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From Bias to Behavior:
Predicting Prejudice Towards Autistic Individuals

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Abstract

The present study sought to examine university students’ judgments about and behavior towards an individual they perceived to be on the autism spectrum versus an individual who they perceived not to be. Furthermore, the study measured implicit and explicit biases towards autistic individuals and the implications those biases had for behaviors directed towards individuals they perceived were autistic. Participants ($n = 112$) completed the study in two separate research sessions, spaced several weeks apart. In Part 1 of the study, participants completed measures of implicit and explicit bias. In Part 2, participants were asked to discuss a neutral prompt with a confederate whom they believed had a diagnosis of Autism Spectrum Disorder or did not have this diagnosis. Following that interaction, participants rated their own behavior and their perceptions of the confederate. Trained research assistants coded non-verbal and verbal behaviors of the participants recorded during the interaction, including behaviors such as eye contact, arm openness, and smiling. Results indicated that participants who perceived more autistic traits in their interaction partner had more negative perceptions of their partner’s social ability and were less willing to interact with them further. Additionally, some prejudiced behaviors such as fidgeting or speech errors varied depending on whether the participant believed the confederate was autistic and, if so, whether they thought so based on a label of an autistic diagnosis or the presentation of behaviors consistent with autism stereotypes. Finally, participants demonstrated implicit and explicit biases against autistic individuals, although those biases did not predict overall behavior. This research helps enhance our understanding of prejudicial judgments and behaviors directed towards autistic individuals and discusses the implications for this prejudice on social and academic success of students with this diagnosis.
From Bias to Behavior:
Predicting Prejudice Towards Autistic Individuals

The Center for Disease Control estimates that 1 in 68 children in the United States are diagnosed with an autism spectrum disorder (ASD; Centers for Disease Control, 2014). Although there is a lot of variation across individuals, this diagnosis commonly affects social interactions, communication abilities, and behaviors (Adreon & Durocher, 2007). Many ASD individuals have difficulty understanding the feelings and perspectives of others, affecting their ability to engage in reciprocal social interactions (Adreon & Durocher, 2007). Individuals with this diagnosis may also struggle with using and understanding non-verbal communication, like eye contact and body language, and may miss social cues or interpret language too literally (Adreon & Durocher, 2007). This can manifest in behaviors such as standing too close during an interaction, monopolizing a conversation with their own interests, or not responding to humor or sarcasm by their interaction partner. Furthermore, ASD individuals frequently have atypical prosody making their voices sound monotonous, or they may be unaware of the volume they are speaking at and may speak too softly or too loudly. All of these behaviors may contribute to others perceiving them as rude or uncomfortable to interact with (Adreon & Durocher, 2007).

Most research around this disorder focuses on children with ASD, rather than college students or adults (Neville & White, 2011; Welkowitz & Baker, 2005) despite the fact that, thanks to increases in academic support, early intervention, and diagnostic understanding of this disorder, more ASD students are attending college (Adreon & Durocher, 2007; Gelbar, Smith, & Reichow, 2014; Neville & White, 2011). ASD individuals who attend university have increases in self-esteem, employment, personal skills, and self-advocacy compared to those who do not attend university (Hart, Grigal, & Weir, 2010). Still, only about 5-40% of individuals with high
functioning ASD successfully attend and complete college (Levy & Perry, 2011). Additionally, 50-60% of adults with high-functioning ASD are unable to live independently, instead living with their parents or in sheltered residential placements (Levy & Perry, 2011). Thus, the transition to college and independent living can be difficult for ASD individuals. Although attending a university offers more opportunities for this population, it also presents certain challenges, contributing to the high rates of drop-out and academic failure in ASD students (White, Ollendick, & Bray, 2011).

Although most ASD students report wanting to form friendships and romantic relationships in college, they may struggle to maintain long-term relationships (Adreon & Durocher, 2007; Howlin, Goode, Hutton, & Rutter, 2004; Jobe & White, 2007). Only 5-10% of ASD adults report having long-term relationships or getting married (Levy & Perry, 2011). It does not help that many universities do not provide adequate social supports for these students (VanBergeijk, Klin, & Volkmar, 2008). ASD individuals have higher rates of social exclusion than their neurotypical peers (Gelbrar et al., 2014; Jobe & White, 2007; Welkowitz & Baker, 2005; White et al., 2011), which contributes to the increased rates of comorbid psychiatric conditions in this population (Gelbrar et al., 2014; Hillier, Fish, Siegel, & Beversdorf, 2011; Hofvander et al., 2009; Kim, Szatmari, Bryson, Streiner, & Wilson, 2000; White et al., 2011), particularly anxiety (Gillott & Standen, 2007; Simenoff et al., 2008) and depression (Ghaziuddin, Ghaziuddin, & Greden 2002; Sterling, Dawson, Estes, & Greenson, 2008). These conditions are problematic for ASD college students in particular as studies have found that ASD individuals with higher cognitive abilities report more depressive symptoms (Sterling et al., 2008). Furthermore, the higher the rates of anxiety in an ASD adult, the less able they are to cope with stressors, and as college presents a variety of stressors including change, independent living, and
increased demands, this population is particularly vulnerable (Gelbar et al., 2014; Gillott & Standen, 2007; Neville & White, 2011).

Social interactions involve more than a single person, so it is important to understand not only how ASD people interact with their peers, but also how their peers interact with them. A study by Sasson and colleagues (2016) found that college students formed less favorable first impressions of ASD students compared to neurotypical students, and were less willing to pursue further social interaction with ASD students. Other studies have found that the more ASD characteristics an individual shows, and the greater the magnitude of those behaviors, the more negatively people perceive that individual (Howlin et al., 2004; Jobe & White, 2007; Mor & Berkson, 2003).

The biases people have towards certain populations can influence their perceptions and treatment of those populations (Chen & Bargh, 1997; Dovidio, Kawakami, & Gaertner, 2002; Greenwald & Banaji, 1995). Research examining explicit biases towards ASD seem to vary, with some studies finding that peers view ASD students negatively (e.g., Campbell, Ferguson, Herzinger, Jackson, & Marino, 2004; Swaim & Morgan, 2001; Wahl & Harman, 1989), some finding relatively neutral explicit biases (e.g., Dickter, Zeman, Burk, Taylor, & Kittel, 2017), and some finding that peer attitudes towards ASD are relatively positive (e.g., Mahoney, 2007). However, self-report assessments may not be the most accurate reflection of how an individual truly feels about the population of interest. Self-report data are at risk of social desirability bias, where participants respond according to how they want to be perceived rather than how they truly feel, and social norms usually dictate an individual should be non-prejudiced (Dasgupta & Rivera, 2006; Dovidio & Gaertner, 2000; Neville & White, 2011; Plant & Devine, 1998; Shook & Fazio, 2008). Indeed, there are inconsistencies between self-report views of ASD and how
peers act in a lifelike setting (Neville & White, 2011). This norm is context dependent, however, as suggested by Klein, Snyder, and Livingston’s (2004) study which found that the extent to which the people around an individual were prejudiced or tolerant influenced how prejudiced or tolerant the individual behaved, so in some settings the norm may actually be to behave in a more prejudiced manner.

Because self-report measures studying attitudes towards disabilities are particularly susceptible to social desirability bias and situational context (Hergenrather & Rhodes, 2007), it is important to also study implicit biases (Dovidio et al., 1997). While explicit biases are conscious biases, reflecting attitudes of which the individual is aware (Dovidio et al., 1997; Greenwald & Banaji, 1995), implicit biases are unconscious attitudes that are automatically activated when in the presence of the attitude object, such as a person from a stereotyped social group (Dovidio et al., 1997; Greenwald & Banaji, 1995). These are often based on past experiences with the attitude object as well as learned societal associations with particular traits, and can persist over an extensive period of time (Dovidio & Gaertner, 2000; Fazio, 2007; Fazio, Jackson, Dunton, & Williams, 1995).

