother–adolescent attachment serves as a moderator between internal representations and withdrawn/depressed symptoms. Higher internal representations scores represent higher emotional insecurity about interparental conflict.

Discussion

The present study sought to investigate the moderating effect of mother–adolescent attachment security on the association between emotional security about interparental conflict and withdrawn/depressed symptoms. Because both types of security predict maladjustment, it is important to consider the interaction between these two constructs in relating to adolescent adjustment. Additionally, the inevitability of conflict between married couples and the association of destructive conflict with adjustment problems for adolescents indicates the importance of better understanding of these relations. Furthermore, research has found that levels of depression increase substantially during adolescence.

The results of the current study were in support of the hypothesis that mother–adolescent attachment security would result in fewer withdrawn/depressed symptoms. We found that fewer withdrawn/depressed symptoms were reported in the context of secure mother–adolescent attachment regardless of adolescents' emotional security about interparental conflict. In addition, our findings supported our prediction of a moderation effect because, although the amount of withdrawn/depressed symptoms is fewer for secure mother–adolescent attachments compared to insecure mother–adolescent attachments, the withdrawn/depressed symptom gap between secure and insecurely attached adolescents is smaller for adolescents who reported emotional insecurity about interparental conflict, through a higher internal representations score.

Therefore, the results indicated the importance of mother–adolescent attachment security and emotional insecurity as predictors of withdrawn/depressed symptoms. Although research is extensive on these two variables alone, research integrating these two variables is limited. It is important to

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consider attachment in the context of emotional security. Research has shown mixed findings on the quality of parent–adolescent attachment with relation to interparental conflict. It has been proposed that adolescents' perceptions of interparental conflict may influence their perceptions of parent–adolescent relations (Harold et al., 2004). Specifically, it has been theorized that these adolescents may witness hostile conflict between their parents and perceive parent–adolescent conflict as more hostile. More research needs to be conducted with consideration to the relationship between emotional security and attachment, and its effects on maladjustment.

The present study had several limitations. First, there was the possibility of reporting biases among participants. Because all the data examined in this study consisted of self-report questionnaires, common problems related to underreporting might have occurred (Hunt, Auriemma, & Cashaw, 2003). With the inclusion of questions such as, "I am unhappy, sad, or depressed," reporters may have understood the goals of the scale and responded accordingly. The use of the SIS Internal Representations scale, rather than the broad SIS Scale, adds to the limitations within this study. By using the SIS Internal Representations scale, we were only measuring one component of emotional security, and our interpretations do not extend to emotional security overall. Additionally, the generalizability of findings was limited because our study only investigated intact families. Families that have experienced divorce would likely differ in levels and patterns of conflict between parents, and their children may have higher levels of withdrawn/depressed symptoms than those present in our sample. Also, our study was limited because it only investigated mother–adolescent attachment and did not include father–adolescent attachment. Lastly, the use of a cross-sectional design limited findings. Although the use of a cross-sectional design aided in making inferences about these relationships between mother–adolescent attachment, emotional security, and withdrawn/depressed symptoms, the cross-sectional design limited the determination of any cause-and-effect relationships.

Research has shown that the quality of attachment may differ between parents (Goossens & van IJzendoorn, 1990). Despite this knowledge, research has heavily focused on mother–adolescent attachment only (exceptions: El-Sheikh & Buckhalt, 2003; Noom, Deković & Meeus 1999; Williams & Kelly, 2005). To broaden our findings regarding the interaction between mother–adolescent attachment and emotional security, it is suggested for future studies to include father–adolescent attachment in order to investigate if paternal attachment can also serve as a moderator. In addition, to mitigate possible reporter bias, future studies may implement Achenbach's Child Behavior Checklist and Teacher's Report Form to gain a more comprehensive understanding of adolescents' symptoms. Also, duplicating these findings in other geographical areas, with inclusion of an ethnically diverse population, would improve generalizability of findings. It is also important to conduct research on single-parent households and nonintact families to gain a more comprehensive understanding of these relations. Future studies should differentiate in terms of measures, with the use of other measures of depression such as the Child Depression Inventory, and utilization of the full SIS scale. Lastly, the inclusion of a longitudinal design would allow for a more comprehensive understanding of results including potential cause-and-effect relationships.

Our findings illustrate the need for investigation of multiple systems within the family. There are limited studies that focus on the integration of mother–adolescent attachment security and adolescents' emotional security about the interparental relationship. Our research shows that these two constructs interact with each other and should be investigated further. Additionally, existing research has heavily focused on the importance of strengthening mother–child attachment bonds in infancy and early childhood. Our findings show the importance of continuing to strengthen the attachment bond through the dynamic period of adolescence. With further research on this area, there is potential for intervention programs to implement these findings by targeting the strengthening of parent–adolescent relationships in populations at high-risk for interparental conflict. Educating families about ways in which secure attachment can progress through adolescence, especially for families with high levels of interparental conflict, may be beneficial in improving adjustment outcomes for adolescents.

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Olfactory Identification, Odor Hedonics, and Atypical Behaviors

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ABSTRACT. Smell identification deficits have been found to coincide with diagnoses of schizophrenia and anxiety disorders. This study aimed to determine if olfactory functioning (in terms of smell identification and subjective experiences) differed depending on self-reported atypical behaviors in a subclinical sample. In Part 1, participants (N = 183) completed self-report questionnaires pertaining to atypical behavior and social interaction. Participants who were recruited for Part 2 (N = 59) completed additional measures of smell identification, odor hedonics, and an emotion recognition task. A one-way Analysis of Variance showed no significant difference in smell accuracy, pleasantness, or intensity ratings of odorants across groups. However, subjective ratings of irritation for the negative odorant significantly differed across groups (F = 3.05, p = .04, d = .13). These findings suggest that subjective perceptual experiences may be more informative than identification accuracy, especially if olfactory measures could be used as a sensory marker of early signs of clinical symptoms or to provide insight into possible underlying neurological and sensory deficits.

Keywords: olfactory functioning, atypical behavior, smell identification, odor hedonics, schizotypy

Sensory function can be a useful tool for understanding individual differences in behavior and brain functioning. In addition, olfactory processing may provide information about the functions of neural structures that are in part responsible for atypical behaviors. Previous studies have reported that smell identification deficits are common among individuals diagnosed with schizophrenia, anxiety, and neurodegenerative disorders (Clepce, Reich, Gossler, Kornhuber, & Thueraif, 2012; Havlíček et al., 2012). Typically, these deficits often coincide with negative symptoms (e.g., blunted affect, anhedonia and social withdrawal; Havlíček et al., 2012). The purpose of the current project was to determine if individual differences in olfactory ability differed depending on self-reported atypical behaviors in a subclinical population. Information from this study could be used to develop a behavioral assessment battery to characterize individuals at risk for the development of schizophrenia, anxiety or neurodegenerative disorders and monitor preventative measures or treatment approaches. Participant groups were entirely subclinical as studying a subclinical population may identify risk factors for developing certain disorders and allow for a better understanding of the progression of the illness.

Most individuals in the general population have the ability to access normative olfactory functions, unless there is a presence of an olfaction or gustation related deficit (Havlíček et al., 2012). Sense of smell is arguably one of the most essential functions that humans experience. Humans use their sense of smell to detect threats in their environment, choose romantic partners, and in food assessment (Havlíček et al., 2012). Olfactory functioning can be deconstructed into distinct

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concepts related to processing of odorants, perhaps the most rudimentary of these being olfactory detection. This is, as the name suggests, one's ability to simply detect the presence of an odorant in the environment. Another form of olfactory processing, olfactory discrimination, begins with the detection of an odorant and then incorporates higher level processing by encompassing one's ability to detect differences between two or more different odorants as well as distinguishing the varying concentrations of a single odorant. Further, olfactory identification is the ability to verbally label a stimulus, based on previous experience with the stimulus (Havlíček et al., 2012). These objective measures of olfactory functioning can be paired with subjective responses to odorants (e.g., perceived intensity or pleasantness). The subjective perception of an odorant is primarily intertwined with emotion (Krusemark, Novak, Gitelman, & Li, 2013). For example, when individuals smell dirty laundry or garbage in their environment, the common emotional response would be to feel disgusted. Conversely, when individuals smell chocolate or cookies baking, they will likely react in a more pleasant way than they did to the smell of the garbage (Krusemark et al., 2013). Factors such as pre-existing knowledge, perceived risks, and psychosocial factors also effect the way individual perceive an odorant. For example, if individuals had a negative experience related to an odorant, they may interpret the odorant as negative itself (Smeets & Dalton, 2005).

Clearly, the process of olfactory functioning is a highly sophisticated and essential process for human functioning. Thus, when deficits arise related to olfaction, the individual may experience negative effects (Doty, Shaman, & Dann, 1983). Smell identification deficits are commonly tested through psychophysical assessments such as the University of Pennsylvania Smell Identification Test (UPSIT; Doty et al.,1983) or the "Sniffin' Sticks" test (Sniffin' Sticks; Hummel, Sekinger, Wolf, Pauli, & Kobal, 1997). The UPSIT is a widely used "scratch and sniff test" that contains 40-items presented as a four-alternative forced-choice olfactory identification test. Each odorant is contained in a microencapsulated pocket and is released by scratching the pocket with a pencil. Participants are typically scored based on their accuracy (Doty et al., 1983). In addition, 'Sniffin' Sticks is a widely used clinical and research olfactory threshold test. This test uses pen-like odor dispensing devices of various dilutions of 2-phenylethanol administered in a three-alternative forced-choice staircase procedure. The test continues until seven reversals, when the threshold is computed as the mean dilution steps of the last four reversals (Hummel et al., 1997).

