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EXPLAINING THE EFFECTS OF VICARIOUS CONTACT

IN AN ENTERTAINMENT TELEVISION PROGRAM ABOUT AUTISM

A THESIS APPROVED FOR THE
DEPARTMENT OF COMMUNICATION

BY THE COMMITTEE CONSISTING OF

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Table of Contents

Acknowledgements iv

Abstract vii

Chapter One: Introduction 1

Chapter Two: Literature Review 5

Vicarious Intergroup Contact 5

Identification with Characters 9

Social Cognitive Theory 11

Chapter Three: Methods 16

Participants 16

Design and Procedure 16

Stimulus Material 17

Measures 20

Chapter Four: Results 23

Main Effects on Attitudes Toward Autistic Individuals 23

Model Testing 25

Chapter Five: Discussion 30

Limitations and Future Directions 33

Conclusion 36

References 38

Table 1. Means, Standard Deviations, and Bivariate Correlations between Variables 49

Figure 1. Mediation Model with Self-efficacy, Anxiety, and Prejudice as Sequential Mediators 27

Figure 2. Mediation Model with Perceived positive valence of Contact and Prejudice as Sequential Mediators 29

Appendix A 50

Appendix B 58

Abstract

This study is designed to further examine the mechanisms behind vicarious intergroup contact and the effect of exposure to a narrative about an autistic individual on reducing intergroup prejudice towards an autistic population. Based on the vicarious contact hypotheses (e.g., Mazziotta et al., 2011), social cognitive theory (Bandura, 1986), and narrative persuasion (e.g., Moyer-Gusé et al., 2017), three hypotheses are proposed that consider the role of identification, self-efficacy, intergroup anxiety, and perceived positive valence of contact in reducing intergroup prejudice towards autistic individuals and increasing willingness to engage in future contact with autistic individuals.

An online experiment was conducted using a video clip from a television program featuring interactions between an autistic character and non-autistic characters (experimental condition), and a clip from a TED talk on the topic of autism (control condition) as the stimuli to test the hypotheses. It was expected that the results from the experiment reveal that vicarious contact with an autistic character increases one's perceptions of self-efficacy, reduces intergroup prejudice towards autistic individuals, and increases willingness to engage in future contact with autistic individuals. The results, their implications, limitations, and future research directions were discussed in connection with the vicarious contact hypotheses, social cognitive theory, narrative persuasion, and the findings of previous literature.

Keywords: *vicarious contact, social cognitive theory, narrative persuasion, autism spectrum disorder, intergroup prejudice*

Chapter One: Introduction

Autism spectrum disorder refers to a range of neurodevelopmental disorders characterized by the lack of social interaction, verbal and non-verbal communication, which usually manifests during the first stage of life (Park et al., 2016). According to the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; 2013), which is a diagnosis guide created by the American Psychiatric Association, individuals with autism usually lack social and communication abilities, which may hamper their learning through social interaction with other individuals. Their insistence on behavioral repetition and sensory sensitivity may conflict with regular life routines. Until 2014, about 1 out of 59 8-year-old children were identified with autism in the United States (Centers for Disease Control and Prevention, 2018). Autism is reported to occur across all racial, ethnic, and socioeconomic groups, though it is four times more commonly found among boys than girls (CDC, n.d.a). Currently, no cure has been found for autism or for treating its core symptoms, although it is supported by research showing early intervention can greatly improve one's development (CDC, n.d.b).

Research has indicated that autistic individuals are often prejudged and discriminated against in society (Hinshaw & Stier, 2008). In a number of studies focusing on experience and support of autistic college students, autistic individuals were reported to be bullied and marginalized in universities (e.g., Connor, 2012; Jones et al., 2013; MacLeod & Green, 2009; MacLeod et al., 2013). Other studies on people around autistic individuals, including teachers and medical professional, suggest that some of them perceive autistic individuals as dangerous people (e.g., Nissenbaum et al., 2002; Pugliesi,

1987) for their characteristics such as poor social skills (Penn et al., 2000) and asocial behaviors (Gray, 1993). Phelan (2001) also suggests the lack of social skills could be one of the factors that prevents individuals with mental illness from receiving good care. As suggested by Hinshaw (2009), to reduce stigmatization of mental illness like autism, it takes the revision of legislation and policy, more realistic media portrayals, and further education for raising public awareness and advancing coping techniques for autism individuals who feel stigmatized.

Wakefield and his colleagues (1998) suggest that the measles, mumps, and rubella (MMR) vaccine may be the cause to autism symptoms in children (Rao & Andrade, 2011), and their assertions have led to the controversy about the safety and efficacy of vaccinations among the general public today, despite the article being retracted, and Wakefield investigated for ethical violations and scientific misrepresentation (Rao & Andrade, 2011). The incident drew a great amount of media attention as the controversy went viral, which in turn expanded public awareness of autism (McKeever, 2012).

While the increasing public attention on autism may have been considered a good sign to improve the situation for autistic individuals, scholars have been critical of the news coverage of autism, given that it often presents autism and autistic individuals in a negative light (e.g., Haller et al., 2010; Holton et al., 2014; Muhamad & Yang, 2017). Several studies have been done on news media framing of autism, and some point out how individuals with autism are often presented as inferior to the majority of those around them and portrayed as “defective” and “invalid” in society (Haller et al., 2010; Weeber, 1999). Others suggest there is a concerning number of stigmatizing cues found in the news coverage of autism that may create a threatening environment for autism and autistic

individuals (Holton et al., 2014). In addition, by examining whether media stories linking criminal behavior and autism may be associated with negative attitudes towards autistic individuals as compared to the effects of educational messages, news coverage of autism has been confirmed to have a great impact on perceptions of autism and autistic individuals (Brewer et al., 2017), which calls for exposure of autism with "proper contextualization and construction" to improves public understanding (Holton et al., 2014).

Fictional characters with clear autism tendency have been featured in entertainment media since the 1970s (Murray, 2006). Some scholars argue the portrayal of autism in movies and television programs tend to arouse pity or shame through these characters without the potential to expand public knowledge on autism (Draaisma, 2009; Holton, Farrell, & Fudge, 2014). However, there are also voices in academia that advocate for the film industry as a channel for raising consciousness among autism peers and non-autistic majority (Schwarz, 2010).

Despite criticism of the mass media's portrayal of autism as potentially creating and reinforcing negative stereotypes about individuals with autism, and also inaccurately depicting autism, films and television programs that feature autistic characters as the protagonists reduce the distance between public and autistic individuals by portraying characters with personalities and telling their stories in a language that their target audience can understand, which is consistent with one of Hinshaw's (2009) suggestions for overcoming the stigmatization associated with autism, by producing more realistic media portrayals with stories and disclosures that are "inspiring and humanizing"(p. 202). It is argued in this study that the media depiction of successful interactions between autistic

characters and those around them may influence the audience's perception of autistic individuals in a positive way.

Based on vicarious contact hypotheses (e.g., Mazziotta et al., 2011), social cognitive theory (Bandura, 1986), and narrative persuasion (e.g., Moyer-Gusé et al., 2017), this study aims to further examine the mechanisms behind vicarious intergroup contact and the effect of exposure to a narrative about an autistic individual on reducing intergroup prejudice towards the autistic population. In the following section, three hypotheses about the process that considers self-efficacy, outcome evaluation, and identification in reducing intergroup prejudice towards autistic individuals, along with an increasing willingness to engage in future contact with autistic individuals is proposed. In the experiment, vicarious contact was manipulated using a video clip based on two episodes from the entertainment television program *Atypical* as the stimulus to test the hypotheses.

Chapter Two: Literature Review

Vicarious Intergroup Contact

Intergroup contact theory proposes that prejudice can be reduced through contact between groups. According to Allport (1954), reduced prejudice will only result when certain conditions related to the intergroup contact are present. Specifically, there should be balanced status between the two groups, and the interactants are expected to cooperate on accomplishing common goals, with the support of authorities, law, or custom (i.e., there should be social network support of the intergroup contact). Since its inception, the theory has been applied to a great variety of intergroup contexts, such as sexual orientation (e.g., Reimer et al., 2017), interaction with the elderly (e.g., Abrams et al., 2006), and those with physical disabilities (e.g., Amsel & Fichten, 1988), mental disabilities (e.g., Walker & Scior, 2013), and mental illness (e.g., Yuker & Hurley, 1987), far beyond its original focus on racial and ethnic groups (Pettigrew & Tropp, 2006). According to Pettigrew & Tropp's meta-analysis of intergroup contact theory (2006), intergroup contact has been found to significantly reduce prejudice related to mental disability, despite much smaller average intergroup contact effects were produced, as compared to those on countering prejudice against sexual orientation, race, and elderly. Although the theory has been supported by a large number of studies, some suggest the contact itself may also produce negative effects, such as increasing intergroup anxiety, which may increase the likelihood of biased processing and evaluations (Stephan & Stephan, 1985).