Research has found that many people have negative implicit attitudes towards individuals with disabilities (Vaughn, Thomas, & Doyle, 2011; White, Jackson, & Gordon, 2006). A study conducted by Dickter and colleagues (2017) created an Implicit Association Test (IAT) designed to measure implicit biases towards ASD peers specifically, based on the original IAT developed by Greenwald and colleagues (1998). They found that there were more negative implicit biases towards ASD people than towards people who were neurotypical, both in college students and in adults (Dickter et al., 2017).
Implicit and explicit biases are different constructs and thus should be considered individually (Dovidio et al., 2002). Although McConnell and Leibold (2001) found a significant correlation between measures of implicit and explicit bias, other studies found there to be only a weak relationship between the two (Dickter et al., 2017; Dovidio et al., 1997; Fazio et al., 1995; Thomas, Doyle, & Daly, 2007). When an attitude is rated as more important or the individual is sufficiently motivated to control prejudice, it moderates the relationship between explicit and implicit biases (Karpinski, Steinman, & Hilton, 2005; Payne, 2001). Research suggests that implicit and explicit biases also predict different types of behavior (Dovidio et al., 1997; Dovidio et al., 2002). Most of the previous research examining implicit and explicit bias has focused on race; there is little research examining bias towards individuals with disabilities.

The degree to which implicit and explicit biases affect behavior towards targeted groups is important to examine in that it can reveal the relationship between prejudice and discrimination. Dovidio, Kawakami, and Gaertner (2002) found that explicit racial biases could be used to predict verbal behaviors during an interracial interaction. Because people are aware of their explicit biases, the behaviors that reflect these biases are the ones under conscious control, such as verbal friendliness and warmth (Dovidio et al., 2002; Karpinski et al., 2005; Shelton, Richeson, Salvatore, & Trewalter, 2005). People are also more aware of these types of behaviors, evidenced by a significant correlation between explicit measures of racial bias and how participants scored their own behavior during an interracial interaction, as well as a significant correlation between self-perception and verbal behavior (Dovidio et al., 1997). There is not, however, a significant correlation between self-perception and measures of implicit bias or non-verbal behaviors (Dovidio et al., 1997). Some studies argue that there is not a relationship
between explicit biases and behavior, suggesting that this area needs to be studied further (McConnell & Leibold, 2001).

Although implicit biases operate outside of an individual’s awareness, they can still influence behavior (Amodio & Devine, 2006; Dovidio & Gaertner, 2000; Payne 2001; Plant & Devine, 1998). Dovidio and colleagues (2002) found that implicit racial biases can be used to predict overall non-verbal friendliness during an interracial interaction. Similarly, McConnell and Leibold (2001) did not find a relationship between explicit bias and behavior, but they found significant correlations between an IAT and an experimenter’s ratings of social interaction bias. The authors concluded that the IAT does predict behavior, especially behaviors that are not under conscious control such as eye contact, body positioning, and fidgeting movements.

Although non-verbal cues seem subtle, they can be detected from just 30 seconds of interaction and still affect how targets feel they are being treated (Amodio, Harmon-Jones, & Devine, 2003; Amodio & Devine, 2006; Dovidio et al., 1997, Dovidio & Gaertner, 2000). When non-verbal cues are inconsistent with verbal cues, conflict may arise, as one person believes they are acting in a non-prejudiced manner while the other individual feels that that person is being prejudiced (Chen & Bargh, 1997; Dovidio et al., 2002). It is important to note that all of these previous studies examined explicit and implicit attitudes towards and behaviors towards individuals based on their race, and no studies have examined how attitudes predict interactions with ASD individuals.

Regardless of the biases someone holds, depending on the situation they may be able to conceal their potential prejudice. The Motivation and Opportunity as Determinants (MODE) model argues that judgments and behaviors result from two different processing modes (Fazio, 1990; Schuette & Fazio, 1995). The first is spontaneous processing, where there is an automatic
activation of the relevant attitude and the individual acts on it without conscious consideration (Fazio, 1990; Fazio et al., 1995; Schuette & Fazio, 1995). The second mode occurs when individuals are given the motivation and opportunity (i.e., time and resources) to consciously make decisions about their behavior (Fazio, 1990; Fazio et al., 1995; Plant & Devine, 1998; Shook & Fazio, 2008). Individuals default to spontaneous processing unless they are given the sufficient motivation and opportunity to switch to deliberative processing (Fazio, 1990; 2007). In both of these processes, the accessibility of the attitude and the strength of the association between the attitude and attitude object affect the expression of the behavior (Fazio, 2007; Schuette & Fazio, 1995). Explicit measures of bias often allow participants the motivation and opportunity to think through their responses, and thus are not necessarily accurate indicators of their automatic attitudes (Amodio et al., 2003; Dasgupta & Rivera, 2006; Shook & Fazio, 2008). In contrast, implicit measures of bias, which are often reaction-time tests, force participants to rely on spontaneous processing when responding (Shook & Fazio, 2008).

If an individual is consciously monitoring their behavior during an interaction in order to appear non-prejudiced, it may take a toll on their executive functioning (Shelton et al., 2005). Richeson and Shelton (2003) had participants complete a Stroop task of executive control following either an interracial or a same-race interaction. This task asks participants to sort color names that may be presented in text colors incongruent with the word itself. Their reaction time differences between the control and incongruent trials is thought to be an index of their current level of executive functioning. The researchers found that participants performed more poorly on the Stroop test following an interracial interaction than a same-race interaction, and specifically participants with greater implicit racial bias performed more poorly on Stroop after an interracial interaction compared to participants with lesser implicit racial bias (Richeson & Shelton, 2003).
This is likely due to effortful self-regulation occurring during the interaction in order to present oneself as unbiased, which temporarily depletes cognitive resources (Richeson & Shelton, 2003; Trewalter & Richeson, 2006). Further research found that these results apply to both partners in an interracial interaction (Richeson, Trewalter, & Shelton, 2005). Thus, applying this work on race to interactions between ASD and non-ASD individuals, it is possible that both neurotypical and neurodivergent individuals may suffer from resource depletion following an interaction. As ASD students only comprise about 0.7-1.9% of university students, interacting with neurotypical individuals is unavoidable and may have a cognitive cost for ASD students (White et. al., 2011). The cognitive cost of self-regulation poses a potential problem given how important self-regulation during interactions is to eliminating prejudice (Monteith, 1993).

The present study sought to expand the literature surrounding social treatment of ASD individuals. Studying potentially biased interactions with ASD people is an important topic, as although there is evidence to suggest that by nature of the disorder some ASD people struggle to pick up on non-verbal cues (Adreon & Durocher, 2007), other studies have shown that people with ASD can recognize non-verbal cues or learn to recognize and react to them (e.g., Argott, Townsend, Sturmey, & Poulson, 2007). Non-verbal prejudiced behaviors directed at autistic students likely contribute to the social exclusion and comorbid psychological conditions experienced by this population, affecting their overall academic experience. It is important to further our understanding of this potential prejudice, along with verbal prejudice, so that this prejudice may eventually be addressed and decreased in a university setting.

Measures of biases have revealed prejudice towards this population, but no studies have yet looked at the implications of these biases for behavior. In contrast to the hypothetical scenarios that dominate the ASD literature, despite not being reflective of actual behavior in real-
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life settings (Amodio & Devine, 2006), this study created an interaction between a college student participant and a college student confederate whom the participant was led to believe either had a diagnosis of ASD or was neurotypical. Past research on disabilities has found that just labeling someone as having a disability changes how individuals say they would perceive or behave towards that individual (Connolly & Peled, 2004; Findler, Vilchinsky, & Werner, 2010; Shifrer, 2013), so the current study aimed to examine whether responses would differ if the confederate engaged in behaviors that were consistent or inconsistent with stereotypes of autistic individuals. In this way the study aimed to isolate the effects of labeling a student as having ASD versus the behavioral aspect of this diagnosis to see which, if any, led to prejudice against the confederate. This design also allowed us to examine potential interactions of a diagnosis label and behavior.