Objective and subjective components of olfactory processing can occur as separate processes. For example, an individual may have the ability to detect and discriminate between odorants, but may have deficits in odorant identification. Similarly, two individuals who have the same objective ability to identify odorants, may have different ratings of subjective pleasantness of the same odorants. Olfactory identification encompasses a variety of functions (i.e., the ability to not only detect a scent, but also to identify it and distinguish it from other scents, while incorporating odor memory). In addition, a large component of processing olfactory stimuli occurs at the neural level. Understanding the neurological basis of olfaction provides justification for why this particular sensory system may function differently in individuals with clinical symptoms.

Olfactory perception has been found to activate the regions of the brain responsible for emotional processing: the amygdala, hippocampus, and the orbitofrontal cortex (OFC). Findings by Schiffman (1974) suggest that olfactory perception directly activated amygdala neurons in some cases, and then activated the OFC. Qureshy et al. (2000) found through PET scans that the regions activated during olfactory identification are the right anterior cingulate gyrus, left insula, OFC, and the left anterolateral cerebellum, whereas during olfactory discrimination the bilateral cerebellar regions were activated (Havlíček et al., 2012; Krusemark et al., 2013; Qureshy et al., 2000). Thus, it is possible that there may be a relationship among olfactory deficits and atypical behavior because these regions are also affected by several psychiatric disorders (i.e., schizophrenia, anxiety disorders, neurodegenerative disorders; Auster, Cohen, Callaway, & Brown, 2014; Doty et al.,1983; Havlíček et al., 2012). In addition, Doty et al., (1983) emphasized the fact that olfactory deficits commonly occur as a result of accidents (i.e. mild traumatic brain injury) and aging. Due to the frequency of olfactory identification deficits coinciding with diagnoses of mental illnesses, this occurrence is likely an indicator of underlying neurological dysfunction.

Previous literature has found anxiety to be significantly related to olfactory functioning (Clepce et al., 2012). For example, past studies have established that increased anxiety reactions occur following the presentation of, what are deemed as, fearful odorants (Albrecht et al., 2010; Clepce

et al., 2012). Albrecht et al. (2010) presented women participants with sweat from a fearful man. Anxiety was measured using the State-Trait Anxiety Inventory X (Spielberger, Gorsuch, & Lushene, 1970), a questionnaire containing items related to stress response, and through physiological recordings such as blood pressure and heart rate measurements. When compared to controls who were presented neutral sweat, the women who were presented the fear-induced sweat showed a heightened anxiety response (Albrecht et al., 2010). Clepce et al. (2012) tested the theory that anxiety is correlated to deficits in olfactory identification through an extended version of the Sniffin' Sticks identification test. This study used participants with diagnosed cases of various types of anxiety disorders (generalized anxiety disorder, social phobia, panic disorder, agoraphobia) and healthy control participants. Researchers found that the anxiety group performed significantly worse on the discrimination task than the control group, although there were no group differences in identification and threshold (Clepce et al., 2012).

Smell identification tests have also served as a vulnerability marker for schizophrenia spectrum disorders (Auster et al., 2014). Specifically, studies using the UPSIT have found that up to 80% of patients with schizophrenia in their studies exhibit these deficits (Auster et al., 2014). Contrasted with the rates of olfactory identification deficits reported among the general population, which is less than 15%, it is apparent that these deficits may be related to schizophrenia (Doty et al., 1984). Due to the heterogeneous nature of schizophrenia, symptoms are typically categorized into symptom domains. The positive symptom domain includes hallucinations, delusions, and disorganized thoughts and speech while the negative symptom domain includes avolition and blunted affect (Ishizuka et al., 2010).

It is a well-established finding that negative and disorganized symptoms are associated with reduced smell identification accuracy, lessened sensitivity, and lower ratings of subjective pleasantness experience when compared to positive symptom group performance and controls (Auster et al., 2014; Brewer et al., 2005; Ishizuka et al., 2010). It has also been established that negative symptoms are specifically related to the first episode of psychosis (Auster et al., 2014). Due to the relationship between negative symptoms and smell identification deficits, it is possible that smell identification deficits may be specifically related to an increased risk of psychosis. Negative symptoms including avolition, anhedonia, and blunted affect are also similar to symptoms of Asperger's syndrome and anxiety disorders, both of which also have been known coincide with olfactory identification deficits (Suzuki, Critchley, Rowe, Howlin, & Murphy, 2003). Individuals with schizophrenia, Asperger's syndrome, and anxiety disorders have been known to present significantly lower scores on hedonic evaluations of odorants as well (Auster et al., 2014; Cieslak et al., 2015; Ishizuka et al., 2010; Krusemark et al., 2013; Suzuki et al., 2003).

Previous literature has established that individuals with schizophrenia often have deficits in social cognition (Brown & Cohen, 2010; Cieslak et al., 2015; Fonseca-Pedrero, Paíno-Piñeiro, Lemos-Giráldez, Villazón-García, & Muñiz, 2009; Gica, Poyraz, & Gulec, 2019). Social cognition has been defined as the ability to make sense of other's behaviors and to understand other's beliefs and intentions (Gica et al., 2019). Social cognition also encompasses social perception, interpretation, and processing (Brown & Cohen, 2010). It is also a well-established finding that individuals with schizophrenia perform worse on emotion recognition tasks (ERTs). Gica et al. (2019) used the Cambridge Neuropsychological Test Automated Battery (CANTAB) ERT (Cambridge Cognition, 2019) to determine how successful patients with schizophrenia are on ERTs. This task requires the participant to identify feelings from presentations of facial expressions on a computer or electronic device. Six basic emotions (sadness, happiness, fear, anger, disgust, or surprise) are shown throughout the 180 trials. The authors found that, compared to healthy controls, patients with schizophrenia performed worse on the ERT. Specifically, patients had the most difficulty recognizing the negative emotions, such as fear and disgust (Gica et al., 2019). Further, individuals with schizotypy have also performed worse on ERTs. Brown and Cohen (2010) used the Schizotypal Personality Questionnaire (SPQ; Raine, 1991) to determine the relationship between individuals with schizotypy and their performance on ERTs. The results show that individuals with schizotypy have impaired facial emotion recognition abilities. Because individuals with schizotypy are likely at an increased risk of developing schizophrenia, results from this study suggest that deficits in emotion recognition ability may serve as an indication of risk for development of a disorder such as schizophrenia (Brown & Cohen, 2010).

The relationship between atypical behaviors

and olfactory deficits may suggest that forms of olfactory functioning (i.e., olfactory identification, odor hedonics) can serve as markers for characterizing individual differences in behavior. This project aimed to determine if objective and subjective measures of olfactory functioning differed across groups of participants with varying degrees of self-reported atypical behavior. To achieve this aim, we conducted a two-part study: Part 1 was designed to test for correlations among self-report assessments of atypical behavior and Part 2 was designed to test for group differences in olfactory functioning.

Part 1 of our study consisted of self-report questionnaires measuring behavioral inhibition/activation (The Behavioral Inhibition/Behavioral Activation Scale, BIS/BAS; Carver & White, 1994), social interaction anxiety (Social Interaction Anxiety Scale, SIAS; Mattick & Clarke, 1998), and behaviors related to schizotypy (Schizotypal Personality Questionnaire – Brief, SPQ-B; Fonseca-Pedrero et al., 2009). These measures were chosen based on their psychometric properties, relevance to our study, and availability at our institution. Specifically, the SIAS was chosen to measure participants' self-reported experiences of anxiety during social interaction because increased social anxiety commonly coincides with diagnoses of schizophrenia and schizotypy (Clepce et al., 2012; Havlíček et al., 2012). Similarly, the BIS/BAS was chosen to measure self-reported instances of behavioral approach and avoidance in participants. The SPQ-B was chosen as the measure of atypical behavior in this study due to its frequent use in current literature and its ability to measure atypical behaviors in subclinical populations. We hypothesized that scores on the SPQ-B would significantly correlate with scores on the BIS/BAS and SIAS.

Part 2 of our study recruited participants based on their total score on the SPQ-B to complete measures of olfactory functioning. The UPSIT was chosen as our measure of smell identification based on its validation in current literature and the ease of administration. Furthermore, the array of odorants presented in the UPSIT enabled us to include an additional measure of subjective reactions to different types of odorants (compared to other olfactory assessments such as Sniffin' Sticks, which measure thresholds to one odorant). Another major benefit of the UPSIT is the ease of use, which allows for rapid and accurate assessment of olfactory functioning in clinics and laboratories. We chose to group participants by their total scores to create three groups: a low-scoring group, a high-scoring group, and a group that scored in the middle range. The cutoff scores for the groups (detailed in the Method section) were chosen specifically to recruit participants in the extremes given that we had limited number of UPSITs.

Previous literature has established that performance on subjective and objective olfactory measures may be related to differing levels of atypical behavior (Auster et al., 2014; Brewer et al., 2005; Clepce et al., 2012; Havlíček et al., 2012; Ishizuka et al., 2010). Specifically, those who score low on the SPQ-B endorse a low amount or absence of atypical behaviors, while those who score high on the SPQ-B endorse a great amount of atypical behaviors. Both of these extremes have been found to coincide with deficits in olfactory functioning, especially when compared to those who score in the middle group, which is meant to represent an average performance (Clepce et al., 2012; Doty et al., 1984; Havlíček et al., 2012).

Therefore, we hypothesized that participants who scored either very low or very high on the SPQ-B would have significantly different scores on olfactory functioning (subjective and objective measures) than those participants who scored in the middle range. Finally, as an exploratory component of the study, we had participants complete a computer-based emotion recognition task (given the connections between olfactory and emotional processing; Krusemark et al., 2013) to determine if participants differed in emotion recognition accuracy based on their atypical behavior (SPQ-B) scores.