The extended contact hypotheses, proposed by Wright and his colleagues (1997), suggest that observing the actions and attitudes of an ingroup member toward an outgroup

member (i.e., an indirect intergroup interaction) may reduce one's anxiety about the intergroup contacts. There are three major mechanisms behind extended contact effects: (a) the ingroup norms that consider intergroup relationships as salient; (b) observation of friendly interaction between an ingroup member and an outgroup member; and (c) inclusion of the outgroup member, who has friendly interactions with the self as an ingroup member. When there are no ingroup norms about interacting with the outgroup established, the positive intergroup interactions between an ingroup member and an outgroup member will serve as references, demonstrating positive attitudes toward the outgroup and ingroup norms that tolerate intergroup contacts (Kohn & Williams, 1956). Friendly behaviors of the outgroup will also need to be observed by the observer, which serves as another source of information, this time for the salience of intergroup relationships in outgroup norms. The extended contact hypotheses also introduced the inclusion of other in the self to the process of intergroup contact for the first time. It is theorized that in one's conception of the world, the ingroup is included as part of the self, while the outgroup is not. This enables individuals, to a certain extent, feel empathy for people whom they consider ingroup members or share other people's pride in their success. Since outgroup members are not included, they received none of the advantages. However, when one observes an ingroup member engaging in a intergroup contact with an outgroup member, inclusion of the self extends to the outgroup member and even the outgroup as a whole, since the perceived intergroup indicates the outgroup member is part of the self of the ingroup member, in addition to the inclusion of the ingroup member in the self of the observer. In this case, the outgroup member and even the outgroup become part of the observer's self (Wright et al., 1997).

Zhou and her colleagues (2018) conducted a meta-analysis on extended contact hypotheses, in which they distinguished perceived and actual extended contacts as two subcategories of extended contact. In perceived extended contact, an observer may underestimate or overestimate the extended contact they observe, as they may have cross-group friends that they do not know, and they may also mistake ingroup and outgroup members as friends even when they are not. In actual extended contact, however, the observations are more accurate.

In relation to the context of our study, Walker & Scior (2013) assessed the impact of brief indirect contact interventions on lay people's attitudes toward the inclusion of intellectual disabled individuals, social distance, and positive behavioral intentions toward intellectual disabled population. The length of effect is also measured with interventions being effective in the short term and partially maintained for one month. Their results indicate that indirect contact intervention is a predictor of public stigma related to intellectual disability, though it remains uncertain if indirect contact intervention can influence people's behavioral intentions.

Extended contact has been distinguished and classified into two categories in the later literature: Extended contact and vicarious contact (Dovidio, Eller, & Hewstone, 2011; Vezzali et al., 2014). While extended contact suggests individuals learn directly about a friendship between an ingroup member and an outgroup member, vicarious contact involves observing interactions between ingroup members and outgroup members from a distance. Vicarious contact studies integrate the extended contact hypothesis and principles from social learning theory (Bandura, 1977a), which asserts that observing the behaviors of another individual, especially someone with whom they identify, can have impacts on one's

attitudes about how one should behave and/or expand one's knowledge and skills of how one can behave.

Vicarious contact, developing by a collective of scholars throughout the past decade, is suggested to share the effect of reducing the intergroup prejudice as well as the three mechanisms of the extended contact hypotheses, though the principles should be considered in a vicarious context (e.g., Ortiz & Harwood, 2007; Mazziotta et al., 2011). First, perceived intergroup contact should be positive and fruitful (Allport, 1954; Wright et al., 1997). Second, there should be some perceived connection between the observer and the observed ingroup member, and the actions of the ingroup member should be perceived as self-relevant to the observer (Wright, Aron, & Brody, 2008). Third, group memberships should be considered salient to the observer, and the ingroup members and outgroup members should be good representatives for their respective groups (Wright et al., 2008). Research has shown that vicarious contact with the depiction of positive interaction can reduce intergroup anxiety, improve attitudes toward the outgroup, and increase willingness to engage in future intergroup contact (Mazziotta et al., 2011; Ortiz & Harwood, 2007). A study on the effects of negative intergroup interactions, on the other hand, suggests when observing such interactions, people who find greater identification with ingroup members tend to have less positive attitudes toward the outgroup (Joyce & Harwood, 2014).

So far, only several studies have used dramatic portrayals in mass media as intergroup contact intervention to reduce intergroup prejudice. For example, Lienemann and Stopp (2013) addressed the relationships between intergroup contact via media portrayals of interracial couples and one’s attitudes toward interracial relationships and racial outgroups. They argue that vicarious contact through media portrayals can have the

same effect on improving attitudes as direct contact and other forms of indirect contact, indicated by research on celebrities (Brown et al., 2003; Fraser & Brown, 2002), as we process the information about vicarious contact in media the same way as we did in direct interpersonal contact (Schiappa et al., 2005).

In sum, based on the previous literature applying the vicarious contact hypothesis, vicarious contact with an outgroup character should be able to reduce intergroup prejudice against the outgroup and increase willingness to engage in future intergroup contact. Therefore, it is proposed that:

> H1a: Exposure to a television program depicting positive interactions between autistic and non-autistic characters will be associated with less prejudice toward autistic individuals, as compared to a control video that does not depict this intergroup interaction.
>
> H1b: Exposure to a television program depicting positive interactions between autistic and non-autistic characters will be associated with greater willingness to engage in future contact with autistic individuals, as compared to a control video that does not depict this intergroup interaction.

Identification with Characters

Identification refers to the process of taking on the role of a character in a narrative (Moyer-Gusé et al., 2017). When identifying with a character, audience members tend to imagine themselves being that character and may replace or interject their own identity into the role of the character in the narrative (Cohen, 2001). There are four dimensions that help measure identification: (a) empathy (sharing the feeling of the character), (b) perspective-

sharing, (c) motivation-sharing, and (d) absorption (the degree to which one's self-awareness is lost during the exposure; Cohen, 2001). Moyer-Gusé and her colleagues (2018) noted that the notion of identification is different from identity, often used in literature on group identity. In social identity theory (Tajfel & Turner, 1979), identity comes from one's sense of who they are and the group(s) to which they belong. Identification, unlike identity, refers to the process of temporarily taking on another individual's identity and experiencing a narrative as the said individual.

Identification has been examined in narrative persuasion theories such as the extended elaboration likelihood model (E-ELM; Slater & Rouner, 2002), and the entertainment overcoming resistance model (EORM; Moyer-Gusé, 2008), as it is one of the essential features in a narrative. E-ELM includes identification with characters as one of the two major components of narrative engagement, in support of the main assumption of model that when viewers are engaged in the narrative of an entertainment program, they are less likely to scrutinize the messages underneath, which means they are less likely to come up with counterargument for these messages. Their attitudes and behaviors are thus more likely to be influenced (Slater & Rouner, 2002). EORM predicts that identification and perceived similarity with a vulnerable character will be associated with the increase of one's perceived vulnerability (Moyer-Gusé, 2008).

Previous studies uncovered that when individuals identify themselves with an ingroup character who successfully interact with characters whom they consider outgroup members, they tend to have more favorable attitudes toward the outgroup (Joyce & Harwood, 2014; Moyer-Gusé et al., 2018; Ortiz & Harwood, 2007). Moreover, Ortiz and Harwood (2007) found identification with a heterosexual character interacting with

homosexual characters in a television sitcom was associated with less intergroup anxiety. Moyer-Gusé and her colleagues (2018) also found identification with an ingroup character was associated with less intergroup anxiety and less prejudice against Muslims with self-efficacy as a mediator (self-efficacy will be discussed with detail in the next section).