It was hypothesized that participants would make different judgments about and behave differently while interacting with an individual they perceived as autistic versus an individual they who perceived was not autistic. Specifically, the label that was applied to the confederate as well as the behavior of the confederate were manipulated in order to examine whether a label of autism or autistic behavior, or the combination of the two, would predict perceptions and behavior. Behavior was measured by trained research assistants’ ratings of verbal and non-verbal behavior exhibited during an interaction. It was hypothesized that the most negative judgments, verbal behavior, and non-verbal behavior would take place when the confederate was both suggested to be autistic and was acting in a manner consistent with autistic stereotypes. Additionally, consistent with studies conducted with other minority groups, it was hypothesized that measures of explicit prejudice towards ASD individuals would predict verbal behaviors during the interaction, and measures of implicit prejudice would predict non-verbal behaviors.
Furthermore, it was hypothesized that participants with greater implicit biases towards individuals with ASD would perform more poorly on a Stroop task following the interaction with an individual they believe has ASD. Finally, we hypothesized that a greater motivation to appear non-prejudiced would result in fewer prejudiced behaviors during the interaction but a poorer performance on the Stroop task.

**Method**

**Participants**

The participants for this study were 112 undergraduate students from a medium-sized Southeastern university. All participants were required to be at least 18 years of age. Participants were recruited through the university’s online research participation system and were compensated with course credit for their participation. All procedures were approved by the university’s Protection of Human Subjects Committee and gave their informed consent prior to participating.

**Materials**

**Activities List.** To study whether the suggestion of an ASD diagnosis affects an individual’s behavior, participants were shown a list of organizations that the person they are interacting with was supposedly involved in. Two lists were created, one reflecting the ASD label condition and the other reflecting the neurotypical control condition. The lists were fabricated for the purpose of the study and do not accurately reflect what organizations the confederate is involved in.

Two pilot tests were conducted when creating the lists. The first asked participants ($n = 37$) to score eight different on-campus organizations on factors such as popularity and
positive/negative perceptions on sliding scales from 0-100 with neutral midpoints set at 50. The second pilot test provided participants \( n = 32 \) with two different lists of four on-campus organizations each, one of which included the ‘Autistic Student Association,’ which is not a real organization on campus but a name generated for the purpose of this study. Participants were asked to rate their assumptions about the student who was supposedly involved in the organizations of each list on a 5-point Likert-style scale from Definitely No – Definitely Yes. Items included common associations with autism (e.g. “This person relies on routines and habits” and “This person is sensitive to their environment”) but also common associations with other diagnoses prevalent in college students such as ADHD, Anxiety, and Depression (e.g. “This person experiences frequent mood swings” and “This person is impulsive”). Next participants were asked whether they think either student (Student 1 or Student 2) has a psychological condition and if so what condition. The final question asked participants to rate the likelihood of each student having various psychological conditions on a 5-point scale with endpoints of Extremely Likely (1) and Extremely Unlikely (5). There was a significant difference in the perceived likelihood that the students had a diagnosis of ASD, \( t(31) = -4.84, p < .001 \). Specifically the student who supposedly belonged to the Autistic Student Association \( (M = 2.78, SD = .24) \) was rated as more likely to have a diagnosis of ASD than the control \( (M = 3.84, SD = .16) \). This suggests that including this organization on a list of activities in which the confederate is involved in does imply that the confederate has a diagnosis of ASD.

After reviewing both pilot tests, the organizations that participants rated as the most neutral for sociability and popularity were selected: the Bike Alliance \( (M_{social} = 50.62, SD_{social} = 18.73; M_{pop} = 47.72, SD_{pop} = 19.83) \), the Innovation and Design Thinking Club \( (M_{social} = 51.40, SD_{social} = 23.37; M_{pop} = 47.93, SD_{pop} = 19.92) \), and Colleges Against Cancer \( (M_{social} = 61.31, SD_{social} = 22.87; M_{pop} = 51.12, SD_{pop} = 16.37) \).
$SD_{social} = 15.46; M_{pop} = 62.52, SD_{pop} = 19.29$). The control list just included these three organizations, while the ASD list included these three organizations as well as the Autistic Student Association.

**Societal Attitudes Towards Autism Scale (SATA scale).** This inventory, developed by Flood, Bulgrin, and Morgan (2013), was designed to measure explicit attitudes towards individuals with Autism Spectrum Disorder. It consists of six demographic questions, including a question about a participant’s prior contact levels with someone with ASD (e.g., little to no contact, have a friend with autism, have volunteered with a person with autism, etc.) and a question about preferences towards individuals with autism compared to individuals without autism. The SATA scale also includes 16 items which can be divided into three separate subscales: the Societal Attitudes subscale (e.g., “people with autism should not have children”), the Knowledge subscale (e.g., “a person with autism is a financial burden to his/her family”), and the Personal Distance subscale (e.g., “I would be afraid to be around a person with autism”). Participants were asked to respond to these 16 items with Strongly Disagree, Disagree, Agree, or Strongly Agree (Flood et. al., 2013). Reliability was acceptable ($\alpha = .79$).

**Feelings Thermometer.** Based on the Feelings Thermometer used by McConnell and Leibold (2001) to measure attitudes towards different races, participants quantified their feelings towards individuals with ASD on a feelings thermometer designed for the present study. Participants were presented with a sliding scale from 0 (Cold) to 100 (Warm) with a neutral midpoint at 50. Participants indicated how they felt towards ASD individuals by sliding the scale to the appropriate number.

**Motivation to Control Prejudiced Reactions Scale (MCPR).** This measure was created by Dunton and Fazio (1997) to examine how important it is to participants that they appear non-
prejudiced. This 17 item scale, originally designed to assess motivation to control racial prejudice, was adapted for the current study by changing any description of an encounter with ‘a black person’ to ‘an autistic person.’ These items include statements such as “In today’s society it is important that one not be perceived as prejudiced in any manner,” “Going through life worrying about whether you might offend someone is just more trouble than it’s worth,” and “I feel guilty when I have a negative thought or feeling about an autistic person.” Participants were asked to rate each item on a Likert-style scale from -3 (strongly disagree) to +3 (strongly agree) (Dunton & Fazio, 1997). Reliability was acceptable (α = .84).

**Implicit Association Test (IAT).** To measure participants’ implicit biases towards ASD, an IAT developed by Dickter and colleagues (2017) was used. This measure, modified from the IAT created by Greenwald and colleagues (1998), is a reaction time task where participants categorize stimulus words into superordinate categories in different blocks. Dickter and colleagues (2017) conducted a pilot test (n = 35) to choose appropriate stimulus words for adapting the IAT to examine attitudes towards ASD. During this pilot test, the participants were given a free response task where they were asked to generate as many words as they could to describe first a neurotypical university student and then an autistic university student. Examples of words the pilot study participants came up with are ‘normal’ and ‘extroverted’ to describe neurotypical students and ‘spectrum’ and ‘introverted’ to describe autistic students. These words were incorporated into this new version of the IAT for the categories neurotypical and autistic. The words of the task that were associated with the pleasant and unpleasant categories were the standard IAT words, including ‘awful,’ ‘beautiful,’ ‘glorious,’ and ‘horrible’ (Greenwald et al., 1998).
During the first two blocks, the participants categorized autistic and neurotypical words with one response key on a keyboard, and ‘good’ and ‘bad’ words with another key. These blocks were 24 trials each. All stimulus words were presented in the middle of the screen with the category words presented in the top right and top left parts of the screen. The second two blocks presented 64 trials. During these blocks, participants grouped all words into one of two categories using a response key designated for each half. Half of the participants were randomly assigned to have good/neurotypical and bad/autistic as the two response options while the other half were randomly assigned to have bad/neurotypical and good/autistic as the two response options. Next, the participants had another block of 24 trials in which the response keys for bad and good were switched. The final two blocks were 64 trials where participants grouped all words into the other pairing of categories that were not previously presented. During each trial, the words were presented until the participants responded. If they responded incorrectly, a red “X” appeared on the screen until they made the correct response. After making a correct response, there was a 250 ms inter-trial interval. The order in which these blocks were presented was counterbalanced across participants.