Method

Participants

Participants were undergraduate students enrolled in psychology classes and were offered extra credit for participation. Part 1 of the study recruited participants to complete self-report questionnaires related to behaviors. Participants were then asked to participate in the second part of the study based on their scores on the SPQ-B. Part 2 involved a smell identification test, odor hedonics, and an emotion task (detailed below). A total of 183 students participated in part one (147 women, 37 men; *M*age = 20.42 years, *SD* = 2.65), and a total of 59 students were recruited for Part 2. Most of our participants identified as European American (n = 116), and the remaining participants identified as African American (n = 22), Latino/a (n = 22), Asian (n =16), other (n = 3), Native American (n = 2), Middle Eastern (n = 1), and Mixed (n = 1).

Participants were asked to report conditions

related to gustation and olfactory function, seasonal allergies, mild traumatic brain injury, and cigarette smoking habits. Although no participants reported conditions related to gustation and olfactory function, our protocol would have excluded them from participation in Part 2 to avoid any confounding variables because individuals with deficits in gustation and olfaction would likely perform worse on the UPSIT (Doty et al., 1983). In addition, 58 participants (32% of our sample) reported seasonal allergies, but were not excluded due to the large frequency of these symptoms in the sample. We also excluded one participant from Part 2 with a reported chronic history of cigarette use and one participant with a history of traumatic brain injury. Three of the 59 Part 2 participants did not complete the ERT due to scheduling issues and inconsistencies within the testing parameters.

Materials

Social Interaction Anxiety Scale (SIAS). The SIAS (Mattick & Clarke, 1998) is a 20-item, self-report survey primarily utilized for measuring levels of distress when interacting with other individuals. Participants respond to statements utilizing a Likert-type scale ranging from 0 (*not at all characteristic of me*) to 4 (*extremely characteristic of me*). Questions in the SIAS include "I have difficulty talking to other people" and "I feel I'll say something embarrassing when talking." Mattick and Clarke (1998) reported that the SIAS was found to possess high levels of internal consistency (.94) and test-retest reliability at four weeks (.92). The authors also found that the measure was able to discriminate between social phobia, agoraphobia, and normal samples. Scores were also shown to correlate with well-established measures of social anxiety (Mattick & Clarke, 1998).

Behavioral Inhibition/Behavioral Activation Scale (BIS/BAS). The BIS/BAS (Carver & White, 1994) is 24-item questionnaire used to assess individual differences in the activation of the behavioral avoidance (or inhibition) systems and behavioral approach systems. The statements measure four different subscales: BAS Drive (4 out of 24 items; e.g., "I go out of my way to get things I want."), BAS Fun Seeking (4 out of 24 items; e.g., "I'm always willing to try something new if I think it will be fun."), BAS Reward Responsiveness (5 of 24 items; e.g., "When I'm doing well at something I love to keep at it."), and BIS (7 of 24 items; e.g., "Criticism or scolding hurts me quite a bit."). Four out of the 24 items are used as fillers. Participants rate each of the 24 statements on a Likert-type scale of 1 (*very true for me*), 2 (*somewhat true for me*), 3 (*somewhat false for me*), or 4 (*very false for me*). Carver and White (1994) found the BIS/BAS to have adequate psychometric properties including reasonable alpha reliabilities for the BIS Drive (.74), BAS Reward Responsiveness (.73), BAS Drive (.76) and BAS Fun Seeking (.66; Carver & White, 1994).

Schizotypal Personality Questionnaire - Brief (SPQ-B). The SPQ-B (Fonseca-Pedrero et al., 2009) is a 22-item questionnaire that contains subscales related to positive (10 of 22 items; e.g., "Do you ever suddenly feel distracted by distant sounds that you are not normally aware of?"), negative (10 out of 22 items; e.g., "I feel very uncomfortable in social situations involving unfamiliar people"), and disorganized symptoms (6 out of 22 items; e.g., "I find it hard to communicate clearly what I want to say to people"). Participants respond "yes" or "no" to each of the items. Fonseca-Pedrero et al. (2009) conducted a study to validate the psychometric properties of the SPQ-B and found it to have adequate psychometric properties. Specifically, the internal consistency of the subscales and total score ranged from .61 to .81. The internal reliabilities for the total score ranged from .75 to .83 and .58 to .87 for the subscales. Test-retest reliability ranged from .70 to .95. In addition, confirmatory factor analyses indicated that the three-factor model (positive, negative, and disorganized) and the four-factor model (positive, paranoid, negative, and disorganized) fit well in comparison to the remaining models. These results also confirmed the multifactor structure of the schizoptyal personality in a subclinical population (Fonseca-Pedrero et al., 2009).

For the purpose of this study, participants scoring 0–4 on the SPQ-B were placed in the low group, scores of 9–11 were considered the middle group, and participants with 14 or more were labeled the high group. The middle group was created following pilot data which suggested there may be a greater difference among middle and high, or middle and low scoring groups as compared to the difference between high and low scoring groups.

Emotion Recognition Task (ERT). The ERT (Cambridge Cognition, 2019) is intended to measure an individual's ability to identify human emotions by utilizing computer generated faces, each depicting different human emotions (sadness, happiness, fear, anger, disgust, or surprise). Participants must identify a total of 180 faces, split into two 90-face sessions with a short break in

between. The ERT has been utilized to measure cognitive function in relation to schizophrenia, depression, and other affective disorders. The task is administered on a tablet with Cambridge Cognition's CANTAB Cognitive Research Software. This test was chosen based on the ease of administration as well as its adequate psychometric properties (Strauss, Shermann & Spreen, 2006).

University of Pennsylvania Smell Identification Test (UPSIT). Olfactory identification was assessed with the UPSIT (Doty et al., 1983). The UPSIT is a widely used "scratch and sniff test" that contains 40-items presented as a four-alternative forced-choice olfactory identification test. Each odorant is contained in a microencapsulated pocket and is released by scratching the pocket with a pencil. The UPSIT is comprised of four packets, each with 10 odorants presented on an individual page, along with four choices for smell identification. Participants were scored based on their accuracy (yielding a score out of 40 for the number of correctly identified odorants). Additionally, participants rated (on a 9-point Likert-type scale) each odorant's perceived pleasantness, intensity, and irritation. Doty et al. (1983) found the UPSIT to accurately differentiate between participants with known olfactory disorders (e.g., Kallmann's syndrome; Korsakoff's syndrome) and normal controls. The authors found the test-retest reliability to be adequate (6-month interval; $r = .918$, $p < .001$). This test was also found to correlate with thresholds of odor detection ($r = -.794$, $p < .001$; Doty et al., 1983).

Procedure

All experimental procedures were approved by the Human Subjects Committee. Participants signed up for the first part of the study through an online recruitment portal. The experimenter reviewed informed consent with each volunteer. Participants then completed a packet of questionnaires containing a demographics survey, the SPQ-B, the SIAS, and the BIS/BAS. After completing the questionnaire, participants were told to wait while a random number generator determined participation in part two (participants were not told that their scores determined qualification at this stage). Participants who fell into one of three groups (low, medium, or high) based on their SPQ-B score scheduled a second session to complete the UPSIT. Those that were not placed in one of the four groups were given a debriefing form for the first part of the study. During the second visit, while completing the UPSIT, participants were asked to identify scents and rate their pleasantness, intensity, and irritation. When finished with the UPSIT, participants then completed an ERT. After completing the ERT, participants were given debriefing forms for each part of the study.

Results

Pearson-product moment correlations indicated a significant relationship between scores on the SPQ-B and scores on the SIAS ($r = .63$, $p < .01$; see Figure 1) and the BIS Drive subscale ($r = .31$, $p < .01$; see Figure 2). No significant relationship between SPQ-B scores and BAS subscales was observed (BAS Drive: $r = -.05$, $p = .47$; BAS Fun Seeking: r-.09, $p = .24$; BAS Reward: $r = -.13$, $p = .07$).

Figure 1

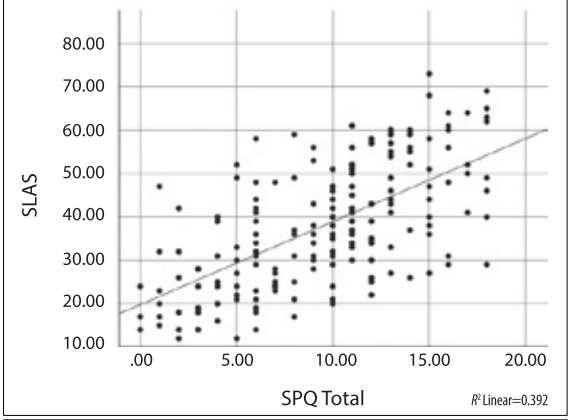


Figure 1. Scatterplot demonstrating scores on the Social Interaction Anxiety Scale (SIAS; Mattick & Clarke, 1998) by total scores on the Schizotypal Personality Questionnaire – Brief (SPQ-B; Fonseca-Pedrero et al., 2009). Regression line depicts significant relationship between scores on the SPQ-B and scores on the SIAS ($r = .63$, $p < .01$).