Social Cognitive Theory

Social cognitive theory was developed by Albert Bandura, as an extension of social learning theory. It is theorized that any type of social behavior can be learned by observing others' behavior (Bandura, 1977b), and this observational learning process includes four parts: Attention, retention, production, and motivation. Attention suggests that observers pay attention to certain social behaviors, depending on certain values of the behaviors or observers' personal factors. Retention indicates that after the observation of a behavior and succeeding events, observers turn the said observation into a symbol for future reperformance. Production refers to the stage where the symbol turns into the observers' own behavior. As observers reproduce the behavior, they receive feedback from others. The last stage, motivation, is the most important part of the process, suggesting that people do not simply adopt every behavior they learn (Bandura, 1986). Many studies employing social cognitive theory take the motivational process as the focus (for example, Moyer-Gusé & Nabi, 2010; Schwarzer, 2001), indicating that this stage may determine whether observers adopt the behavior or not.

The theory has been commonly applied to the domain of mass media-mediated persuasion (e.g., Bandura, 1986; Branscum et al., 2013; Mazziotta et al., 2011). For example, Wright and Silberman (2018) applied social cognitive theory to study the

relationships between media exposure to dangerous driving behaviors, perception of driving risk, and driving behaviors. Specifically, they studied how individuals' perception of driving risk and driving behaviors changed after they were exposed to dangerous driving behavior in mass media. Social cognitive theory was employed, as the theory further explains when people are observing the behavior, they are more likely to familiarize themselves with people of the same sex as themselves (Bandura, 1986), so if the person who observes the dangerous driving behavior is male, and the person who was portrayed in media and was either rewarded or unpunished because of their dangerous driving behaviors, the observer is most likely to adopt the dangerous driving behaviors. This also indicates the role of identification in the social learning process theorized in social cognitive theory.

Two factors, self-efficacy and outcome evaluation, are believed to have great impacts on one's motivation. Self-efficacy is defined as the extent to which people believe they can perform a given behavior. Bandura (1989a) stated that perceived self-efficacy has significant influences one's motivation. One's judgment on self-efficacy relies on four sources of information: Performance accomplishing experience, vicarious experience for judging one's ability in comparison with other's performance, verbal persuasion, and the social influences that correspond, and the state of physiological arousal in which people partly evaluate their ability, strength, and vulnerability (Bandura, 1989b).

Literature on vicarious contact found that there is a connection between identification with characters and self-efficacy regarding the potential uncomfortable interpersonal interactions (Moyer-Gusé et al., 2011; Moyer-Gusé et al., 2017). More specifically, individuals' self-efficacy to make friends with an outgroup member can be

influenced by their media exposure to television content regarding cross-group friendship (Ortiz & Harwood, 2007). If the participants who identified themselves as White watch television content about the friendship between a White person and a Black person, they are likely to perceive higher self-efficacy to initiate cross-group friendships with black people. Also, by observing the interactions, they may have more positive outcome evaluation regarding the cross-group friendship if they observe more positive consequences of the intergroup interactions (Ortiz & Harwood, 2007).

Intergroup anxiety, along with intergroup contact avoidance, was suggested to be the result of uncertainty about one's skills and ability to navigate without prejudice in intergroup interactions (Plant et al., 2008; Plant & Butz, 2016; Plant & Devine, 2016). Individuals can only become more confident about their own capability to engage in intergroup contact, when they are past successful experience of the others to draw upon, according to the assumption of social cognitive theory (Bandura, 1986), which suggest it takes exposure to positive intergroup contact to reduce one's anxiety toward intergroup contact in the future. Stephan and Stephan (1985) suggest that anxiety leads to biased processing of information when intergroup interactions occur, which worsens one's attitudes towards the outgroup or stops one's intergroup attitudes from improving. Moreover, Moyer-Gusé and her colleagues have found that identification in a narrative depicting positive intergroup contact led to greater self-efficacy toward intergroup contact, which predicted significantly less anxiety about future interactions with the outgroup, less prejudice toward the outgroup, and greater willingness to participate in contact (2018).

Based on the extant literature on identification with characters, self-efficacy, and intergroup anxiety, it is proposed that:

H2: Identification with characters engaging in positive interactions between themselves and autistic individuals will be associated with greater self-efficacy regarding intergroup interactions with autistic individuals, which will predict less intergroup anxiety, prejudice toward autistic individuals, and greater willingness to engage in future contact with autistic individuals.

As indicated by extant studies, social cognitive theory may contribute to further uncovering processes behind vicarious intergroup contact (Mazziotta et al., 2011; Vezzali et al., 2014). The perceived positive valence of intergroup contact is believed to be important since the intergroup contact has to be perceived as positive and fruitful for the effects to take place (Mazziotta et al., 2011). In social cognitive theory, outcome evaluation is conceptualized as one's judgment about the anticipated consequences associated with enactment of a given behavior. According to Bandura (1989a), people decide their own actions partly by observing consequences, and the positive and negative consequences they produced for themselves also influence their own motivations and behaviors. It is believed that people are unlikely to adopt a behavior if it results in less positive effects (Bandura, 2001), and that people tend to observe and imitate the behaviors of appealing and/or similar models (Bandura, 1986; Moyer-Gusé et al., 2018). In other words, there is the potential for exposure to the positive interactions between characters with whom viewers are likely to identify and outgroup members to motivate positive outcome evaluation in the ways that they perceive the relationships as positive and successful. If people perceive an intergroup relationship as positive and goal-fulfilling, they are more likely to imitate the intergroup interaction. Therefore, it is proposed that:

H3: Identification with characters engaging in positive interactions between other characters and autistic individuals will be associated with positive perceived positive valence of intergroup contact, which will predict less prejudice toward autistic individuals and greater willingness for future contact with autistic individuals.

Two serial mediation models were created based on the above constructs and the last two hypotheses proposed in the current study. The purpose of the models is to examine the role of these elements in reducing intergroup prejudice and increase willingness to future intergroup contact in a narrative context. These models may help contribute further understanding of the mechanisms behind vicarious contact effects.

Chapter Three: Methods

Participants

In this study, a total number of 157 participants was recruited to participate in an anonymous online experiment. All participants were recruited through Amazon.com's Mechanical Turk (MTurk), an online crowdsourcing marketplace where individuals perform on-demand tasks for small amounts of reward. Their age ranged from 18 to 30 years old (M = 24.34, SD = 2.09), and 57.3% of the participants identified that they are male (n = 90) and 41.4% female (n = 65). Upon completing the study, each participant was awarded $1.30. Approximately 51% of the participants indicated that they were White, 25.5% Asian/Pacific Islander, 9.6% Hispanic or Latino, 8.3% Black or African American, 0.6% Native American or American Indian, and 3.8% other. Approximately 17.2% of the participants (n = 27) indicated they have been diagnosed as having Autism Spectrum Disorder. A total number of 44 participants were excluded from analyses because they failed to complete the study or correctly respond to at least one of the four attention check questions, leaving a total number of 113 cases.

Design and Procedure

The current study used a between-participant experimental design. Participants were instructed to access an online survey on Qualtrics. At the beginning of the online experiment, participants completed a pretest questionnaire regarding their demographic information, medical history related to autism, self-efficacy regarding future contact with autistic individuals, intergroup anxiety, prejudice against autistic individuals, and willingness for future contact with autistic individuals. After the pretest questionnaire,

participants were randomly assigned to either the experimental or the control condition, where they were asked to view a short video online. Participants in the experimental condition (n = 60) watched a series of video clips from the television program *Atypical*, whereas participants in the control condition (n = 53) watched a TED Talk video *Autism—what we know (and what we don't know yet)* (Chung, 2014). After viewing the videos, only participants in the experimental condition were asked to respond to several questions regarding identification with ingroup characters and perceived positive valence of intergroup contact. Participants in both conditions were asked to complete the posttest questionnaire about their self-efficacy regarding future contact with autistic individuals, intergroup anxiety, prejudice toward autistic individuals, and willingness for future contact with autistic individuals.