The Social Phobia and Anxiety Inventory (SPAI-23). The SPAI-23, created by Roberson-Nay and colleagues (2007), was used to assess social phobia. Participants were asked to score 23 items on how frequently they personally experience the situation described by each item, rating the frequency as Never, Very infrequent, Sometimes, Very frequent, and Always. Items include statements such as “I feel anxious when making a speech in front of an audience,” “I feel anxious when stating an opinion to other people,” “I feel anxious when approaching and/or initiating a conversation with other people,” and “there are certain places I do not go because I feel trapped” (Roberson-Nay et al., 2007). Reliability was acceptable ($\alpha = .93$).
**Autism Quotient (AQ).** The AQ developed by Baron-Cohen, Wheelwright, Skinner, Martin, and Clubley (2001) is composed of 50 items which participants scored as *Definitely Agree* (1), *Slightly Agree* (2), *Slightly Disagree* (3), and *Definitely Disagree* (4). It is designed to assess whether the participants share similar tendencies as is common to ASD individuals, including statements such as “I prefer to do things the same way over and over again,” “I usually notice car number plates or similar strings of information,” “I find it hard to make new friends,” and “I find it difficult to imagine what it would be like to be someone else” (Baron-Cohen et al., 2001). A score of 26 or higher suggests behavior consistent with Asperger’s syndrome and a score of 32 or higher suggests behavior consistent with ASD. Reliability was acceptable ($\alpha = .80$).

**Color-Word Stroop Task.** This computer task, programmed on millisecond.com and based on the Stroop task used in Richeson & Shelton’s (2003) study, was conducted with a color-coded four-button response box. Participants were told to report the correct color of a stimulus word that itself was the name of a color (e.g., red) or a string of “X”s. Participants were told to press the appropriate key on the response box to name the color of the stimulus as quickly as possible. Color names or the control “X”s appeared on the screen one at a time, in one of the following four colors: red, yellow, green, or blue. Each stimulus was preceded by a fixation cross. Each stimulus appeared for a maximum of 2000 ms. The task started with 32 practice trials, and then consisted of seven blocks of 12 trials each for a total of 84 experimental trials. Incompatible trials occurred when the color name appeared in a color other than its semantic meaning (e.g., “red” written in blue type). Control trials consisted of the string of “X”s appearing in one of the four colors (e.g., in blue type). Interference scores were calculated by subtracting
the latencies associated with the control trials from the latencies associated with incompatible trials (Trawalter & Richeson, 2006; Richeson & Shelton, 2003).

**Interpersonal Discrimination Scale.** This questionnaire was developed by King, Shapiro, Hebl, Singletary, and Turner (2006) to measure discrimination from sales personnel towards customers, but has been adapted for the present study with ‘I’ replacing ‘the salesperson’ and ‘my partner’ replacing ‘the customer.’ The five items of this scale (α = .58) include statements such as “the extent to which I smiled at my partner,” “the extent to which I made eye contact with my partner,” and “the extent to which I was rude to my partner.” Each item was scored on a seven point Likert scale with 0 indicating ‘not at all’ and 6 indicating ‘very much’ (King et al., 2006). A modified version of this scale was used to assess a confederate’s perception of how the participant behaved. Unlike the scale the participants completed, the five items on the scale given to the confederate (α = .89) included statements such as “the extent to which the participant smiled at me,” “the extent to which the participant made eye contact with me,” and “the extent to which the participant was rude to me.”

**Social Implication Scale (SIS).** This inventory created by Montepare, Kempler, and McLaughlin-Volpe (2014) evaluates how the participants perceived the confederate’s social interaction potential, including items such as “I would avoid this person,” “This person is a poor listener,” and “I would like to work with this person.” In total there are 9 items on this measure which was scored on a 7-point scale with endpoints of ‘strongly disagree’ and ‘strongly agree’ (Montepare et al., 2014). Reliability was acceptable (α = .79).

**Autistic Trait Assessment.** This measure was created for the purpose of this study based on results from Dickter and colleagues’ (2017) study. By asking 1834 undergraduate students “what behaviors do you feel are characteristic of an autistic college student?” they identified
some of the most common behaviors associated with ASD such as Poor Communication (endorsed by 72.8% of participants), Low Sociability (30.4%), Poor Attention Switching (14.3%), Exceptional Specific Skills (13.3%), High Intelligence (9.6%), Express Emotion Atypically (7.7%), Repetitive Physical Behaviors (6.1%), Distractible (5.2%), Routines and Habits (4.8%), Strong Attention to Detail (4.0%), Sensitive to Environmental Stimuli (3.8%), Difficulty Understanding Tasks (1.7%), and Imagination (0.8%) (Dickter et al., 2017).

Participants rated 13 statements about their partner on a 7-point Likert scale with endpoints of ‘strongly disagree’ and ‘strongly agree.’ In the current study, the statements were directly taken from the list above and were worded as “my partner exhibited poor communication,” “my partner exhibited low sociability,” “my partner exhibited distractible behavior,” etc. Reliability in our study was acceptable (α = .74).

Procedure

Participants completed the study in two separate sessions, each of which lasted half an hour. Upon arriving to the lab for Part 1 and giving their informed consent, participants completed the SATA, Feelings Thermometer, and Motivation to Control Prejudiced Reactions Scales administered using online survey software (i.e., Qualtrics). Next, participants completed the IAT. Once the participants finished the IAT they were debriefed on Part 1 and reminded to return to the lab 1-3 weeks later for Part 2 of the study. Prior research has found that completing an IAT or measures of explicit bias may influence behavior during an interaction, which is why there was a time lapse between sessions rather than having participants complete the whole study in a single session (Dovidio, Kawakami, & Gaertner, 2002; McConnell & Leibold, 2001).

For Part 2 participants were asked again for their informed consent. Participants also provided consent to be videotaped and audio-recorded during the interaction portion of the study.
Using Qualtrics, participants completed the SPAI-23 and AQ. Next, participants were given a slip of paper and asked to write down the on-campus organizations they are involved in. The researcher said they would give the participant’s list to another participant, and that the participant would then be receiving that other participant’s list, but really the participant was given one of the lists created by the researcher. Half of the participants were randomly assigned to receive the ASD list while the other half were assigned to receive the control list.

The next stage of the study was an interaction between the participant and a confederate. The following prompt, taken from Dovidio and colleagues’ (1997) study, was used to facilitate an interaction between the participant and a confederate. It was chosen for being neutral to the topic being studied and for being applicable to college students. The prompt reads: “First-year college students often bring more than they need to college. Please identify three or four things that are most essential for first-year students to bring, as well as three or four things that first-year students are most likely to bring to college and do not need” (Dovidio et al., 1997). Participants were given three minutes to discuss this prompt with the confederate.

The confederate was a male student actor recruited through the university’s theater department. Only one confederate was used to portray both the ASD and neurotypical conditions to eliminate potential confounds regarding his appearance or other characteristics. The confederate was trained to respond comparatively during each condition, and was shown video interviews of university students with ASD. He was also informed of common behaviors associated with this diagnosis. Some behaviors the confederate used to portray the ASD condition included a lack of eye contact with the participant, repetitively licking his lip, and perseverating in talking about his bike. In the NT condition the confederate was trained to let the participant lead the interaction, supplying natural and engaged responses but not initiating
conversation. In both conditions, the confederate gave the same responses to the discussion prompt, including talking about his bike although he did not focus on that item in the NT condition while it was a point of focus for the ASD condition. The confederate practiced discussing the prompt with research assistants until he responded consistently each time. The training session also included sensitivity training so that the confederate who, as far as the researchers knew, was neurotypical could portray a student with ASD in a respectful way.

After taking a few minutes to look over the activities list they had been assigned, the participant was asked to follow the researcher to another room that had been set up for an interaction with the ‘other participant’ whose list they had just read. The video camera and audio recorder had already been turned on and the confederate was already waiting in the room when the participant arrived. There was also a second camera in the room which was not turned on but was pointing at the confederate to further the cover story that the confederate was another participant. The participant was asked to take a seat in the empty chair across from the confederate and the researcher handed them a hard copy of the discussion prompt. The researcher notified the participant and confederate that this was the portion of the study that would be videotaped and audio-recorded and that they would have three minutes to discuss the prompt, then the researcher left. After three minutes the researcher returned and brought the participant back to the room where they had begun the study so that they could complete the Stroop task.

After finishing the Stroop task, the participants completed the interpersonal discrimination scale. While they were doing that, the confederate completed the modified version of the interpersonal discrimination scale. Then the participant completed the Social Implication
Scale and the Autistic Trait Assessment. Following the completion of those measures, the participant was debriefed and then dismissed.