Figure 2

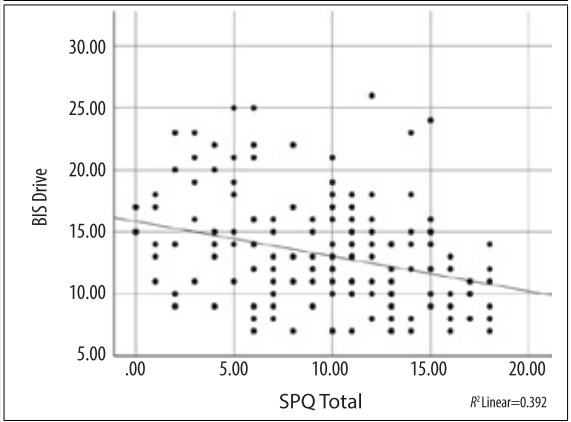
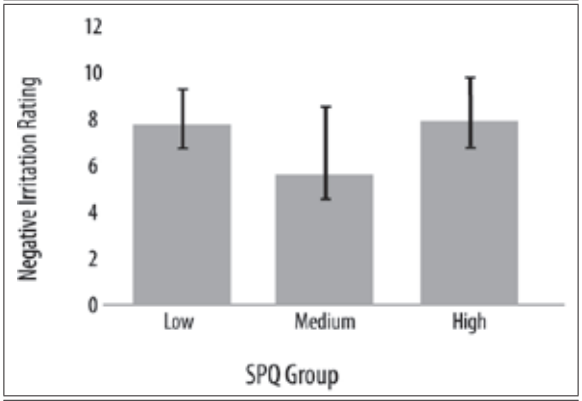


Figure 2. Scatterplot demonstrating scores on the BIS Drive subscale (BIS/BAS; Carver & White, 1994) by total scores on the Schizotypal Personality Questionnaire – Brief (SPQ-B; Fonseca-Pedrero et al., 2009). Regression line depicts significant relationship between scores on the SPQ-B and scores on the BIS Drive subscale ($r = .31$, $p < .01$).

A total of 59 participants qualified for the second part of the study based on the cutoff scores for the SPQ-B established for this study (low SPQ-B group: $N = 22$; middle SPQ-B group: $N = 15$, high SPQ-B group: $N = 22$). To include odor hedonics as part of the analyses, a total of three odorants were selected based on pilot data that identified natural gas, grass, and watermelon as the items that were rated the most negative, neutral, and positive, respectively. A one-way ANOVA showed no significant difference in UPSIT accuracy, pleasantness, or intensity ratings of odorants across groups (see Table 1). Subjective ratings of irritation, however, for the natural gas odorant (considered negative), significantly differed across groups, $F(3, 63) = 3.05$, $p = .04$, with a small effect size ($d = .13$; see Figure 3). Although this difference is small, it may be attributed to our small sample size or lack of a clinical sample.

FIGURE 3



Subjective perception rating of irritation of negative odorant (natural gas) by SPQ-B group (SPQ-B; Fonseca-Pedrero et al., 2009). Standard deviations are represented in the figure by the error bars.

Table 1

Results From a One-Way ANOVA Analysis of Differences in Olfactory Perception (i.e., Accuracy and Odor Hedonics) Across Three Groups of Participants

UPSIT Item	*F*	*p*	Low		Middle		High		Total	
			M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Total UPSIT Accuracy*	1.47	.23	32.86	2.87	32.27	3.73	33.64	2.92	33.22	3.12
Irritation (Negative)	3.05	.04	7.09	2.69	5.60	2.92	7.91	1.77	7.10	2.48
Pleasantness (Negative)	2.47	.07	1.59	1.01	2.67	2.23	1.73	1.45	1.82	1.52
Intensity (Negative)	0.40	.75	3.78	3.24	2.87	2.23	3.95	3.55	3.58	3.09
Irritation (Neutral)	1.54	.21	4.14	2.98	2.60	1.68	4.05	2.63	3.64	2.47
Pleasantness (Neutral)	0.82	.49	4.41	2.36	5.47	1.40	5.14	2.85	4.88	2.34
Intensity (Neutral)	0.37	.77	4.45	2.86	4.20	2.54	3.82	3.05	4.06	2.76
Irritation (Positive)	0.52	.67	1.95	2.13	1.33	0.62	4.32	1.43	1.67	1.52
Pleasantness (Positive)	1.06	.37	7.59	1.71	8.07	1.33	8.23	1.15	7.88	1.49
Intensity (Positive)	0.05	.98	4.45	2.92	4.20	2.83	1.68	3.43	4.30	2.95

Note. Participants were grouped based on Schizotypal Personality Questionnaire-Brief scores (SPQ-B; Fonseca-Pedrero et al., 2009). Olfactory accuracy (total score out of 40) was based on performance on The University of Pennsylvania Smell Identification Test (UPSIT; Doty et al., 1983). Odor hedonics include irritation, pleasantness, and intensity ratings on a 9-point Likert-type scale for natural gas (negative odorant), grass (neutral odorant), and watermelon (positive odorant). * Total UPSIT score out of 40 questions.

Post-hoc comparisons conducted using Tukey's HSD revealed that the middle SPQ-B group had significantly different ratings compared to the low SPQ-B group on the SIAS ($M = -15.27$, $SD = 2.92$, $p = .00$). The middle SPQ-B group had significantly different ratings compared to the high SPQ-B group ($M = -10.10$, $SD = 2.62$, $p = .00$). The high SPQ-B group had significantly different ratings compared to the low SPQ-B group on the SIAS ($M = 25.37$, $SD = 3.04$, $p = .00$).

In addition, the low SPQ-B group did not have significantly different ratings compared to the middle SPQ-B group on the BIS Drive ($M = 2.09$, $SD = 1.02$, $p = .175$). The middle SPQ-B group did not have significantly different ratings compared to the high SPQ-B group on the BIS Drive ($M = .910$, $SD = .92$, $p = .754$), while the high SPQ-B had significantly different ratings compared to the low SPQ-B group on the BIS Drive ($M = -3.00$, $SD = 1.06$, $p = .027$).

Post-hoc comparisons conducted using Tukey's HSD also revealed that the middle SPQ-B group had significantly lower irritation ratings on the natural gas odorant (5.6 out of 9) compared to the high SPQ-B group (7.9 out of 9; $M = -2.31$, $SD = 0.79$, $p = .025$). Irritation ratings for the low SPQ-B group (7.09 out of 9) did not significantly differ from the high SPQ-B group ($M = -0.82$, $SD = .72$, $p = .66$), and the 1.49-point difference between low and middle SPQ-B group did not reach statistical significance ($M = 1.49$, $SD = 0.79$, $p = .25$).

Using Bonferroni adjusted alpha levels of .0125 per test (.05/4), results indicated that the low SPQ-B group had significantly different ratings on the SIAS compared to the middle SPQ-B group ($M = -15.27$, $SD = -2.92$, $p = .00$). The middle SPQ-B group had significantly different ratings on the SIAS compared to the high SPQ-B ($M = -10.10$, $SD = 2.62$, $p = .00$). The low SPQ-B group had significantly different ratings on the SIAS compared to the high SPQ-B group ($M = -15.27$, $SD = -2.92$, $p = .00$).

Results indicated that the low SPQ-B group did not have significantly different ratings on the BIS Drive compared to the middle SPQ-B group ($M =$

2.09, $SD = 1.02$, $p = 2.53$). The middle SPQ-B group did not have significantly different ratings on the BIS Drive compared to the high SPQ-B group ($M = .91$, $SD = .92$, $p = 1.00$). The low SPQ-B group had significantly different ratings on the BIS Drive compared to the high SPQ-B group ($M = -3.00$, $SD = 1.06$, $p = .03$).

The middle SPQ-B group had lower irritation ratings on the natural gas odorant compared to the high SPQ-B group, but did not reach statistical significance ($M = -2.31$, $SD = 0.79$, $p = .03$). Irritation ratings for the low SPQ-B group did not significantly differ from the high SPQ-B group ($M = -0.82$, $SD = .72$, $p = 1.00$). In addition, the 1.49-point difference between low and middle SPQ-B group did not reach statistical significance ($M = 1.49$, $SD = 0.79$, $p = .39$). All data were analyzed with SPSS.

Discussion

Olfactory identification ability and subjective ratings of odorants were expected to differ across groups of individuals that score either relatively high or low on the SPQ-B compared to middle-range scores. This project represents a first step toward reconciling inconsistencies in the literature, and could be a foundation for future research aimed at refining behavioral assessments for early symptom detection and monitoring.

Part 1 analyses revealed a significant relationship between scores on the SPQ-B and scores on the SIAS, as well as the BIS Drive subscale. These were anticipated as previous literature has established the relationship between behavior inhibition and social anxiety in relation to schizophrenia symptom behaviors (Cieslak et al., 2015). Further, it is well-established that individuals with schizophrenia also experience social anxiety and social dysfunction (Cieslak et al., 2015; Fonseca-Pedrero et al., 2009).

Part 2 results were not significant when analyzing group differences in UPSIT accuracy, pleasantness, or intensity ratings. However, subjective ratings of irritation for the aversive odorant (natural gas) did vary among groups. Our findings are of particular interest, as our population was entirely subclinical. Results indicated that participants in the mid-scoring group had significantly lower irritation ratings when compared to those of the high-scoring group. Individuals in the mid-scoring group endorsed less atypical behaviors than the high-scoring group. This suggests that individuals that endorsed more atypical behaviors also have a heightened irritation reaction to the aversive odorant, when compared to those with a moderate amount of atypical behaviors.

Although the difference in irritation ratings between the low-scoring and mid-scoring group did not reach statistical significance, the difference is trending in a way to possibly suggest a curvilinear relationship, such that those scoring high or low on the SPQ-B may be more reactive to the aversive odorant. This relationship suggests that individuals who scored in both extremes, high in atypical behavior endorsement and low in atypical behavior endorsement, may have more irritation to the aversive odorant than those with a moderate, or average, amount of atypical behaviors. It is possible that a larger sample size may help elucidate this relationship.

In addition, our findings may suggest that odorants perceived as irritating may be the most aversive and/or reactive to humans when compared to positive or neutral odorants (even if positive odorants may also be considered equally intense). This conclusion would support findings from Albrecht et al. (2010) which found negative odorants to produce anxiety reactions in a group of participants. The negative odorant we chose (natural gas) might have evoked a strong, irritating reaction in participants based on their past experiences with the odorant. For example, natural gas can be involved in fires or explosions and is usually associated with toxicity. Thus, the perception of this specific negative odorant might have elicited a fear response in participants (Smeets & Dalton, 2005). Because the effect size of the negative odorant irritation across SPQ-B group was small, results should be interpreted with caution. A larger sample size or the inclusion of a clinical group may clarify our findings and allow for a larger effect size. One major limitation of our design was that we did not conduct a power analysis prior to starting the study. Our sample size was constrained by the number of available UPSITs.