Stimulus Material

Participants were randomly assigned to view one of the two stimulus materials. The entertainment television program *Atypical* was selected as the stimuli material for the experimental condition, as the storylines focus on interactions between the protagonist and his family, friends, and also community members like his schoolmates and neighbors, which are more likely to happen in the lives of the show's target audience. This characteristic enables us to measure the level of identification with the ingroup characters, which is an independent variable we are unable to control. Hence, young adults between 18 and 30 years of age, the target audience group of the show, were selected as the participants for the study. A video clip (15:34 minute long) was created based on episodes "Pants on Fire" and "In the Dragon's Lair" from Season 2 of the program. In the video clip, an

autistic teenage boy, Sam, asks his friend Zahid to teach him how to lie. Sam practices by telling lies to his ex-girlfriend Paige, and she accidentally injures her fingertip with a paper guillotine. Sam manages to lie to prevent Zahid from getting fired by their boss. Paige forgives Sam after he buys a stylus for her phone since her fingertip is injured, and she asks Sam to watch for her during the school's lock-in as she is a sleepwalker. Sam has dinner with Zahid's family and stays overnight to practice for the lock-in. Sam is having trouble sleeping in Zahid's room in the middle of the night, so he goes out and wanders the streets. Sam then gets into trouble with a police officer as he does not stop when the police officer pulls over near him. Zahid shows up and explains that Sam is autistic, but the policeman does not listen and takes them into the police station. Zahid helps Sam cope with the situation and tells him about his dream to become a nurse. Sam and Zahid are released from the station, though the police officer refuses to apologize for his actions. The two then go back to their own homes, and the video clip ends with Zahid browsing the webpage of a nursing school before he goes to bed. The video clip consists of the interactions with positive outcomes between the autistic protagonist and his friends. While at least two scenes in the video clip inform viewers of the protagonist's autistic characteristics that sometimes trigger unexpected situations, and the interaction between him and the police officer depicts the tensions that autistic individuals are facing, two non-autistic characters, Zahid and Paige were portrayed as benefiting from the interactions with the autistic protagonist.

The TED Talk video *Autism—what we know (and what we don't know yet)*, featuring geneticist Wendy Chung (2014), explains what has been uncovered about autism spectrum disorder through studies and clinical treatments. The speaker gives a speech to her

audience about the nature of autism, the cause of autism, and how scientists are going to intervene from a genetic perspective. A complete transcript of the video can be found in Appendix A at the end of the paper. The video (15:34 minute long) was selected to be the stimulus for the control condition, as no interaction between autistic and non-autistic individuals was present in the video while participants in the control condition were exposed to an autism-related content to maintain the flow of the experiment.

Previous studies on extended or vicarious contacts differ in terms of how they manipulate participants' exposure to intergroup contact. For example, Moyer-Gusé and her colleagues (2018) manipulate the exposure to intergroup contact by exposing their participants in the experimental condition to the episode of a documentary-style series about interracial interactions, while another episode about minimal living from the same television series was shown in the control condition. Mazziotta and his colleagues (2011) use the same video as their stimulus in both the experimental and control conditions, except the outgroup characters were replaced by the ingroup characters in the video for the control condition. Exposure has also been manipulated by not assigning a stimulus to the control group at all before both pretest and posttest, as compared to exposing the experimental group to the intergroup contact between the two tests (Cadenas et al., 2016). All three approaches involve certain levels of threat to internal validity, as the differences between their experimental and control conditions may not be limited to what the researchers intended. However, it is also important to note that narratives, in the form of entertainment programs, are intricate to work with when such materials are used to create stimuli with designated differences between conditions. In the current study, we chose to limit the

unintended differences between stimuli by asking participants in both conditions to watch videos of the same length and related to the same general topic (i.e., autism).

Measures

Identification. Identification was measured using 5 items, adapted from Cohen's (2001) identification scale. Sample items include "While viewing the program, I forgot myself and was fully absorbed" and "I think I have a good understanding of at least some of the non-autistic characters" (all items were reversed coded; 1 = *strongly agree*, 7 = *strongly disagree*). Participants were asked about the extent to which they were absorbed into the story and/or identify themselves with the characters portrayed. The first item on the scale was excluded from the analyses to improve the reliability of the identification scale (experimental condition only: $M = 5.67$, $SD = .87$, $\alpha = .77$).

Self-efficacy. Three items were designed to measure participants' confidence in their ability to engage in future contact with individuals with autism. Participants were asked to indicate their agreement or disagreement with different statements (e.g., "I am confident in my ability to have positive interactions, develop positive relationships, and befriend people with autism" on a 1 to 7 scale (1 = strongly disagree, 7 = strongly agree; pretest: $M = 5.67$, $SD = 1.08$, $\alpha = .93$; posttest: $M = 5.78$, $SD = 1.05$, $\alpha = .91$).

Intergroup anxiety. Intergroup anxiety was measured using six items adapted from Stephan and Stephan's (1985) intergroup anxiety scale. Participants indicate the extent to which they feel awkward, anxious, irritated, relaxed (reversed coded), comfortable (reversed coded), and careful (reversed coded) when they interact with autistic individuals

(1 = *extremely unlikely*, 7 = *extremely likely*; pretest: M = 4.46, SD = .74, α = .74; posttest: M = 4.42, SD = .76, α = .76).

Perceived positive valence of contact. Perceived positive valence of contact was measured using three items assessed on seven-point scales (all items were reversed scored in the questionnaire with higher values reflecting lower positive valence of contact perceived by the participants). Participants indicate to what extent they believe the interactions are successful, to what extent they believe the characters accomplish shared goal(s) together, and to what extent they believe the characters share a positive relationship (experimental condition only: M = 5.61, SD = 1.05, α = .81).

Prejudice against autistic individuals. Prejudice against autistic individuals was measured using 6 items, adapted from Modern and Classical Prejudices Scale (Akrami et al., 2006), on a seven-point scale with higher values indicating greater prejudice. Participants were to indicate the extent to which they agree with the statements, such as "Most people with autism are no longer victims of discrimination," and "People with autism get too little attention in the media." Item 4 and 6 were reversed coded (pretest: M = 3.08, SD = 1.09, α = .71; posttest: M = 3.03, SD = 1.12, α = .75).

Willingness for future contact. Willingness for future contact with autistic individuals was measured using five items on seven-point scales, adapted from Esses and Dovidio's (2002) scale. Participants were asked to indicate their willingness to engage in a range of contact behaviors with autistic individuals if given the opportunity (all items were reversed coded; 1 = *extremely likely*, 7 = *extremely unlikely*; pretest: M = 5.04, SD = 1.50, α = .89; posttest: M = 5.33, SD = 1.23, α = .85).

Measures for Covariates

Medical history related to Autism Spectrum Disorder. Participants were asked to indicate whether or not they have been diagnosed as having an Autism Spectrum Disorder before their participation in the study. This was measured with a yes (= 1) or no (= 0) response to the item "Have you ever been diagnosed as having an Autism Spectrum Disorder?" The mean for this item was .18 (*SD* = .38).

Total duration of time spent completing the survey. Total duration of time spent by each participant to complete the survey was measured using Qualtrics. This variable was coded in minutes (*M* = 21.60; *SD* = 4.36).

Chapter Four: Results

As stated above, participants were asked if they have ever been diagnosed as having Autism Spectrum Disorder, and in approximately 17.7% of the qualified cases, participants indicated that they have been diagnosed as autistic (n = 20). Since autistic individuals display a board range of symptoms with diverse levels of severity (CDC, n.d.c), and whether autistic individuals in real life perceived the autistic character with the symptoms portrayed in the program as an ingroup member remains unknown, these participants were not excluded from the analyses. Instead, medical history related to autism was included as a covariate variable for each of the following analyses. Total duration of time spent completing the survey was also included as a covariate variable. See Table 1 for means, standard deviations, and bivariate correlation between all key variables.

Main Effects on Attitudes Toward Autistic Individuals

Before the data analysis, we also compared the frequency distributions across experimental and control conditions in terms of people that have a medical history related to autism. There are 15% of participants in the experimental condition reporting that they have been diagnosed as having autism before (n = 9), and 20.8% in the control condition (n = 11). Results of a chi-square test indicate medical history related to autism was not significantly associated with exposure ($\chi_2(1) = .64$, $p = .42$). This ensures the two conditions did not differ significantly in terms of medical history related to autism.