Coding

Based on past research examining non-verbal and verbal behaviors during potentially prejudiced interactions, two trained undergraduate research assistants rated the participants’ behavior while interacting with the confederate (McConnell & Leibold, 2001; Dovidio et al., 2002). When coding non-verbal behaviors, the judges watched the video of the interaction without sound. On 9-point Likert-style scales they rated the participant’s general comfort level (1 = Not Comfortable, 9 = Very Comfortable) and amount of eye contact (1 = No Eye Contact, 9 = Eye Contact the Entire Interaction), and on 5-point Likert-style scales they rated the participant’s forward body lean (1 = Leaning Away, 5 = Leaning Forward), body positioning (1 = Facing Away, 5 = Facing the Confederate), the openness of the participant’s arms (1 = Very Closed, 5 = Very Open), and the expressiveness of the participant’s arms (1 = Not Expressive, 5 = Very Expressive). The judges also recorded the number of times the participant smiled during the interaction and the number of fidgeting body movements (e.g., swinging feet, playing with their hair, shifting positions).

When coding verbal behaviors, the judges listened to the audio recording. On 9-point Likert-style scales they rated the participant’s friendliness (1 = Very Unfriendly, 9 = Very Friendly), abruptness/curtness (1 = Very Abrupt, 9 = Not Abrupt), and warmth (1 = Very Cold, 9 = Very Warm). The judges also recorded the number of speech errors/hesitations the participant made during the interaction (e.g., “um,” “uh,” “well,”) and the number of extra social comments made by the participant. These extra comments occurred when the participant provided information that went above and beyond what was required to answer the prompt.
Results

Participants

Of the 112 participants, data from only 56 were included: 24 male participants and 32 female participants ($M_{age} = 19.00$, $SD = 1.11$). The rest of the participants were excluded for (a) not returning for part two of the study ($n = 42$), (b) knowing the confederate outside of the study ($n = 5$), (c) knowing the person they interacted with was an actor ($n = 4$), (d) revoking consent to be videotaped or audio-recorded ($n = 4$), or (e) researcher error ($n = 1$).

Manipulation Check for ASD Traits in Confederate

Participants in the ASD Behavior condition ($M = 3.96$, $SE = 0.11$) perceived more autistic traits in their interaction partner than participants in the NT Behavior condition ($M = 3.30$, $SE = 0.12$), $F(1, 51) = 16.35$, $p < .001$, $\eta^2_p = .245$. For a summary of the descriptive statistics of ASD traits and all of the measures used in the study, see Table 1.

Self-Report Measures

Implicit Bias. The IAT scores were calculated based on Greenwald and colleagues’ (2003) revised method. The mean IAT score was 0.50 ($SD = .49$, range -1.12 to 1.34), which significantly differed from 0, $t(55) = 7.57$, $p < .001$. This suggests an overall implicit bias against autistic individuals.

Explicit Bias. The mean score on the feelings thermometer was 74.19 ($SD = 22.06$, range 30 to 100), which significantly differed from the neutral midpoint set at 50, $t(52) = 7.98$, $p < .001$, suggesting an overall positive attitude towards autistic individuals. The mean Preference score was 3.50 ($SD = .91$, range 1 to 5), which significantly differed from a neutral score of 4,
$t(52) = -4.09, p < .001$. This suggests an overall preference for neurotypical over autistic individuals. The mean score on the SATA was 3.44 ($SD = .32$, range 2.81 – 4.00).

**Autistic Traits.** Scores on the AQ ranged from 7 to 36, with a mean score of 18.53 ($SD = 6.68$). Although no participants reported a prior diagnosis of ASD or Asperger’s, four participants reported scores above 26, suggesting behavior consistent with Asperger’s, and three participants reported scores above 32, suggesting behavior consistent with ASD.

**Social Anxiety.** The mean score on the SPAI-23 was 30.36 ($SD = 9.71$), with scores ranging from 10 to 55. Of the 56 participants included 62.3% scored 30 or above on this measure, suggesting a possible social phobia.

**Motivation to Control Prejudice.** The mean score on the MCPR scale was 4.85 ($SD = .78$) with scores ranging from 2.53 to 6.82.

**Person Perception Variables**

To examine the effects of behavior and club on each of the person perception variables of interest, 2 (Behavior: NT, ASD) x 2 (Club: NT, ASD) between-subjects analyses of variance (ANOVAs) were conducted. Main effects and interactions are reported below.

**Social Implications.** There was a main effect of Behavior on the SIS such that participants in the NT Behavior condition ($M = 5.04, SE = 0.14$) perceived higher social abilities in their interaction partner than participants in the ASD Behavior condition ($M = 4.59, SE = 0.13$), $F(1, 52) = 5.51, p = .023, \eta^2_p = .096$. There was not a main effect of Club nor was there an interaction.
Interpersonal Discrimination. There was a main effect of Club on the Participant version of the IDS (IDS-P) such that participants in the ASD Club condition ($M = 2.33, SE = 0.13$) self-rated themselves as showing less discrimination towards their interaction partner than in the NT Club condition ($M = 2.77, SE = 0.13$), $F(1, 52) = 5.74, p = .020, \eta_p^2 = .099$. This effect was qualified by a significant interaction, $F(1, 52) = 5.74, p = .020, \eta_p^2 = .099$. A simple main effects analysis revealed that there was no effect for participants in the ASD Behavior condition. However, there was an effect in the NT Behavior condition such that participants in the NT Club group self-rated as significantly more discriminatory towards their interaction partner ($M = 3.09, SE = .20$) than the ASD club condition ($M = 2.22, SE = .20$), $F(1, 24) = 9.25, p = .006, \eta_p^2 = .278$.

There were no significant main effects or interactions for the Confederate version of the IDS (IDS-C). There also was not a significant difference between the IDS-P and IDS-C.

Behavior Data

Data Analysis Strategy for Behavior. Each interaction behavior score coded by the trained research assistants was standardized and then assessed for interrater reliability. The Warmth variable was excluded from analysis for having poor interrater reliability ($\alpha = .25$), but the majority of the other variables all had acceptable reliability ($\alpha > .70$). The exceptions were Body Positioning ($\alpha = .54$) and Arm Openness ($\alpha = .64$), which were not excluded but may not have as reliable results due to their lower interrater reliability. The mean score between coders was calculated for each behavior and then the ratings were divided into two categories. The first category was molar judgments, which provided a general perspective on the quality of the interaction. For non-verbal, the molar judgment was General Comfort Level of the participant ($\alpha = .83$), while for verbal the molar judgment score was a combination of Participant Friendliness
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The mean scores of Friendliness and reverse-scored Abruptness were summed to create the overall Verbal Molar variable. The other variables were categorized as specific social behaviors and were analyzed individually.

First, univariate ANOVAs were conducted to examine potential differences across Behavior and Club conditions for each interaction behavior. Then a multiple regression analysis was conducted to predict each behavior from explicit bias (SATA), implicit bias (IAT), and condition, looking at possible interactions between all variables. On the first step of the regression, SATA, IAT, and condition were added as independent variables. On the second step, the interaction terms of mean centered SATA and mean centered IAT and dummy coded Behavior and Club were entered.

Analysis of Variance. Table 2 displays the means and standard deviations of each interaction behavior per club or behavior condition. Table 3 shows the significant and marginally significant results of the ANOVA. Interaction behaviors with no significant or marginally significant effects of condition were not included in the table. There were main effects of Behavior on Smiles, Fidgets (marginal), and Arm Expressiveness (marginal) such that participants in the ASD Behavior condition smiled less, fidgeted less, and were less expressive than in the NT Behavior condition. There were marginal main effects of Club on Arm Openness, Speech Errors, and Verbal Molar such that participants in the ASD Club condition had more open arms, more speech errors or hesitations, and had overall higher quality verbal interactions than participants in the NT Club condition.

Non-Verbal Regression. For Number of Smiles ($\alpha = .96$) there was a significant predictive effect of Behavior such that the participant smiled more in the NT Behavior condition ($M = .33, SD = .88$) than in the ASD Behavior condition ($M = -.27, SD = .99$), $t = 2.26, p = .028$, 
$\beta = .31$. There was also a significant IAT x Club interaction, $t = -2.37$, $p = .022$, $\beta = -.43$. The relationship between IAT and Smiles was not significant for the ASD Club condition, but in the NT Club condition there was a marginally significant negative relationship such that individuals with more implicit bias smiled less.