The lack of significant relationship between olfactory accuracy and atypical behaviors could be due to the method chosen to characterize olfactory ability, specifically the UPSIT. Although well-validated, this measure may not be sensitive enough to detect individual differences in olfactory identification, particularly in a subclinical population. This may explain the lack of difference in scores among the high-scoring and low-scoring SPQ-B groups. Similarly, identification performance could have been affected by participants' past experiences with the items on the UPSIT. For example, a few of the items on the UPSIT are relatively uncommon

scents, such as clove, turpentine, and musk. During data collection, several participants voiced concerns of being unfamiliar with these specific items. Thus, participants could have chosen the wrong answer because of unfamiliarity and not an actual identification impairment on these specific items.

Although we did ask participants to report any known conditions related to gustation and olfaction functioning, participants could have unidentified gustation or olfactory impairments that might have affected their performance on the UPSIT. Similarly, seasonal allergies and illness might have affected performance. A total of 58 participants reported suffering from seasonal allergies. Doty (1997) found that the most common factors affecting olfactory dysfunction were head trauma, upper-respiratory infections and nasal-sinus disease. Due to the frequency of seasonal allergies occurring in the general population, and in our sample, we did not exclude participants from participating in Part 2 of the study based on reported seasonal allergies, which is a clear limitation of our design. However, we did exclude one participant with reported traumatic brain injury from participating in Part 2 of this study. It has also been reported that smoking cigarettes is often detrimental to olfactory identification ability, specifically in relation to dosage (i.e., lower doses resulted in less impairment; Doty, 1997). Because of this known confound, we excluded one participant, who was originally placed in our high-scoring SPB-Q quartile and had a chronic history of smoking, from participating in Part 2 of this study. Although we tried to control for smoking history in the Part 1 demographics questionnaire, some participants might not have reported accurate usage. This might have resulted in impaired accuracy performance on the UPSIT.

Other forms of olfactory processing (i.e., detection, discrimination) could also be tested in future research to determine their relationship with atypical behavior, such as use of an olfactory threshold measure. Doty (1997) found detection thresholds to be more reliable than recognition thresholds, with a staircase procedure being the most successful. Olfactory threshold measures could be useful to determine a fault in an individual's detection ability, which may be predictive of mental illness and degenerative disease. Other forms of olfactory processing, other than smell identification, may be significantly related to atypical behaviors, and therefore may be more informative sensory markers.

Finally, the differences in atypical behaviors between our high-scoring SPQ-B group and low-scoring SPQ-B group may not be significant enough in themselves. Future directions could include a clinical group, likely yielding more significant results, due to the greater difference in behavior between a healthy group and a clinical group. Characterizing this relationship in the general population would lend support for designing and implementing a study with a clinical population at local mental health facilities.

Due to the established relationship between psychiatric disorders and olfactory deficits, it is clear that olfactory measures may be a useful tool to implement in diagnosis, prevention, or treatment of disorders. Specifically, when an olfactory deficit is discovered, preventative measures or early intervention may be warranted to help delay the progression of the illness. Olfactory tests could be added to a battery of assessments to aid in the diagnosis of an individual, along with other screening procedures such as psychiatric evaluations and interviews. Through further research, a defect in the olfactory system could even become a new symptom domain in schizophrenia spectrum, neurodegenerative, or anxiety disorders.

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Past Sports Participation, Self-Efficacy, Goal Orientation, and Academic Achievement Among College Students

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ABSTRACT. The relationship between past sports participation in high school and levels of general self-efficacy, goal orientation, and GPA in college were examined among 149 college undergraduates. Participants were recruited from both MTurk and a local university and completed an online survey, which included a demographic questionnaire, the General Self-Efficacy Scale, the Goal Orientation Instrument, and a sports participation questionnaire. Significant positive correlations were found between past sports participation and current levels of general self-efficacy ($r = .20$, $p < .05$), learning goal orientation ($r = .22$, $p < .001$), and prove performance goal orientation ($r = .21$, $p < .001$). No significant relationships were observed for college GPA. The findings suggested that high school sports participation may be beneficial in increasing levels of general self-efficacy in college, which could therefore improve academic performance in college. The current study was the first to evaluate the relationship between participation in sports during high school and current levels of self-efficacy, goal orientation, and academic performance in college students. Future directions for research are discussed.

Keywords: sports, self-efficacy, goal orientation, academic performance, college students

Experimental and observational evidence has shown that school-aged children and youth should accumulate an average of 30 to 60 minutes of physical activity a day in order to obtain maximum health benefits (Janssen & LeBlanc, 2010). This activity should be of at least moderate intensity and consist of mostly aerobic forms of exercise in order to lead to the most health benefits (Janssen & LeBlanc, 2010). Consistent levels of such physical activity are associated with physical health benefits such as lower levels of cholesterol, decreased risk of injury, better bone density, healthier blood pressure, and decreased risk for obesity (Janssen & LeBlanc, 2010). In addition to physical health benefits, physical activity has shown a positive impact on psychological variables such as fewer depressive symptoms, improved learning and memory, and better cognitive health (Fredricks & Eccles, 2005; Janssen & LeBlanc, 2010; Trudeau & Shephard, 2008). Researchers have also noted that school dropout rates among students in grades 8 through 12 were significantly reduced by one form of physical activity, sports participation, and that such participation increased engagement in school and self-esteem among students, which indirectly improved academic performance (Fredricks & Eccles, 2005; Trudeau & Shephard, 2008).

A significant body of research literature has examined extracurricular activity in general, and sports participation specifically, among youth and related developmental outcomes (e.g., Eccles & Barber, 1999; Mahoney, Vandell, Simpkins, & Zarrett, 2009). For example, Eccles and Barber (1999) conducted an early study with predominantly European-American adolescents and found that participation in organized activities was linked to indicators

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of both positive and negative outcomes. Sports involvement was linked to positive educational outcomes but also to involvement in risky behaviors (e.g., consuming alcohol). Of the many organized activities that adolescents can participate in, sports have historically received the greatest amount of attention (Mahoney et al., 2009). Adolescents who participate in organized sports, compared to those who do not, tend to have higher high school grade point averages (GPAs) and a greater likelihood of attending college (Barber, Eccles, & Stone, 2001). Additionally, research has suggested that participating in a greater number of organized extracurricular activities, including sports, is positively associated with adjustment, which might be explained by the unique learning and development experiences that extracurricular activities offer (Fredricks & Eccles, 2010). Furthermore, research has suggested that involvement in more years of organized sports is positively associated with better academic performance and psychological adjustment (Bohnert, Aikins, & Arola, 2013). Researchers in this field have suggested that these positive developmental outcomes may be facilitated by specific skills, values, and beliefs that are associated with sports involvement (Hansen & Larsen, 2007). Whether sports involvement and these values, beliefs, and skills and academic impact extend into the college years has yet to be examined.

In recent research with adults, participation in physical activity has been positively related to one type of belief system—the psychological variable of self-efficacy (Çetinkalp & Turksoy, 2011; Kenyon, Kubik, Davey, Sirard, & Fulkerson, 2012; Kvarme, Haralsdad, Helseth, Sorum, & Natvig, 2009). Self-efficacy, or the belief about one's ability to succeed in accomplishing a task, behavior, or desired outcome (Bandura, 1977, 1986), has been categorized and measured in different ways. The current study measured general self-efficacy, which refers to individuals' overall beliefs in their abilities to accomplish a desired task (Høigaard, Kovač, Øverby, & Haugen, 2015). General self-efficacy, for example, has been shown to significantly and positively relate to physical activity (Kvarme et al., 2009), as well as to mediate the effect between perceived barriers of physical activity and actual levels of physical activity (Kenyon et al., 2012). The previous studies did not include sports participation as a type of physical activity, thus making the current study unique.

In addition to its relationship to physical activity and possible relationship to sports participation, findings have also linked self-efficacy to a variety of emotional responses (e.g., stress, coping, and well-being) and other behaviors including academic performance (Au, 2015). According to Pajares (1996), self-efficacy beliefs can have important influential effects on an individual's ability to accomplish a task because self-belief impacts determination, perseverance, and resilience, which might be related to sports participation. In addition to effort and behavior, self-efficacy beliefs impact thoughts and emotional reactions. Lower self-efficacy can lead to doubt, stress, depression, and less creativity, which in turn can affect one's ability to perform in various settings such as sports participation and academics. Those with higher self-efficacy, however, are calmer and more confident in their abilities, leading them to better performance than individuals with similar cognitive ability but lower self-efficacy (Pajares, 1996).

Self-Efficacy and Academic Performance: Direct Links and Mediators

Self-efficacy has been positively linked to academic performance in many ways such as college performance and persistence (Brown, Lent, & Larkin, 1989), college retention and adjustment (Caskie, Sutton, & Eckhardt, 2014), and perceptions of academic success, but not necessarily performance on a task (Lane, Hall, & Lane, 2004). Additionally, a meta-analysis supported Bandura's (1977, 1986) theory and ideas about educational-vocational behavior suggesting that self-efficacy is related to academic behaviors (Multon, Brown, & Lent, 1991).

Several mechanisms underlying the relationship between general self-efficacy and academic performance have been proposed (Lodewyk & Winne, 2005). Some research has suggested that individuals' internal feedback during tasks contributes to their self-efficacy, which in turn predicts how difficult individuals will perceive a task (Lodewyk & Winne, 2005). Self-efficacy has also been shown to mediate students' learning style, therefore impacting their academic achievement (Zimmerman, 2000). These findings support the theory that students' self-beliefs in their academic abilities positively contribute to their motivation and ability to perform (Zimmerman, 2000). As we speculate that sports participation is linked to self-efficacy, and the literature suggests a relationship between self-efficacy and academic performance, sports participation might also be related to academic performance.