H1a predicted exposure to the program depicting a positive intergroup interaction between an autistic and non-autistic character would lead participants to report less prejudice toward autistic individuals, as compared to the control condition where

participants were not exposed to such intergroup interactions. First, results of a T-test indicate that participants who were exposed to the program depicting positive intergroup interactions did not report less prejudice toward autistic individuals (M = 3.05; SE = .14) than did those in the control condition (M = 3.00; SE = .16). This difference, .05, BCa 95% CI = -.38 to .45, was not significant; it represented an effect of d = .33. We then conducted an ANCOVA test, and results shows the effect of exposure to the program depicting positive intergroup interactions on prejudice toward autistic individuals was not significant after controlling for the effect of autism-related medical history as well as total duration of time spent completing the survey, $F(1,109) = .30$, $p = .58$, partial $\eta^2 = .003$. The covariate, autism-related medical history, was significantly related to the participants' prejudice against autistic individuals, $F(1,109) = 16.74$, $p < .001$, partial $\eta^2 = .12$.

H1b predicted that exposure to the program depicting a positive intergroup interaction between an autistic and non-autistic character would lead participants to report greater willingness to engage in future contact with autistic individuals, as compared to the control condition where participants were not exposed to such intergroup interactions. Results of a T-test indicate that participants who were exposed to a positive valenced intergroup interaction between autistic and non-autistic characters did not report increased willingness to engage in future contact with autistic individuals (M = 5.42; SD = .15) than did those in the control condition (M = 5.22; SD = .18). This difference, .20, BCa 95% CI = -.25 to .66, was also not significant; it represented an effect of d = 1.21. Results of an ANCOVA show that the effect of exposure to the program depicting positive intergroup interactions on willingness to engage in future contact with autistic individuals was not significant, after controlling for the effect of autism-related medical history as well as total

duration of time spent completing the survey, $F(1,109) = .59$, $p = .45$, partial $\eta^2 = .01$. Thus, the relationship predicted in H1 was not supported.

Model Testing

Model testing was conducted for the experimental condition only (n = 60) since H2 and H3 focus on the process in which exposure to the interaction influenced prejudice toward autistic individuals and participants' willingness to future contact with autistic individuals. The analysis of the serial mediation model in H2 was conducted using Haye's PROCESS macro (Model 6; Hayes, 2013). Paths in the model are illustrated in Figure 1 with corresponding coefficients. The total effect of identification with ingroup characters on participants' willingness to future contact with autistic individuals was significant ($\beta = .42$, $t = 2.74$, $p < .01$). The total direct effect of identification with ingroup characters on participants' willingness to future contact with autistic individuals, removing the effect of the mediators, was not significant ($\beta = .23$, $t = 1.31$, $p = .20$). The total indirect effect of identification with non-autistic characters on willingness to engage in future contact, which is the sum of specific indirect effects, was not significant with a point estimate of .20 (95% CI = -.0479 to .4689). Results of the mediation analysis were not significant, as the specific indirect effect of identification with ingroup characters on participants' willingness to future contact with autistic individuals via self-efficacy, intergroup anxiety, and prejudice against autistic individuals was not significant with a point estimate of .01 (95% CI = -.0135 to .0520). However, the specific indirect effect of identification with non-autistic characters on willingness to engage in future contact via self-efficacy was significant with a point estimate of .16 (95% CI = .0137 to .3636), which suggests H2 is partially supported

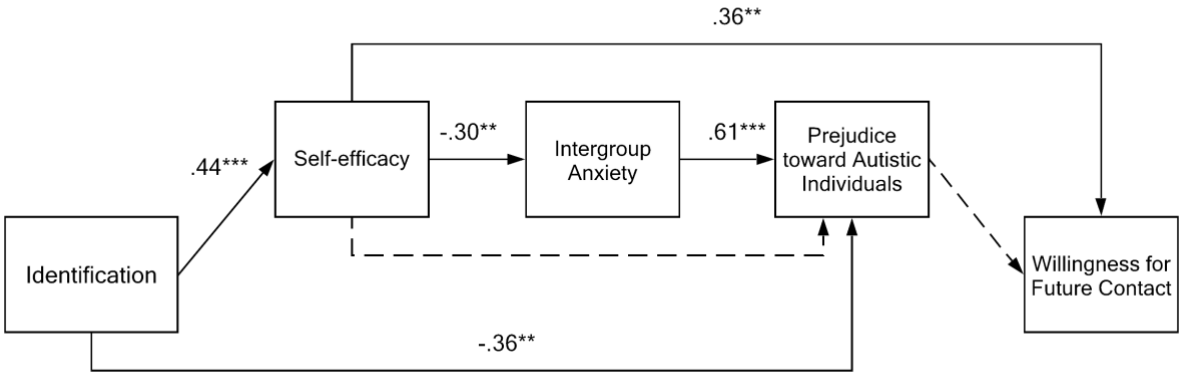
apart from intergroup anxiety and prejudice against autistic individuals as mediator variables.

Most of the specific direct effects were found to be significant. As H2 hypothesized, identification with the ingroup character was associated with greater perceptions of self-efficacy to interact with autistic individuals (β = .44, t(56) = 3.50, p < .001), which means the greater participants identified with the non-autistic character in the intergroup interaction, the more they felt confident in their abilities to interact with autistic individuals. Also as predicted, the effect of self-efficacy on intergroup anxiety about interacting with autistic individuals was significant (β = -.30, t(55) = -2.97, p < .01), indicating participants who felt more confident with their ability to engage in interactions with autistic individuals had less anxiety toward future contact with autistic individuals. The effect of anxiety about future interactions was positively associated with prejudice against autistic individuals (β = .61, t(54)= 4.09, p < .001), which means participants who felt less anxious about engaging in future interactions with autistic individuals held less prejudice against autistic individuals. However, prejudice against autistic individuals did not predict participants' contact willingness to interact with autistic individuals (β = -.14, t(53)= -.99, p = .33). Although not hypothesized, identification with non-autistic characters is associated with less prejudice against autistic individuals (β = -.36, t(54)= -2.83, p < .01), and self-efficacy is associated with greater willingness to engage in future contact with autistic individuals (β = .36, t(53)= 2.81, p < .01), which suggests identification and self-efficacy might play parts in the process that are more critical than we formerly predicted. The covariate, medical history related to autism, was a significant predictor of prejudice toward autistic individuals (β = .72, t(54)= 3.49, p < .001); the other covariate, total duration of time spent completing

the survey, predicted less prejudice toward autistic individuals (β = .09, t(54)= 2.34, p < .05) and greater willingness to engage in future contact with autistic individuals (β = -.09, t(53)= -2.51, p < .05).

Figure 1

Mediation Model with Self-efficacy, Anxiety, and Prejudice as Sequential Mediators.



Note. All significant paths in the model are included. *p < .05, **p < .01, **p < .001.

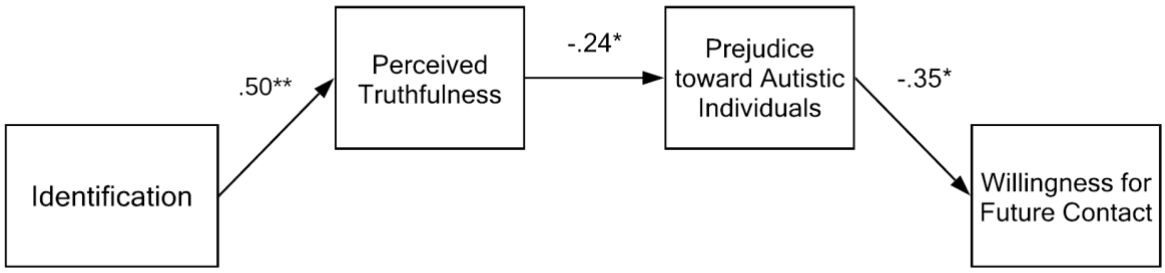
The serial mediation model in H3, illustrated in Figure 2 with corresponding coefficients, was also tested with PROCESS macro (Model 6; Hayes, 2013). The total effect of identification with non-autistic characters on willingness to engage in future contact with autistic individuals was significant (β = .42, t = 2.74, p < .01). The total direct effect of identification on willingness, removing the effect of mediators, was not significant (β = .23, t = 1.28, p = .21). The total indirect effect of identification with non-autistic characters on willingness to engage in future contact with autistic individuals was significant with a point estimate of .20 (95% CI = .0032 to .4548). The specific indirect effect of identification with non-autistic characters on willingness to engage in future contact with autistic individuals via perceived positive valence of contact and prejudice

against autistic individuals was not significant with a point estimate of .04 (95% CI = -.0056 to .1064), which does not support H3.