For Number of Fidgets ($\alpha = .74$) there was a marginally significant effect of behavior such that participants fidgeted more in the NT Behavior condition ($M = .24, SD = .98$) compared to the ASD Behavior condition ($M = -.20, SD = .77$), $t = 2.00, p = .051, \beta = .27$. There was also a significant IAT x Club interaction, $t = 2.53, p = .015, \beta = .44$. For the ASD Club condition, there was a significant negative relationship between IAT and Fidgets such that greater bias was associated with less fidgeting. For the NT Club condition there was a significant positive relationship between IAT and Fidgets such that greater bias was associated with more fidgeting.

For Body Positioning there was a marginally significant effect of SATA such that higher SATA scores predicted more directly facing the confederate during the interaction, $t = -1.97, p = .055, \beta = -.27$. This main effect was qualified by a marginally significant IAT x Behavior interaction, $t = -2.00, p = .051, \beta = -.46$. The relationship between IAT and Body Positioning was marginally significant in the positive direction for the ASD Behavior condition indicating that in this condition the more implicit bias a participant reported the more directly they faced the confederate. There was no significant relationship between IAT and Body Positioning for the NT Behavior condition.

There were no significant predictors for Comfort, Eye Contact ($\alpha = .87$), Body Lean ($\alpha = .83$), Arm Openness, or Arm Expressiveness ($\alpha = .89$).
**Verbal Regression.** For Speech Errors ($\alpha = .88$) there was a marginally significant effect of club such that in the ASD Club condition ($M = .25, SD = 1.02$) the participant made more speech errors than in the NT Club condition ($M = -.23, SD = .80$), $t = -1.98, p = .053, \beta = -.26$. This main effect was qualified by a marginally significant SATA x Club interaction, $t = -1.77, p = .084, \beta = -.40$. There was a significant positive relationship between SATA and Speech Errors in the ASD Club condition but no significant relationship between SATA and Speech Errors in the NT Club condition.

For Verbal Molar there was a marginally significant effect of club such that participants in the ASD Club condition ($M = .36, SD = 1.15$) displayed more positive overall verbal behavior during the interaction than participants in the NT condition ($M = -.30, SD = 1.47$), $t = -1.80, p = .078, \beta = -.24$.

There were no significant predictors for Extra Social Comments ($\alpha = .92$).

**Relations among Variables**

**Relations among Biases.** A multiple regression analysis was conducted to predict Feelings Thermometer scores from IAT, SATA, AQ, Preference, and Prior History. The analysis revealed that Preference was a significant predictor of Feelings Thermometer scores such that a greater preference towards autistic individuals versus neurotypical individuals predicted more favorable attitudes towards autistic individuals on the Feelings Thermometer, $t = 2.03, p = .048, \beta = .27$. Prior History with autistic individuals was also found to be a significant predictor of Feelings Thermometer scores such that participants with more prior contact with autistic individuals reported more positive perceptions of this population on the Feelings Thermometer, $t = 2.35, p = .023, \beta = .30$. The other variables were not significant predictors. Regression analyses
were also conducted to predict IAT and SATA scores from the same variables listed above, but no significant predictors of those measures were found.

**SIS Regression.** A regression analysis was conducted to predict SIS from SATA, IAT, and condition. On the first step SATA, IAT, and condition were added as independent variables. One the second step the interaction terms of mean centered SATA and mean centered IAT and dummy coded Behavior and Club were entered. There were no effects of IAT, Club, or interactions. However, there was an effect of SATA such that higher scores on the SATA predicted higher scores on SIS, $t = 2.28$, $p = .027$, $\beta = .29$. This suggests that more positive attitudes towards autistic individuals corresponds with more positive social perceptions of the confederate. There was also an effect of behavior, such that being in the ASD Behavior condition led to poorer social perceptions of the confederate than those in the NT Behavior condition, $t = 2.39$, $p = .020$, $\beta = .31$.

**Stroop Task Regression.** A regression analysis was conducted to predict Stroop Task Scores from SATA, IAT, MCPR, and condition. On the first step SATA, IAT, MCPR, and condition were added as independent variables. On the second step the interaction terms of mean centered SATA, mean centered IAT, and mean centered MCPR and dummy coded Behavior and Club were entered. There were no effects of SATA, IAT, Behavior, or interactions. However, Club was a marginally significant predictor of Stroop scores such that participants in the ASD Club condition ($M = 232.87$, $SD = 200.07$) performed more poorly on the Stroop task following the interaction compared to the NT Club condition ($M = 147.62$, $SD = 214.87$), $t = -1.72$, $p = .093$, $\beta = -.24$.

**Correlational Analyses.** A correlational analysis was performed between the measures of implicit biases, explicit biases, prior history with autistic individuals, and motivation to
control prejudice. Different measures of explicit bias, namely the SATA, Feelings Thermometer, and Preference rating were correlated with each other such that more favorable attitudes towards autistic individuals on one measure suggested more favorable attitudes towards autistic individuals on the other measures of explicit bias. Furthermore, the SATA was correlated with MCPR such that individuals who were more motivated to control their prejudices reported more favorable explicit attitudes towards autistic people on the SATA. The Feelings Thermometer was correlated with a participant’s prior history with autistic individuals such that individuals with more prior experience interacting with autistic people had more positive perceptions of autistic people. There was a marginal correlation between the IAT and the Feelings Thermometer such that greater implicit biases corresponded to less favorable attitudes towards autistic individuals on the Feelings Thermometer, but this was the only relationship between implicit and explicit measures of bias. A summary of these results can be found in Table 4.

Another correlational analysis looked at the relationships between implicit and explicit biases, perceptions of the confederate, and behaviors during the interaction. The SIS was significantly correlated with the measure of ASD traits in the confederate such that the more autistic traits the participant rated in the confederate, the lower the participant perceived the confederate’s social potential. The SATA and SIS scales were correlated in that the more favorable the participant’s explicit attitude towards autistic individuals, the higher the participant rated the confederate on social ability. The final significant correlation of this analysis was between the self-perceived behavior of the participant and the confederate’s perception of how the participant behaved, rated on the same scale: IDS. The more discriminatory behaviors the participant self-reported, the more discriminatory behaviors the confederate thought they demonstrated. See Table 5 for a summary.
Further analyses examined the relationship between Prior History, SIS, MCPR, and recognition of autistic traits in the confederate. This series of correlations found a significant positive correlation between SIS and MCPR such that individuals who perceived higher social abilities in the confederate were also more likely to control prejudiced reactions. See Table 6 for a summary.

Another correlation examined the relationship between participants self-rated autistic and social phobia tendencies, comparing them with the IDS scores of both the participant and the confederate. Although there were no significant correlations among the IDS scores and the AQ or SPAI-23, the AQ and SPAI-23 were significantly positively correlated with each other suggesting that more autistic traits corresponded with more social phobia traits. See Table 7 for a summary.

The next correlational analysis compared IDS scores with the ratings of non-verbal behavior. This analysis yielded significant negative correlations between IDS-P and ratings of Comfort, Eye Contact, and Arm Expressiveness, and a marginally significant negative correlation between IDS-P and Smiles. This indicates that the more discriminatory the participant self-rated their own behavior the less comfortable they seemed, the less eye contact they maintained, the less expressive their arms were, and the fewer times they smiled. Similarly, the IDS-C was significantly negatively correlated with Comfort, Eye Contact, Arm Expressiveness, and number of smiles, suggesting the same implications as for the IDS-P. It is also worth noting that there were significant relationships among many of the non-verbal behaviors. See Table 8 for a summary.

The final correlational analysis conducted for this study examined the relationship between IDS scores and the ratings of verbal behaviors. IDS-P and IDS-C were both
significantly negatively correlated with Extra Social Comments and Verbal Molar, such that the more discrimination the participant displayed as rated by themselves and the confederate, the fewer additional social comments the participant offered during the interaction and the overall poorer quality of verbal behaviors. See Table 9 for a summary.