Goal Orientation, Self-Efficacy, and Academic Performance

One factor that has been related to self-efficacy and academic performance, and might also be related to sports participation, is goal orientation. According to goal orientation theory, individuals have either a learning goal orientation or performance goal orientation toward any given task (Dweck, 1986). Individuals with a learning goal orientation focus their attention on increasing their confidence on a task, and performance-oriented individuals focus on increasing their ability to demonstrate or perform a task for others (Harachiewicz & Elliot, 1993). Individuals with a high learning goal orientation believe their skills are malleable, thus giving them more confidence in developing their skills. Individuals with a high performance goal orientation, however, believe their skills are fixed and cannot be increased, making their motivation only to perform well (Dweck & Leggett, 1988). Learning-oriented individuals generally strive to gain knowledge and skills in order to develop competence, whereas performance-oriented individuals prefer to demonstrate their confidence by not receiving negative feedback about their abilities and instead receiving positive judgements about their abilities (Dierdorff, Surface, & Brown, 2010).

Previous research has suggested that those with high learning goal orientation have high levels of self-efficacy because they view everything as a learning experience, whether or not their past experiences were successes or failures (Phillips & Gully, 1997). In contrast, individuals with high performance goal orientation might have lower self-efficacy because they view their abilities and intelligence as fixed (Phillips & Gully, 1997). Such individuals, therefore, lose motivation when not performing to certain standards because they view it as a failure (Phillips & Gully, 1997). Because goal orientation is related to self-efficacy, and self-efficacy seems to be related to sports participation based on its relationship to physical activity, goal orientation might also be related to sports participation.

Also of relevance to failure, in particular, is the fact that learning-oriented individuals tend to adopt an adaptive response pattern, whereas performance-oriented individuals adopt a maladaptive response pattern (Bell & Kozlowski, 2002). An adaptive response pattern is characterized by persistence when an individual encounters failure. This type of response pattern leads to the development of new strategies and increased learning because the individual is determined to conquer the complex task. On the other hand, the maladaptive response pattern is characterized by the likelihood of choosing to withdraw or give up when faced with failure or a challenging task (Bell & Kozlowski, 2002). Thus, according to Bell and Kozlowski (2002), performance-oriented individuals are likely to put in less effort on a task than learning-oriented individuals because extra effort is viewed as a lack of ability. Encouraging individuals to adopt more of a learning goal orientation rather than a performance goal orientation may lead to increased levels of self-efficacy, and therefore increase performance (Phillips & Gully, 1997). In terms of academic performance, Button, Mathieu, and Zajac (1996) found a strong positive relationship between GPA and learning goal orientation among students.

Although research has shown that a learning goal orientation contributes to superior performance, especially academic performance, other research has shown that the opposite might be true depending on the situation. For example, Mangos and Steele-Johnson (2001) found that individuals with a performance goal orientation outperformed those with a learning goal orientation on complex tasks. Consistent with this finding, other research has suggested that a performance goal orientation may be beneficial to performance in certain situations or with certain tasks that are more complex (Mangos & Steele-Johnson, 2001). Unlike research on learning goal orientation, research on performance goal orientation has demonstrated less conclusive and significant findings (Bell & Kozlowski, 2002). Based on the research showing that the most beneficial type of goal orientation might depend on the type of task and the type of motivation underlying performance goal orientation, VandeWalle and Cummings (1997) separated performance goal orientation into two dimensions: avoid and prove. Avoid performance goal orientation describes individuals who prefer to avoid negative judgments or disconfirmation about their abilities, whereas prove performance goal orientation characterizes individuals who prefer to prove their abilities and competence while gaining favorable judgments from others (Dierdorff et al., 2010). VandeWalle and Cummings (1997) found that measuring performance goal orientation in two dimensions was a better and more accurate measure because it accounts for different motivations underlying performance goal orientation.

Self-Determination and Self-Efficacy Theory

According to self-determination theory, an individual's ability to achieve a certain level of performance

for a given activity can be greatly influenced by the development of self-determined motivation, as well as consistent involvement in the activity. In particular, self-determination theory has been applied to research on sports participation and performance, demonstrating that the development of intrinsic motivation is especially impactful in terms of accomplishing sports performance goals and that individuals motivated more by extrinsic factors are more likely to drop out of sports leagues/teams (Ryan & Deci, 2000). Recent research has found positive relationships between self-determined motivation toward participation in sports-related physical activities and the well-being of youth, yet has not examined how these findings might influence or be related to self-efficacy and academic achievement (Inoue, Wegner, Jordan, & Funk, 2015). Both self-determination theory and self-efficacy theory suggest that individuals' perceptions of their capabilities can have a direct (for self-efficacy theory) or indirect (for self-determination theory) effect on performance (Inoue et al., 2015). For example, in terms of sports participation, students' confidence or belief in their abilities to perform well, or improve in a sport, might therefore increase the likelihood that they would be more involved in a sport. Similarly, the level of participation or performance in a sport in students who are strongly intrinsically motivated—motivated by their own interest, enjoyment, or inherent satisfaction—might be influenced indirectly. Based on these relationships, it seems that relationships might exist between sports participation, self-efficacy, and goal orientation.

Purpose of Current Study

Based on current research regarding the relationship between physical activity in general, and sports participation specifically, and a number of psychological variables, the purpose of the current study was to examine the relationships between past participation in high school sports and current levels of self-efficacy, goal orientation, and academic achievement among college students. In the current study, past sports participation was used as a predictor variable for self-efficacy, goal orientation, and academic performance (as measured by college GPA). Similarly, self-efficacy and goal orientation were used as predictor variables for academic performance (GPA).

Considering research that proposes a positive relationship between athletic participation and self-efficacy, the current study aimed to evaluate the relationship between involvement in sports during high school and current levels of academic performance, self-efficacy, and goal orientation in college students. The current study focused on past sports involvement in high school, as opposed to concurrent sports involvement in college, in order to examine any carryover implications that past sports involvement might have on college students with regard to their self-efficacy, goal orientation, and academic achievement. We chose to operationalize sports participation in a variety of ways including hours per week (intensity of involvement), years of participation (intensity of involvement and level of commitment), number of sports activities (breadth of involvement), and a self-report of the participants' perceived level of participation and commitment. However, we chose to use the number of years of participation in a sports activity as the measure in our analyses because it was the most normally distributed of the sports participation variables among the current sample.

Consistent with previous research on self-efficacy, we hypothesized that students who participated in sports in the past would have higher levels of general self-efficacy. Additionally, we hypothesized that past sports participation would be positively correlated with learning goal orientation and prove performance goal orientation due to a desire to learn or gain favorable judgments about their abilities from others, but that sports participation would be negatively correlated with avoid performance goal orientation because those attempting to avoid negative judgements about their abilities may participate less in sports.

Considering the desire to gain favorable judgements with prove performance goal orientation, we hypothesized that individuals who are more prove performance goal oriented would have higher self-efficacy, and individuals who are trying to avoid negative judgements (avoid performance goal-oriented individuals) would have lower self-efficacy because they might have less confidence in their abilities. Despite the research demonstrating that performance goal orientation might be beneficial for certain tasks or under certain circumstances, more research has found learning goal orientation to be related to higher self-efficacy, thus we hypothesized that self-efficacy would also be positively related to learning goal orientation.

In terms of associations with academic performance, we hypothesized that individuals with high levels of learning goal orientation would have higher academic performance, as measured by college GPA. Because we hypothesized that there would be a

relationship between learning goal orientation and self-efficacy, we also hypothesized that self-efficacy would be positively related to college GPA, meaning that higher self-efficacy and higher levels of learning goal orientation would be related to better academic performance in college. We also hypothesized that sports participation would be positively correlated with college GPA because those who participated in sports or were more involved in sports would have learned some valuable skills or developed abilities that led them to be more successful in college. Finally, we hypothesized that the combination of general self-efficacy, levels of goal orientation, and past sports participation would explain more of the variance in college GPA than any variable individually. This research is important because of its possible implications for determining factors that may assist with success in, or admission to, college, as well as funding and/or encouragement for sporting activities in all levels of schooling.

Method

Participants

Participants included 251 undergraduate college students recruited from Amazon's Mechanical Turk (MTurk) and an online research participation management system at a Christian liberal arts university in Southern California. Of the 251 participants recruited, a total of 149 participants qualified for the study. Participants who were ineligible for the study included the following: participants from the university sample who reported a GPA but had no actual GPA, participants who reported no GPA and identified as first-year students, university participants who identified as first-year students but whose GPA could not be verified, MTurk participants who did not report a GPA or did not report a GPA on a 4.0 scale, and participants who were 3 standard deviations above or below the mean on demographic variables, sports participation variables, or any of the dependent variables. The final sample included 149 participants, which included 56.4% of the MTurk sample and 43.6% of the university sample.

Participants were between the ages of 18 and 36 years, with a mean age of 23.56 years ($SD = 4.75$). More participants identified as women (57.7%) than men (41.6%), and one participant identified as other. Most participants reported their current status in school as sophomores (29.5%), 26.2% of participants reported their status as seniors, 24.8% juniors, 12.1% in their fifth year or more, and 7.4% as first-year students. The most common race reported by participants was European American or White (59.1%), with 8.7% self-identifying as African American or Black, 13.4% as Asian American, 5.40% as Latino/Latina or Hispanic, 6.1% as Other, and 6.7% as Mixed Race.