All of the specific direct effects in this model were found to be significant. Identification with non-autistic characters significantly predicted greater perceptions of self-efficacy toward future contact with autistic individuals (β = .50, t(56)= 3.43, p < .01), which suggests the greater participants identified with the non-autistic characters in the intergroup interaction, the greater positive valence of the contact they perceived between non-autistic and autistic characters. The effect of perceived positive valence of contact on level of prejudice against autistic individuals was also significant (β = -.24, t(55)= -2.19, p < .05), indicating participants who perceived greater positive valence of the interactions between non-autistic and autistic characters held less prejudice against autistic individuals. Also as hypothesized, prejudice against autistic individuals negatively predicted willingness to engage in future contact with autistic individuals (β = -.35, t(54)= -2.14, p < .05), which means participants who held less prejudice against autistic individuals were more willing to interact with autistic individuals in the future. The covariate, medical history related to autism, negatively predicted prejudice against autistic individuals (β = -.76, t(55)= 2.89, p < .01).

Figure 2

Mediation Model with Perceived Positive Valence of Contact and Prejudice as Sequential Mediators.



Note. All significant paths in the model are included. *$p < .05$, **$p < .01$.

Chapter Five: Discussion

The current study tested the influence of exposure to a narrative about an autistic individual on increasing willingness to engage in future contact with autistic individuals. By integrating the vicarious contact hypotheses, social cognitive theory, and narrative persuasion, the goals of this study were to further examine mechanisms of the vicarious contact hypotheses within entertainment context, and to examine the effects of vicarious contact on interactions between autistic individuals and other people that are outside of the interracial contact, which has been the predominant research focus.

In this study, it was predicted that exposure to a television program depicting positive interactions between autistic individuals and other characters will lead to less prejudice toward autistic individuals and greater willingness to engage in future contact with autistic individuals. The hypothesis itself was based on the major assumption of vicarious contact hypothesis, which asserts observing intergroup contact between an ingroup member and an outgroup member will improve one's attitude toward the outgroup (Mazziotta et al., 2011). The current study sought to test the main effect of vicarious contact within the context of interacting with autistic individuals. However, we did not find support for the advantage of a narrative depicting a positive intergroup interaction between autistic character and non-autistic characters over a factual presentation about autism on participants' willingness to engage in future contact with autistic individuals, as there were no significant differences found between the two conditions. This indicates that mere exposure to a narrative depicting a positive intergroup interaction between autistic and non-autistic characters does not directly increase people's willingness to engage in future

contact with autistic individuals, and there are other factors in narrative contributing to the supposed vicarious contact effects, which in fact, aligns with our findings with H2 that suggest people need to identify with the non-autistic characters to a certain extent to change their attitudes toward autistic individuals.

The second hypothesis predicted that identification with ingroup non-autistic characters engaging in positive interactions between themselves and autistic individuals will lead viewers to perceive greater self-efficacy toward future contact with autistic individuals, which in turn is related to less intergroup anxiety, prejudice toward autistic individuals, and greater willingness to engage in future contact with autistic individuals. The mediated relationship was originally proposed and tested by Moyer-Gusé and her colleagues (2018) on prejudice against Muslim immigrants, with their results showing that the full model was significant.

The current study sought to test the relationship with a different target group (i.e., autistic individuals) to develop a more insightful understanding of vicarious contact through a narrative. Results only partially support H2 as the indirect effect of identification with non-autistic characters on willingness was significant via only self-efficacy as a mediator variable, but not intergroup anxiety or prejudice toward autistic individuals. This finding is not consistent with what Moyer-Gusé and her colleagues (2018) found with their study.

Despite no significant relationship found between self-efficacy and prejudice as previously suggested, we did find self-efficacy significantly predicted willingness to engage in future contact. This finding indicates that the role of self-efficacy in this process is more essential than a mediator between identification and anxiety as originally proposed.

We also found the direct effect of identification with the ingroup members on reducing prejudice against outgroup members was significant, which further confirms the crucial role of identification in the process underlaying the vicarious contact effect.

The third hypothesis predicted the effect of identification with characters engaging in positive interactions between other characters and the autistic character on willingness to engage in future contact with autistic individuals, through perceived positive valence of intergroup contact and prejudice toward autistic individuals. The hypothesis was based on the assumption of social cognitive theory about people's tendency to adopt a behavior based on their outcome evaluation of the said behavior (Bandura, 1968).

Although all the specific direct effects (i.e., identification → perceived positive valence of contact; perceived positive valence of contact → prejudice; prejudice → contact willingness) were significant, results did not support the indirect effect of identification with non-autistic individuals on participants' willingness to engage in future contact with autistic individuals via perceived positive valence of contact, which does not align with what was predicted based on social cognitive theory. Nevertheless, this finding indicates and confirms each of the following relationships: The more people identify with the ingroup members involved in an intergroup contact, the greater valence of intergroup contact they perceive, which in turn leads to less prejudice against outgroup members, and less prejudice against outgroup member leads to greater willingness to engage in future contact. We also suggest multicollinearity could be an alternative explanation for the lack of support for the indirect effects in both H2 and H3. Multicollinearity refers to the phenomenon where a predictor variable can be linearly predicted by other predictor variables in the same multiple variable model. It has been associated with regression

analysis, which is the foundation of Hayes' PROCESS macro. This assumption is supported by results of the bivariate correlation tests on our variables in the model indicating that multiple mediators in our models are significantly correlated with each other.

In sum, there were no significant findings to fully support the main argument of vicarious contact hypothesis, the model proposed by Moyer-Gusé and her colleagues (2018). Possible limitations of the current study, along with future research directions, will be discussed in depth in the next section, based on the above findings.

Limitations and Future Directions

A number of limitations will be addressed in the current study. The first category of limitations relates to the manipulation in the experiment. It is noted that stimuli used in the two conditions not only differ in terms of the presence of intergroup interaction but also in several other aspects. The stimulus prepared for the experimental condition exposed participants to the positive interaction between characters as well as many other elements in the narrative, which were not present in the control stimulus. Another concern with the stimuli involves the racial identities of the ingroup characters in the video for the experimental condition. One of the ingroup characters in the video appeared to be of Indian descendent, whereas the majority of the participants were self-identified as White. With race being a potentially larger factor in the intergroup contact research (Pettigrew & Tropp, 2006), it is reasonable to consider this element a possible confound to the main effect of vicarious contact. Future research should be mindful of unintended elements presented in

their stimuli, which may affect how audience perceive characters' group memberships, and implement a cleaner manipulation.

The second category of limitation involves the environment in which the data were collected. This study was conducted virtually on an online survey website rather than physically in a laboratory. The processes where participants moved through the required tasks were not monitored. There is no instrument for ensuring that participants have watched the full videos in a normal speed. However, we should note the efforts have been made for the quality of the responses: For example, watching time was set on the pages where the stimuli were present, and four attention checks were added in different sections of the questionnaire to filter low-quality data. Nevertheless, future research should test the hypotheses in a laboratory environment to ensure better manipulations.

The third category of limitation is that the study did not test the effects of transitional narratives depicting positive intergroup interactions. A storyline in which a transitional character grows along with the progress of the story from exhibiting antisocial behavior to performing desirable behavior was suggested to be a potentially efficient model for further application of vicarious contacts (Bandura, 2004). Moyer-Gusé and her colleagues (2018) managed to create an experimental condition with transitional narratives as stimuli, though the extent to which the transitional narratives hold greater influence on changing audience's attitudes, as compared to narratives without transitional characters was not measured. Future research needs to further explore factors such as transitional characters and their relationships with tested constructs, including self-efficacy and intergroup anxiety.

Variables that we chose to only measure in the experimental condition may suggest another limitation of this study. By only measuring identification with non-autistic characters and perceived positive valence of contact in the experimental condition, we have no idea whether or not the entertainment narrative about autism makes a difference in terms of the level of one's identification with non-autistic characters and how they perceived the valence of intergroup contact, as compared to an informational talk about autism. We encourage future research to design stimuli and questionnaires that enable measurement of these variables in both experimental and control conditions.