**Discussion**

The current study sought to expand the literature around biases towards ASD individuals by furthering our understanding of the link between prejudice towards and social exclusion of this population. Participants were placed into a situation where they interacted with someone they thought was autistic, whether that suggestion was made by participation in a club to support autistic individuals, physical confederate behaviors, or both or neither in a control condition. Results indicated that the participants did indeed think that the person they interacted with was autistic in the experimental conditions, suggesting that the study successfully created a realistic encounter with an autistic individual, thus addressing the inconsistencies between self-report views of ASD and behaviors in a lifelike setting (Neville & White, 2011).

Participants in the ASD Behavior condition reported more negative social perceptions of the confederate and less of a desire to interact with them further compared to participants in the NT Behavior condition. This was consistent with the results of Sasson and colleagues’ (2016) study which reported that college students held less-favorable impressions about ASD students and were less willing to continue interacting with them. This is critical as it helps explain the social isolation facing many ASD students, which subsequently influences the higher rates of anxiety and depression in this population. The correlation between social perception and the perceived autistic traits in the confederate also aligns with the findings that the more ASD
characteristics an individual shows the more negatively they will be perceived (Howlin et al., 2004; Jobe & White, 2007; Mor & Berkson, 2003).

Interestingly, a regression analysis found that explicit bias was a significant predictor of social perception scores, regardless of what condition the participant was in. A more positive attitude towards ASD individuals as measured on the SATA predicted more positive social perceptions of the confederate, whether the participant thought they were interacting with an ASD student or not. Because social perceptions of the confederate and motivation to not appear prejudiced were correlated such that more motivation to control prejudice was associated with more positive social perceptions, it is possible that individuals who are more concerned with their appearances or are less biased are more likely to positively perceive their peers.

The first measure of behavior during the interaction involved the participant self-rating their own behavior. While there was a significant difference in how discriminatory the participant behaved across Club conditions, it was not in the direction hypothesized. Participants rated themselves as being more discriminatory in the NT Club condition than in the ASD Club condition. It is possible that the label of an ASD diagnosis could, rather than provoking a discriminatory response, instead prompt participants to behave in an overly positive way, regardless of biases they might hold against this population. There was also an interaction such that for the ASD Behavior condition the Club condition did not affect behavior, but for the NT Behavior condition the participants were more discriminatory in the NT Club condition than the ASD Club condition, further supporting the idea that an ASD label could elicit an overly positive reaction from the participants. There were no significant effects of condition on the confederate’s perception of the participant’s behavior. The confederate knew what Behavior condition the participant was assigned to but did not know what Club condition they had been assigned to and
thus did not know whether or not he had been labeled as having ASD. This supports the possibility that it may not just be the presence of a label but also the expectations around that label that shape behavior perception (Shifrer, 2013).

Unlike Dovidio and colleagues’ (1997) study, there was a high correlation between the participant’s self-perception of their behavior and the confederate’s perception of the participant’s behavior, suggesting that participants rated their own levels of discrimination similarly to how the confederate rated them. Additionally, in Dovidio and colleagues’ (1997) study the self-ratings of discriminatory behaviors were related to judges’ ratings of the participants’ verbal behaviors but not non-verbal behaviors during an interaction. However, in the present study scores of discrimination, both as reported by the participant and the confederate, were related to ratings of both verbal and non-verbal behaviors. This suggests an increased self-awareness of both types of behavior, going against the idea that non-verbal behaviors operate completely outside of awareness.

There were a few significant or marginally significant differences in the behaviors coded by the research assistants, in line with the hypothesis that participants assigned to the different conditions would treat the confederate differently. Autistic behavior impacted how often the participant smiled, fidgeted, and gestured during the interaction such that participants in the ASD Behavior condition smiled less and had less expressive arms, suggesting greater prejudice, but also fidgeted less, contrary to the hypothesis. Smiling and expressive arms are behavioral cues conveying positive emotions and attitudes, while fidgeting conveys negative emotions and attitudes (McConnell & Leibold, 2001). As prior research has reported that neurotypical peers have negative attitudes towards ASD students (e.g., Campbell et al., 2004; Dickter et al., 2017) or may be uncomfortable while interacting with ASD students (Adreon & Durocher, 2007), it
was hypothesized that participants in the ASD Behavior condition would exhibit fewer positive behaviors, like smiling, and more prejudiced behaviors, like fidgeting. While it was unexpected that participants fidgeted more when the confederate behaved neurotypically than when the confederate behaved in a way consistent with ASD, it is possible that some participants may have been uncomfortable because they were asked to interact with a stranger or because they knew they were being filmed and audio-recorded, which could have contributed to their increased fidgeting. It is still relevant that two of the three significant behavior differences were in the hypothesized direction, indicating overall greater prejudice in the ASD Behavior condition than in the NT Behavior condition.

An Autistic label impacted arm openness, the number of speech errors, and verbal molar behavior. Interestingly, the ASD label resulted in greater arm openness, suggesting less prejudice in the interaction. Participants in the ASD Club condition also received higher Verbal Molar scores, suggesting a higher quality overall verbal interaction. This is contrary to what was hypothesized based on previous research that found higher Verbal Molar scores when participants interacted with majority rather than minority group members (McConnell & Leibold, 2001). As discussed before, one explanation of this result might be that the ASD label may be prompting the participant to overcompensate and behave in an overly positive manner. A study looking at anti-gay prejudice found that participants paired with a gay target behaved more positively than participants paired with a straight target (Goh, 2017). The author suggests this is due to overcompensation in order to avoid being viewed as biased (Goh, 2017), which could explain the same effect occurring in the present study. Our hypothesis that there would be more prejudiced behaviors in the ASD condition was supported by the fact that there were more speech errors in the ASD Club condition compared to the NT Club condition. Two of the three
significant differences in behavior across Club conditions were in the non-hypothesized
direction, suggesting overall less prejudice in the ASD Club condition than in the NT Club
condition.

Regarding the bias measures, similar to Dickter and colleagues’ (2017) study, there was
an overall implicit bias against ASD individuals. Explicit biases varied based on the measure
being used. A Feelings Thermometer, which is a measure of emotional warmth towards a
population, yielded an overall warm attitude towards ASD individuals, while a rating of
preferences of neurotypical versus ASD individuals found that participants preferred
neurotypical individuals. It is possible that the variations in explicit biases found in the ASD
literature may be due to differences in how the questions are framed and what specific attitudinal
constructs each measures. For example, Campbell and colleagues (2004) used a cognitive
attitudes assessment and found that children rated their ASD classmates negatively, compared to
Mahoney (2007) who used a variety of explicit bias measures including scales of knowledge of
ASD, behavioral intentions, and a multidimensional attitudes assessment to conclude that people
have relatively positive perceptions of ASD individuals. Although the explicit measures of the
present study examined different constructs, the SATA, Feelings Thermometer, and Preference
scores were all still correlated with each other. A more favorable attitude on one measure was
related to more favorable attitudes on the other measures. This suggests that a participant’s
relative attitude towards ASD individuals remains consistent across different measures.

Consistent with the majority of the literature, there was a lack of associations between the
implicit and explicit measures of bias. The only marginally significant correlation was between
the IAT and Feelings Thermometer, where the greater implicit biases were associated with less
favorable ratings on the Feelings Thermometer. This supports the idea that explicit and implicit biases are separate constructs and need to be viewed independently.

There were not many interaction behaviors that were able to be predicted from biases in our study, and those that were able to be predicted from bias were often contrary to our hypotheses. For example, the number of times the participant fidgeted could be predicted by an interaction between IAT and Club condition but in the ASD Club condition, individuals with greater implicit bias fidgeted less than in the NT Club condition. This may be due to overall discomfort during the interaction or participants overcompensating for their biases in the ASD Club condition and thus acting more positively.

There were also several interaction behaviors which were only predicted by biases for the NT conditions. For example, the number of times the participant smiled could be predicted by an interaction between IAT and Club condition. There were no significant effects for the ASD Club condition, but in the NT Club condition individuals with greater implicit bias smiled less. Theoretically implicit biases against ASD individuals should not affect behavior unless the participant is interacting with an ASD individual. As previously stated, it is possible that individuals with less biases are simply friendlier and more prone to positively perceiving their peers.