Measures

Demographic questionnaire. Participants completed a demographic questionnaire asking about age, sex, year in school, number of units completed, name of university, race/ethnicity, socioeconomic status, level of parent education for each parent, and cumulative college GPA. In addition to self-reporting their college GPA, the GPAs of participants from the university sample were verified with participants' consent by the university's registrar via a confidential coding system.

General Self-Efficacy Scale. General self-efficacy was assessed using the 10-item General Self-Efficacy Scale (Schwarzer & Jerusalem, 1995). Items were rated from 1 (*not at all true*) to 4 (*exactly true*). The total score was calculated by finding the sum of all the items. Total scores could range from 10 to 40, with higher scores indicating more general self-efficacy. Sample items included "I can always manage to solve difficult problems if I try hard enough," "It is easy for me to stick to my aims and accomplish my goals," and "I can usually handle whatever comes my way." The α coefficient for the scale has been shown to be between .76 and .90, indicating moderate to good reliability (Schwarzer & Jerusalem, 1995). The authors of the General Self-Efficacy Scale found the scale to be positively correlated with "emotion, optimism, and work satisfaction," whereas they found negative correlations with "depression, stress, health complaints, burnout, and anxiety" (Schwarzer & Jerusalem, 1995). Cronbach's α for this scale for the current sample was strong ($M = 32.37$, $SD = 3.50$, $\alpha = .83$).

Goal Orientation Instrument. Goal orientation was assessed using Vandewalle's and Cummings's (1997) 13-item Goal Orientation Instrument. The instrument includes three subscales: Learning Goal Orientation, Prove Performance Goal Orientation, and Avoid Performance Goal Orientation. The items were rated on a scale from 1 (*strongly disagree*) to 6 (*strongly agree*). The three subscales of the instrument were scored individually by finding the mean score for each dimension of goal orientation. The higher the average score on each subscale, the higher the level of that particular type of goal orientation. Sample items for the learning goal orientation subscale include "I am willing to select a challenging work assignment that I can learn a

lot from," and "I often look for new opportunities to develop new skills and knowledge." Sample items for the prove performance goal orientation subscale include "I am concerned with showing I can perform better than my coworker" and "I try to figure out what it takes to prove my ability to others at work." Sample items for the avoid performance goal orientation subscale include "I would avoid taking on a new task if there was a chance that I would appear rather incompetent to others" and "Avoiding a show of low ability is more important to me than learning a new skill." Based on previous research, coefficient αs were .87 for the learning goal orientation subscale, .83 for the prove performance goal orientation subscale, and .80 for the avoid performance goal orientation subscale, indicating good reliability (Dierdorff et al., 2010). Cronbach's α for learning goal orientation (M = 18.85, SD = 3.18, α = .83), prove performance goal orientation (M = 17.48, SD = 4.24, α = .73), and avoid performance goal orientation (M = 17.68, SD = 4.44, α = .73) were all moderate to strong for the current sample.

Sports participation questionnaire. Past sports participation was assessed through an 11-item sports participation questionnaire created by the authors for the current study (see Appendix). Sample questions were: "Did you participate in some form of organized team sport as defined above during high school?"; "For how many years during high school did you participate in your sport?"; "How many hours a week did you attend, practice, participate, or play your sport during high school?"; and "How many team sporting activities were you involved in during high school?" Participants ranked their level of participation in their sport from 1 (*no participation*) to 4 (*high level of participation*) and their commitment to the sport from 1 (*not committed*) to 4 (*extremely committed*), as well as self-reported the type of sport(s) in which they participated. Participants were also asked similar questions about whether they currently play a sport in college and whether they participated in other extracurricular activities in the past or currently to be used for exploratory analyses. Questions about sports participation in high school were examined to determine which variable would be used for analyses.

Procedure

Data were collected through two online surveys on MTurk and through an online university research participation management system. To identify MTurk participants who were college students, an initial survey asked respondents about their academic standing (i.e., "Are you an undergraduate college student who has completed at least one full semester in college?"). For completing this initial survey, participants were paid $0.02 immediately through their MTurk account. Each participant who answered affirmatively was invited to complete the second survey consisting of an informed consent and the following questionnaires, which were randomized to control for order effects: a demographics questionnaire, the General Self-Efficacy Scale, the Goal Orientation Instrument, and a sports participation questionnaire. After completion of the second survey, participants were paid $2.00 through their MTurk account. The participants recruited from the university who had completed at least one full semester in college completed the same second survey as the MTurk participants. These participants received one hour of research credit to fulfill a requirement for their psychology foundations course.

Creation of the GPA Variable

To examine the validity of self-reported GPA, the actual GPA of the university sample participants were obtained, with participants' consent, from the university's registrar through a confidential coding system and were then matched to the corresponding reported GPAs. Correspondence between actual and reported GPAs for the university sample was 78%. Therefore, reported GPA was replaced with actual GPA for the university sample. Given the nature of the data collection of the Mturk sample, we were not able to verify their GPAs.

Results

Comparing the MTurk and University Samples

A Multivariate Analysis of Variance (MANOVA) was conducted to examine differences between the MTurk and university samples on general self-efficacy, learning goal orientation, prove performance goal orientation, avoid performance goal orientation, GPA, level of sports participation, level of commitment to sport, and years of participation in sports. A significant Box's M test (p < .001) indicated that there was not homogeneity of covariance matrices. There was not a statistically significant difference based on the sample, $F(8, 137) = 1.14$, $p = .34$; Pillai's Trace = .06, η^2 = .06. Levene's test indicated unequal variances for level of commitment to sport ($F = 5.61$, $p = .02$) and level of sports participation ($F = 7.75$, $p < .01$). Follow-up one-way Analyses of Variance revealed no

significant differences between samples for general self-efficacy, $F(1, 146) = 1.68$, $p = .20$, $\eta^2 = .01$, learning goal orientation, $F(1, 146) = 0.56$, $p = .46$, $\eta^2 < .01$, prove performance goal orientation, $F(1, 146) = 0.48$, $p = .49$, $\eta^2 < .01$, avoid performance goal orientation, $F(1, 146) = 0.05$, $p = .82$, $\eta^2 < .01$, GPA, $F(1, 146) = 0.64$, $p = .43$, $\eta 2 < .01$, commitment to high school sport, $F(1, 146) = 0.26$, $p = .61$, $\eta^2 < .01$, level of participation in high school sport, $F(1, 146) = 1.08$, $p = .30$, $\eta^2 < .01$, and years of participation in high school sport, $F(1, 146) = 0.12$, $p = .73$, $\eta^2 < .01$. These results confirmed that the participants from each sample were not significantly different on any main outcome variables; thus the two groups were analyzed together for subsequent analyses.

Level of Sports Participation

Frequency counts were used to examine levels of sports participation as assessed by different sports participation questions such as the number of years that participants were involved in their sport, the number of sports that participants were involved in during high school, their level of commitment to their sport, and their level of participation in their sport. Based on the distributions of these various sports participation variables, we chose to use the number of years that participants participated in their sport during high school (years) as the measure of sports participation for subsequent analyses. Most participants reported that they participated in their sport for 4 years (38.3%) during high school, 8.1% reported 1 year, 15.4% 2 years, 19.5% 3 years, and 18.8% did not participate in any sports during high school.

Relationships Between Sports Participation, Self-Efficacy, Goal Orientation, and GPA

Pearson Product-Moment correlations were conducted to examine the relationship among all dependent variables, and the results are shown in Table 1. Statistically significant positive correlations were observed between years of sports participation and general self-efficacy ($r = .20$, $p = .01$), learning goal orientation ($r = .22$, $p = .01$), and prove performance goal orientation ($r = .21$, $p = .01$). There was no significant correlation between years of sports participation and avoid performance goal orientation ($r = -.07$, $p = .43$).

In terms of the relationship between dimensions of goal orientation and general self-efficacy, statistically significant positive relationships were observed between general self-efficacy and both prove performance goal orientation ($r = .26$, $p = .002$) and learning goal orientation ($r = .59$, $p < .001$). Avoid performance goal orientation, however, was not significantly related to general self-efficacy ($r = -.12$, $p = .16$).

In terms of the relationship between college GPA, learning goal orientation, general self-efficacy, and sports participation, results indicated that GPA was not statistically significantly correlated with learning goal orientation ($r = .03$, $p = .73$) nor self-efficacy ($r = .001$, $p = .99$). Additionally, there was no statistically significant relationship between college GPA and past sports participation in high school ($r = .04$, $p = .65$). Further exploratory analyses between GPA and prove performance goal orientation ($r = -.01$, $p = .93$) and learning goal orientation ($r = -.14$, $p = .08$) also did not demonstrate statistically significant relationships.

In addition, a MANOVA was conducted to examine years of sports participation on general self-efficacy, learning goal orientation, prove performance goal orientation, avoid performance goal orientation, and GPA. The Box's M test ($p = .19$) indicated that there was homogeneity of covariance matrices. There was not a statistically significant difference based on years of past sports participation, $F(5, 137) = 1.15$, $p = .29$; Wilk's $\lambda = .85$, $\eta^2 = .04$, thus follow-up tests were not performed. Levene's test indicated equal variances for all dependent measures, all p's > .21. Finally, due to the lack of a significant relationship between sports participation and GPA, no regression analyses were conducted.

Discussion

The purpose of the current study was to evaluate the relationship between sports participation in high school and academic performance in college, as well as other important related factors such as

Table 1

Correlations Between Outcome Variables.

Scale	GPA	APGO	PPGO	LGO	GSE
Years	.04	-.07	.21**	.22*	.20*
GSE	.00	-.12	.26**	.59**	
LGO	.03	-.12	.41**		
PPGO	-.01	.30*			
APGO	-.14				

Note. * $p < .05$ and ** $p < .001$; Years = number of years the participant played a sport throughout high school; GSE = General Self-Efficacy; LGO = Learning Goal Orientation; PPGO = Prove Performance Goal Orientation; APGO = Avoid Performance Goal Orientation GPA = Grade point average on a 4.0 scale.

general self-efficacy, learning goal orientation, prove performance goal orientation, and avoid performance goal orientation. This study is unique in that it was the first study to examine how past participation in sports is related to current self-efficacy, goal orientation, and academic performance in college. Our hypotheses were partially supported.