Future research should also examine another mediation process that might underlay vicarious contact effects. Another hypothesis was developed, though has not been fully theorized and tested due to the capacity of the current study. Originally, three routes were proposed for the vicarious contact to be effective. H2 and H3 demonstrate the first two routes (as depicted separately in Figure 1 and 2). The last hypothesis predicted that identification with characters engaging in positive interactions between other characters and autistic individuals will be associated with greater perceived authenticity of the narrative, which will predict less prejudice toward autistic individuals and greater willingness to engage in future contact with autistic individuals. The hypothesis was based on the last assumption of vicarious contact hypotheses, which is the observer must include the outgroup member as part of themselves for the vicarious contact to be effective (Wright et al., 1997; Mazziotta et al., 2011). According to the transitive inclusion process, when individuals observe an intergroup friendship, they, to some extent, include the ingroup member as part of themselves as they share the membership with the ingroup member. The outgroup member is seen as part of ingroup member's self as they share an interpersonal

relationship. Thus, the observers may see the outgroup member as part of themselves. If the group membership is perceived to be salient, the outgroup member is seen to be connected to the ingroup, which allows the observer to include the outgroup as part of the self (Mazziotta et al., 2011). In the context of narrative, the salience of group membership may be considered the authenticity of a character depicted as a member of the group. An overall perceived faithfulness of the story ro one's own experiences may represent how people regard the characters and their membership to their groups as authentic to real life.

Conclusion

The current study showed that when an audience identifies with the ingroup character in a narrative depicting positive interaction between non-autistic and autistic characters, their self-efficacy toward future contact with autistic individuals increases, which leads to greater willingness to engage in future contact with autistic individuals. It was also found that identification with the non-autistic character led to greater perceived positive valence of the interaction between non-autistic and autistic characters, greater perceived positive valence of contact was associated with prejudice against autistic individuals, and prejudice against autistic individuals negatively predicted willingness to engage in future contact with autistic individuals. The study further examined the mechanisms behind vicarious contact by integrating the vicarious contact hypotheses, social cognitive theory, and narrative persuasion. The effects of vicarious contact were tested within the context of interactions between autistic and non-autistic individuals. The attempt was also made to test the application of vicarious contact on increasing willingness to engage in future intergroup contact with entertainment programs, which may lead to a

boarder and more influential usage of vicarious contact to reduce prejudice toward outgroup and increase intergroup contact willingness.

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Table 1. Means, Standard Deviations, and Bivariate Correlations between Variables

	M	SD	1	2	3	4	5	6	7	8	9	10
1. Identification[a]	5.67	.87	--									
2. Self-efficacy (pretest)	5.67	1.08	.26*	--								
3. Self-efficacy (posttest)	5.78	1.05	.42**	.75**	--							
4. Intergroup Anxiety (pretest)	4.46	.74	.03	.04	-.04	--						
5. Intergroup Anxiety (posttest)	4.42	.76	.04	-.06	-.16	.76**	--					
6. Perceived Contact Valence[a]	5.61	1.05	.42**	.16	.49**	-.33**	-.27*	--				
7. Prejudice (pretest)	3.08	1.09	-.26*	-.13	-.22*	.32**	.32**	-.28*	--			
8. Prejudice (posttest)	3.03	1.12	-.32*	-.23*	-.35**	.38**	.41**	-.37**	.81**	--		
9. Contact Willingness (pretest)	5.04	1.50	.28*	.30**	.44**	-.25**	-.24*	.29*	-.51**	-.51**	--	
10. Contact Willingness (posttest)	5.33	1.23	.29*	.37**	.48**	.012	-.13	.28*	-.43**	-.43**	.76**	--

[a]Experimental condition only; *p <.05; **p < .01

Appendix A

TED Talk Video Transcript

"Why?" "Why?" is a question that parents ask me all the time. "Why did my child develop autism?" As a pediatrician, as a geneticist, as a researcher, we try and address that question.

But autism is not a single condition. It's actually a spectrum of disorders, a spectrum that ranges, for instance, from Justin, a 13-year-old boy who's not verbal, who can't speak, who communicates by using an iPad to touch pictures to communicate his thoughts and his concerns, a little boy who, when he gets upset, will start rocking, and eventually, when he's disturbed enough, will bang his head to the point that he can actually cut it open and require stitches. That same diagnosis of autism, though, also applies to Gabriel, another 13-year-old boy who has quite a different set of challenges. He's actually quite remarkably gifted in mathematics. He can multiple three numbers by three numbers in his head with ease, yet when it comes to trying to have a conversation, he has great difficulty. He doesn't make eye contact. He has difficulty starting a conversation, feels awkward, and when he gets nervous, he actually shuts down. Yet both of these boys have the same diagnosis of autism spectrum disorder.

One of the things that concerns us is whether or not there really is an epidemic of autism. These days, one in 88 children will be diagnosed with autism, and the question is, why does this graph look this way? Has that number been increasing dramatically over time? Or is it because we have now started labeling individuals with autism, simply giving them a diagnosis when they were still present there before yet simply didn't have that label? And in fact, in the late 1980s, the early 1990s, legislation was passed that actually provided

individuals with autism with resources, with access to educational materials that would help them. With that increased awareness, more parents, more pediatricians, more educators learned to recognize the features of autism. As a result of that, more individuals were diagnosed and got access to the resources they needed. In addition, we've changed our definition over time, so in fact we've widened the definition of autism, and that accounts for some of the increased prevalence that we see.

The next question everyone wonders is, what caused autism? And a common misconception is that vaccines cause autism. But let me be very clear: Vaccines do not cause autism. (Applause) In fact, the original research study that suggested that was the case was completely fraudulent. It was actually retracted from the journal Lancet, in which it was published, and that author, a physician, had his medical license taken away from him. (Applause) The Institute of Medicine, The Centers for Disease Control, have repeatedly investigated this and there is no credible evidence that vaccines cause autism. Furthermore, one of the ingredients in vaccines, something called thimerosal, was thought to be what the cause of autism was. That was actually removed from vaccines in the year 1992, and you can see that it really did not have an effect in what happened with the prevalence of autism. So again, there is no evidence that this is the answer. So the question remains, what does cause autism?

In fact, there's probably not one single answer. Just as autism is a spectrum, there's a spectrum of etiologies, a spectrum of causes. Based on epidemiological data, we know that one of the causes, or one of the associations, I should say, is advanced paternal age, that is, increasing age of the father at the time of conception. In addition, another vulnerable and critical period in terms of development is when the mother is pregnant. During that period,

while the fetal brain is developing, we know that exposure to certain agents can actually increase the risk of autism. In particular, there's a medication, valproic acid, which mothers with epilepsy sometimes take, we know can increase that risk of autism. In addition, there can be some infectious agents that can also cause autism.

And one of the things I'm going to spend a lot of time focusing on are the genes that can cause autism. I'm focusing on this not because genes are the only cause of autism, but it's a cause of autism that we can readily define and be able to better understand the biology and understand better how the brain works so that we can come up with strategies to be able to intervene. One of the genetic factors that we don't understand, however, is the difference that we see in terms of males and females. Males are affected four to one compared to females with autism, and we really don't understand what that cause is.

One of the ways that we can understand that genetics is a factor is by looking at something called the concordance rate. In other words, if one sibling has autism, what's the probability that another sibling in that family will have autism? And we can look in particular at three types of siblings: identical twins, twins that actually share 100 percent of their genetic information and shared the same intrauterine environment, versus fraternal twins, twins that actually share 50 percent of their genetic information, versus regular siblings, brother-sister, sister-sister, also sharing 50 percent of their genetic information, yet not sharing the same intrauterine environment. And when you look at those concordance ratios, one of the striking things that you will see is that in identical twins, that concordance rate is 77 percent. Remarkably, though, it's not 100 percent. It is not that genes account for all of the risk for autism, but yet they account for a lot of that risk, because when you look at fraternal twins, that concordance rate is only 31 percent. On the other hand, there is a

difference between those fraternal twins and the siblings, suggesting that there are common exposures for those fraternal twins that may not be shared as commonly with siblings alone.