It is worth noting that although there were only a few significant predictors of the behaviors, those that were significant involved implicit measures predicting non-verbal behaviors and explicit measures predicting verbal behaviors. This is consistent with the theory that implicit biases predict non-verbal behaviors outside of conscious control while explicit biases predict the more controllable verbal behaviors (Dovidio et al., 2002; Karpinski et al., 2005; McConnell & Leibold, 2001; Shelton et al., 2005). More research is needed before it can
be concluded that implicit biases predict non-verbal behaviors and explicit biases predict verbal behaviors directed towards ASD individuals, but this suggests that that might be true for this population.

Previous research conducted with racial minorities found that the amount of bias held by an individual can be used to predict their Stroop score following an interracial interaction (Richeson & Shelton, 2003); however, this result did not apply to ASD in the current study. It was also hypothesized that a greater motivation to control prejudice would deplete cognitive resources when interacting with an ASD individual, resulting in poorer Stroop task performance, but that hypothesis was also not supported in the present study. The only predictor of Stroop performance was Club, where individuals in the ASD Club condition performed marginally more poorly on Stroop than the NT Club condition. Given the previous discussion on labeling potentially leading students to behave more positively towards ASD peers regardless of their biases, it is possible that the students in the ASD Club condition were self-regulating and engaging in effortful positive behaviors that took a toll on their executive functioning.

The correlation between explicit bias and motivation to control prejudice is consistent with Fazio’s (1990) MODE theory of prejudice expression. Participants who were more motivated to control prejudice reported less explicit bias towards ASD individuals on the SATA, which, as a self-report measure, gave the participants sufficient opportunity (namely time) to consciously consider what they were reporting. There was not a significant relationship between the measure of implicit bias and motivation to control prejudice, which aligns with the MODE model as individuals were forced by time constraints to rely upon spontaneous processing, where motivation does not affect responses (Fazio, 1990). This exemplifies how social desirability bias,
being motivated to not seem prejudiced, affects the self-report measures of explicit bias but not the reaction-time tasks measuring implicit bias.

There was an association between the degree of warmth felt towards ASD individuals and prior history with ASD individuals, suggesting that individuals with more prior exposure to ASD people have more favorable opinions of this population. A meta-analysis by Pettigrew and Tropp (2008) found that intergroup contact reduces intergroup prejudice, and specific to ASD, research has found that explicit attitudes tend to be more positive when the participant has had more contact with ASD individuals (Mahoney, 2007; Gelbrar et al., 2014; Neville & White, 2011). Increasing contact between neurotypical and ASD students should be explored as a way to reduce prejudice towards this population.

Future research is needed to continue examining prejudice directed towards ASD individuals. Some limitations of the present study that should be addressed in future studies include a small sample size and a 50% participant drop-out rate. Although conducting the study in one session would have yielded a larger final sample size, we made the decision to conduct the study in two parts because prior research found that implicit and explicit measures of bias can influence behavior during an interaction (Dovidio et al., 2002; McConnell & Leibold, 2001). Another potential limitation was that, although the pilot test and manipulation check do imply that participants thought the confederate was an ASD student, the confederate was an actor and so the results may not be indicative of how participants would treat an actual ASD student. Finally, although the laboratory setting was necessary for maintaining internal validity, it was not necessarily a natural setting and the participants knew they were being recorded, which may have prompted them to act in a less prejudiced manner (Klein et al., 2004). Therefore, these
results may not generalize to the typical social and classroom settings where ASD students encounter their peers.

A college degree increases employability and lifetime earnings for all university students, including ASD students (Hart et al., 2010). Thus it is critical for ASD students to be successful in college, and the biggest barrier to that success, more so than cognitive abilities, is social difficulties (Levy & Perry, 2011). In the current study, neurotypical participants perceived less social ability in an ASD-behaving peer than a neurotypical one and were less likely to pursue further social interaction with them. These findings suggest that these outcomes may contribute to the social exclusion and subsequent challenges common for ASD students.

In most social scenarios peers are not informed that a student has a diagnosis of ASD, and so social judgments and treatment of that individual are often based on behavior alone. This implies that most ASD students do not have the protective factor of a label which seems to lead to less discrimination directed towards them, as indicated by the more positive self- and confederate-ratings of the participant’s behaviors towards the confederate in the ASD Club condition compared to the NT Club condition. Rather, by exhibiting ASD-consistent behaviors without the added benefit of a label, ASD students may be perceived negatively or even avoided by their peers, as was reported on the social implication measure of this study. Students who exhibit ASD behaviors may be the targets of prejudiced behavior, such as a lack of smiling by their peers. Additionally, the more ASD-consistent behaviors the ASD student engages in, the more negatively their neurotypical peers may perceive them. The fact that ASD-consistent behaviors frequently occur in the absence of a label likely contributes to the social ostracism of ASD students.
The implication of this study on peer treatment of ASD individuals extends beyond university students. Of ASD students who graduate college only about 24% find employment, primarily lower level jobs (Levy & Perry, 2011). ASD individuals may be cognitively capable of employment, but social and behavioral challenges, particularly during a job interview, may prevent them from being hired (Levy & Perry, 2011; VanBergeijk, Klin, & Volkmar, 2008). Examining the perceptions of ASD adults at all times of life, not just while at university, is important for improving the long-term outcomes for this population. By supplying further evidence that ASD individuals are negatively perceived by their peers, even just by displaying stereotypically autistic behaviors in the absence of a labeled diagnosis, this study provided insight into the type of judgments people make about ASD individuals. This study also supplied examples of how these judgments may relate to prejudiced behaviors directed towards ASD people, although additional research is needed to elucidate this association. Further research into prejudice towards ASD individuals will help develop plans to address this prejudice, ultimately improving the quality of life for ASD individuals.
References


Table 1

Descriptive Statistics of Different Measures

<table>
<thead>
<tr>
<th>Measure</th>
<th>M</th>
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<th>Minimum</th>
<th>Maximum</th>
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<td>22.06</td>
<td>30.00</td>
<td>100.00</td>
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<td>210.09</td>
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Table 2

*Means and Standard Deviations of Interaction Behaviors across Conditions*

<table>
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<th>Club M (SD)</th>
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<td>Neurotypical Condition</td>
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<td>-.01 (.78)</td>
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<td># of Extra Social Comments</td>
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<td>-.01 (.94)</td>
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<td>-.04 (.85)</td>
<td>.05 (1.02)</td>
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<td>Eye Contact</td>
<td>.03 (1.04)</td>
<td>-.04 (.83)</td>
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<td>Forward Body Lean</td>
<td>.10 (.94)</td>
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<td>Body Positioning</td>
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<td>Arm Openness</td>
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<td>Arm Expressiveness</td>
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<tr>
<td># of Smiles</td>
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<tr>
<td># of Fidgets</td>
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Table 3

Significant Effects of Condition on Interaction Behavior

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** $p < .01$
* $p < .05$
† $p < .10$
Table 4

*Correlations Between Measures of Bias, History, and Motivation to Control Prejudice*

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<td>.409**</td>
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<td>5. History</td>
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** p < .01
* p < .05
† p < .10
Table 5

*Correlations Between Measures of Bias, Perception of Confederate, and Discrimination*

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**p < .01
* p < .05
† p < .10
Table 6

*Correlations Between History, Perception of the Confederate, Motivation to Control Prejudice, and Stroop*

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** p < .01  
* p < .05  
† p < .10
Table 7

*Correlations Between Participants Autistic and Social Phobia Traits and Behavior*

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** $p < .01$

* $p < .05$

† $p < .10$
Table 8

*Correlations Between Ratings of Discrimination and Non-Verbal Behaviors*

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<td>Comfort Level</td>
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** p < .01  
* p < .05  
† p < .10
Table 9

*Correlations Between Ratings of Discrimination and Verbal Behaviors*

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<td>1. Interpersonal Discrimination- Participant</td>
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</tr>
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<td>2. Interpersonal Discrimination- Confederate</td>
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<td>3. # of Speech Errors</td>
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<td>.778**</td>
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** p < .01
* p < .05
† p < .10