The hypothesis that sports participation in high school would be positively correlated with general self-efficacy was supported. This finding aligns with past research demonstrating the positive associations between sports programs and general self-efficacy (Çetinkalp & Turksoy, 2011), as well as self-determined motivation, which could have an effect on performance (Inoue et al., 2015; Ryan & Deci, 2000).

In addition, our hypothesis that sports participation in high school would be positively associated with both prove performance goal orientation and learning goal orientation was supported. These results suggest that, because individuals who are more prove performance-oriented tend to desire to demonstrate or prove their abilities to others and gain favorable judgement (Dierdorff et al., 2010), they might exhibit higher levels of participation in sports because sports involvement provides individuals the opportunity to improve their athletic abilities or performance and then demonstrate that ability (Inoue et al., 2015). Learning goal orientation was most likely positively related to sports participation because learning-oriented individuals seek to work at tasks in order to learn something new or improve competence in their skills; thus, a learning goal-oriented individual may be more likely to be involved in sports for a greater amount of time (Harachiewicz & Elliot, 1993). However, sports participation was not negatively associated with avoid performance goal orientation, perhaps because individuals who wish to avoid negative judgement about their abilities may simply not participate in sports (Dierdorff et al., 2010).

Results supported the hypotheses that learning goal orientation and prove performance goal orientation would be positively correlated with general self-efficacy, although the effect sizes were only moderate. The finding that learning goal orientation is related to higher levels of general self-efficacy is consistent with previous findings that demonstrate that self-efficacy levels are high in learning-oriented individuals because they see their skills as malleable and view everything as a learning experience (Phillips & Gully, 1997). Performance goal orientation has been linked to lower levels of general self-efficacy because individuals are attempting to prove their abilities rather than desiring to increase their knowledge or abilities (Phillips & Gully, 1997). Performance goal orientation has also been split into different types of performance orientation to measure different underlying motivations—prove (individuals who wish to demonstrate their abilities in order to gain favorable judgements regarding their abilities) and avoid (individuals who wish to demonstrate their abilities in order to avoid any negative judgements about their abilities). Therefore, it may be that individuals who wish to prove their abilities have more confidence in their abilities, thus also have higher general self-efficacy, which explains the relationship we found between prove performance goal orientation and general self-efficacy. The relationship between learning goal orientation and general self-efficacy was stronger than that of prove performance goal orientation, suggesting that learning-oriented individuals still have greater self-beliefs than performance-oriented individuals, which is consistent with previous research (Phillips & Gully, 1997).

According to the two-dimensional model of performance goal orientation, we expected avoid performance goal orientation to be negatively correlated with general self-efficacy, yet the results did not support this hypothesis. It is possible that avoid performance-oriented individuals do not choose to avoid negative judgement about their abilities because they have low general self-efficacy, but rather because of different underlying motivations unrelated to their self-efficacy (VandeWalle & Cummings., 1997).

Contrary to our hypotheses, academic performance was not significantly related to any other variable. This may be due to the small range and lack of variance in our measure of academic performance among the participants (i.e., GPA). Some research has used GPA to categorize participants into low, medium, and high levels of academic performance. However, with our limited number of participants and small range in GPA, such an analysis was not conducted (Lodewyk & Winne, 2005). Although academic performance as measured by GPA was not found to be associated with past participation in sports, it is still possible that sports participation is linked to academic performance through some other aspect of academic performance that is unrelated to GPA such as SAT/ACT scores, motivation, study skills, or academic self-efficacy.

However, considering the finding that college students' general self-efficacy was related to sports participation in high school, and past research has shown the link between general self-efficacy and academic performance (Inoue et al., 2015), the link between general self-efficacy and GPA might still exist.

Implications

The findings from the current study have several implications for sports participation in high school. Higher levels of general self-efficacy are related to many factors including the ability to accomplish a task or perform well (Pajares, 1996). Thus, participation in sports, which we found to be related to high levels of general self-efficacy, may be beneficial in increasing levels of general self-efficacy and therefore could increase performance in various tasks including performance academically. This is especially important when considering the ability to succeed academically in college because, if general self-efficacy contributes to academic success, students should be encouraged to take part in activities that help increase general self-efficacy beliefs.

Because having a learning-oriented and prove performance-oriented mindset is strongly related to general self-efficacy, it may be important for parents and teachers to help cultivate these types of mindsets among students in order to boost their levels of general self-efficacy, enhance confidence in their abilities, and help them to view everything as a learning experience despite success or failure. This study is original in that it demonstrated a relationship between past sports participation and current goal orientation and general self-efficacy in college, which means that past participation in sports during high school can have carryover effects into college. Being actively involved in sports during high school was significantly related to general self-efficacy beliefs and levels of goal orientation in college. Therefore, involvement in an organized sporting activity throughout high school may influence general self-efficacy and thus academic success in college. It is possible that sports and athletic participation teaches students valuable skills that the classroom cannot. Therefore, sporting activities should not be viewed as something distracting from school work, but rather beneficial to students' learning. Depending on different areas and socioeconomic backgrounds, athletic programs may not be as readily available for some as they are for others, thus having possible negative effects on general self-efficacy and academic achievement.

Limitations and Future Directions for Research

Several limitations to the current study should be noted. First, it was not possible to verify the GPAs for the MTurk sample, which could be related to our lack of significant findings related to GPA because these GPAs might not have been reported as accurately. GPA might also not have been the most comprehensive or representative means of evaluating academic performance among college students because GPAs for different universities might not be comparable, as classes may vary in difficulty from one university to another. Because we did not find any significant results associated with GPA, we were not able to examine our main hypothesis. Future research should evaluate different aspects of college academic performance (e.g., SAT/ACT scores, study skills or habits, motivation, academic self-efficacy) in order to gain a deeper understanding of the role past sports participation may play on academic performance in college, general self-efficacy, and goal orientation. Additionally, the goal orientation scale was not specific to schoolwork and instead emphasized work, which might have impacted the interpretation of the findings. Future research should adapt or create a goal orientation scale that is more specific to schoolwork in order to further examine the relationship between goal orientation and the other outcome variables among college students.

Another limitation of the current study was that students were retrospectively evaluating their sports participation in high school, which might have introduced some recall error. Future research should examine ways in which a composite score for overall sports participation (e.g., number of years, hours per week, level of commitment, level of participation) could be measured in order to better analyze relationships with sports participation. Research should also look at different kinds of sports, including the differences in club and recreational sports, to see if some sports have more or less of an impact than others. The relationship between sports participation on academic performance may also differ in college students by their year in school (e.g., GPAs for first-year and sophomore students may be less stable than those of junior and senior students), and this study did not take class ranking into account. Future research should evaluate the impact that year in school may have on these relationships. It is also possible

that past sports participation and college GPA are unrelated, and current sports participation would have been a more appropriate variable to measure. However, we did not test this question because the purpose of the current study was to examine past sports participation in high school in relation to current levels of self-efficacy, goal orientation, and academic achievement in college. Additionally, future research should experiment with cross-sectional or longitudinal methods in order to gain more accurate results of the relationship between sports participation and academic performance. Further research in this area is important and useful because it will provide more knowledge for educators, parents, and students about how participation in sports influences students' future beliefs about their abilities, mindset, and overall academic performance.

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APPENDIX

Sports Participation Questionnaire

Listed below are questions for this section of the survey. Please provide a response for every question and select or write N/A if the question does not apply to you. For the purpose of this study, sports participation in high school is considered any type of team sport that involves some form of organized physical activity. Sports participation can include, but is not limited to: football, basketball, soccer, volleyball, lacrosse, swimming, dance, cheerleading, tennis, baseball, track and field, cross country, etc. Sports participation may be on any form of high school team, junior varsity, varsity, club, intramural, etc., but must be an organized, official team. Teams can be through a high school or outside of school.

Did you participate in some form of organized team sport as defined above during high school?

- ☐ Yes
- ☐ No

If you answered yes to the previous question, how many team sporting activities were you involved in during high school? If you did not participate in any sports during high school, please write N/A.

If you participated in a sport, please write the name of one sport you participated in during high school. If you did not participate in a sport during high school, write N/A.

If you participated in more than one sport during high school, please write the name of another sport that you participated in. If this does not apply to you because you did not participate in any sport during high school or only participated in one sport, please write N/A.

If you participated in more than two sports during high school, please write the name of another sport that you participated in. If this does not apply to you because you did not participate in any sport during high school or only participated in two or less sports, please write N/A.

If you participated in more than three sports during high school, please write the name of another sport that you participated in. If this does not apply to you because you did not participate in any sport during high school or participated in three or less sports, please write N/A.

Please answer this question based on the sport you feel like you participated the most in during high school. For how many years during high school did you participate in this sport?

- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ N/A (I did not participate in any sport during high school)

Please answer this question based on the sport you feel like you participated the most in. For how many hours a week did you attend, practice, participate, or play your sport during high school? If you did not play any sports during high school, please write N/A.

Please answer this question based on the sport you feel like you participated the most in. How would you rank your level of commitment to that sport?

- ☐ Not committed
- ☐ Slightly committed
- ☐ Moderately committed
- ☐ Committed
- ☐ Extremely committed
- ☐ N/A (I did not play any sports during high school)

Please answer this question based on the sport you feel like you participated the most in. How would you rank your level of participation in that sport?

- ☐ No participation
- ☐ Some participation
- ☐ Average participation
- ☐ More than average participation
- ☐ High level of participation
- ☐ N/A (I did not play any sports during high school)

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