So this provides some of the data that autism is genetic. Well, how genetic is it? When we compare it to other conditions that we're familiar with, things like cancer, heart disease, diabetes, in fact, genetics plays a much larger role in autism than it does in any of these other conditions. But with this, that doesn't tell us what the genes are. It doesn't even tell us in any one child, is it one gene or potentially a combination of genes? And so in fact, in some individuals with autism, it is genetic! That is, that it is one single, powerful, deterministic gene that causes the autism. However, in other individuals, it's genetic, that is, that it's actually a combination of genes in part with the developmental process that ultimately determines that risk for autism. We don't know in any one person, necessarily, which of those two answers it is until we start digging deeper.

So the question becomes, how can we start to identify what exactly those genes are. And let me pose something that might not be intuitive. In certain individuals, they can have autism for a reason that is genetic but yet not because of autism running in the family. And the reason is because in certain individuals, they can actually have genetic changes or mutations that are not passed down from the mother or from the father, but actually start brand new in them, mutations that are present in the egg or the sperm at the time of conception but have not been passed down generation through generation within the family. And we can actually use that strategy to now understand and to identify those genes causing autism in those individuals. So in fact, at the Simons Foundation, we took 2,600 individuals that had no family history of autism, and we took that child and their mother and father and used them to try and understand what were those genes causing autism in

those cases? To do that, we actually had to comprehensively be able to look at all that genetic information and determine what those differences were between the mother, the father and the child. In doing so, I apologize, I'm going to use an outdated analogy of encyclopedias rather than Wikipedia, but I'm going to do so to try and help make the point that as we did this inventory, we needed to be able to look at massive amounts of information. Our genetic information is organized into a set of 46 volumes, and when we did that, we had to be able to account for each of those 46 volumes, because in some cases with autism, there's actually a single volume that's missing. We had to get more granular than that, though, and so we had to start opening those books, and in some cases, the genetic change was more subtle. It might have been a single paragraph that was missing, or yet, even more subtle than that, a single letter, one out of three billion letters that was changed, that was altered, yet had profound effects in terms of how the brain functions and affects behavior. In doing this within these families, we were able to account for approximately 25 percent of the individuals and determine that there was a single powerful genetic factor that caused autism within those families. On the other hand, there's 75 percent that we still haven't figured out.

As we did this, though, it was really quite humbling, because we realized that there was not simply one gene for autism. In fact, the current estimates are that there are 200 to 400 different genes that can cause autism. And that explains, in part, why we see such a broad spectrum in terms of its effects. Although there are that many genes, there is some method to the madness. It's not simply random 200, 400 different genes, but in fact they fit together. They fit together in a pathway. They fit together in a network that's starting to make sense now in terms of how the brain functions. We're starting to have a bottom-up

approach where we're identifying those genes, those proteins, those molecules, understanding how they interact together to make that neuron work, understanding how those neurons interact together to make circuits work, and understand how those circuits work to now control behavior, and understand that both in individuals with autism as well as individuals who have normal cognition. But early diagnosis is a key for us. Being able to make that diagnosis of someone who's susceptible at a time in a window where we have the ability to transform, to be able to impact that growing, developing brain is critical. And so folks like Ami Klin have developed methods to be able to take infants, small babies, and be able to use biomarkers, in this case eye contact and eye tracking, to identify an infant at risk. This particular infant, you can see, making very good eye contact with this woman as she's singing "Itsy, Bitsy Spider," in fact is not going to develop autism. This baby we know is going to be in the clear. On the other hand, this other baby is going to go on to develop autism. In this particular child, you can see, it's not making good eye contact. Instead of the eyes focusing in and having that social connection, looking at the mouth, looking at the nose, looking off in another direction, but not again socially connecting, and being able to do this on a very large scale, screen infants, screen children for autism, through something very robust, very reliable, is going to be very helpful to us in terms of being able to intervene at an early stage when we can have the greatest impact.

How are we going to intervene? It's probably going to be a combination of factors. In part, in some individuals, we're going to try and use medications. And so in fact, identifying the genes for autism is important for us to identify drug targets, to identify things that we might be able to impact and can be certain that that's really what we need to do in autism. But that's not going to be the only answer. Beyond just drugs, we're going to

use educational strategies. Individuals with autism, some of them are wired a little bit differently. They learn in a different way. They absorb their surroundings in a different way, and we need to be able to educate them in a way that serves them best. Beyond that, there are a lot of individuals in this room who have great ideas in terms of new technologies we can use, everything from devices we can use to train the brain to be able to make it more efficient and to compensate for areas in which it has a little bit of trouble, to even things like Google Glass. You could imagine, for instance, Gabriel, with his social awkwardness, might be able to wear Google Glass with an earpiece in his ear, and have a coach be able to help him, be able to help think about conversations, conversation-starters, being able to even perhaps one day invite a girl out on a date.

All of these new technologies just offer tremendous opportunities for us to be able to impact the individuals with autism, but yet we have a long way to go. As much as we know, there is so much more that we don't know, and so I invite all of you to be able to help us think about how to do this better, to use as a community our collective wisdom to be able to make a difference, and in particular, for the individuals in families with autism, I invite you to join the interactive autism network, to be part of the solution to this, because it's going to take really a lot of us to think about what's important, what's going to be a meaningful difference. As we think about something that's potentially a solution, how well does it work? Is it something that's really going to make a difference in your lives, as an individual, as a family with autism? We're going to need individuals of all ages, from the young to the old, and with all different shapes and sizes of the autism spectrum disorder to make sure that we can have an impact. So I invite all of you to join the mission and to help

to be able to make the lives of individuals with autism so much better and so much richer.

Thank you.

Appendix B

Survey Questionnaire

Self-Efficacy

Please indicate your agreement with each of the following statements using the scale provided: 1 = strongly disagree, 2 = disagree, 3 = somewhat disagree, 4 = neither agree nor disagree, 5 = somewhat agree, 6 = agree, 7 = strongly agree.

1. I am confident that I have the ability to have a positive interaction with people who have autism.
2. I am confident that I have the skills to develop positive relationships with people who have autism.
3. I believe that I can trust my ability to befriend with people who have autism.

Intergroup Anxiety

If you were interacting with people who have autism (e.g., talking with them, working on a project with them), how likely would you feel the following emotional states compared to occasions when you are interacting with people who do not have autism? Please indicate how you would feel in terms of the six emotion states on seven-point scales (1 = extremely unlikely, 2 = moderately unlikely, 3 = slightly unlikely, 4 = neither likely nor not likely, 5 = slightly likely, 6 = moderately likely, 7 = extremely likely.): awkward, anxious, irritated, relaxed*, comfortable*, and careful*.

Perceived Positive Valence of Contact between the Ingroup and Outgroup Characters

Please indicate your agreement with each of the following statements using the scale provided: 1 = extremely agree, 2 = moderately agree, 3 = slightly agree, 4 = neither agree nor disagree, 5 = slightly disagree, 6 = moderately disagree, 7 = extremely disagree..

1. The interactions between non-autistic characters and autistic character seems to be successful.
2. In the program, the characters who have and do not have autism accomplish their shared goal(s) together.
3. The characters who have and do not have autism have good relations with each other.

Identification with the Ingroup Character

Please indicate your agreement with each of the following statements using the scale provided: 1 = strongly agree, 2 = agree, 3 = somewhat agree, 4 = neither agree nor disagree, 5 = somewhat disagree, 6 = disagree, 7 = strongly disagree.

1. While viewing the program, I forgot myself and was fully absorbed.
2. I think I have a good understanding of at least some of the non-autistic characters.
3. I tend to understand the reasons why some non-autistic character does what he or she does.
4. While viewing the show I could feel the emotions the non-autistic characters portrayed.

5. At key moments in the show, I felt I knew exactly what the non-autistic characters were going through.

Prejudice Toward Autistic Individuals

Please indicate your agreement with each of the following statements using the scale provided: 1 = strongly disagree, 2 = disagree, 3 = somewhat disagree, 4 = neither agree nor disagree, 5 = somewhat agree, 6 = agree, 7 = strongly agree.

1. Most people with autism are no longer victims of discrimination.
2. People with autism are in general treated in the same way as people without autism in society.
3. People with autism are getting too demanding in their push for equal rights.
4. People with autism get too little attention in the media. *
5. Society takes more care of people with autism than is fair to other groups.
6. It is right that people with autism sometimes get special support from society to find appropriate jobs. *

Willingness for Future Contact with Autistic Individuals

Please indicate your willingness to engage in a range of contact behaviors with autistic people if given the opportunity with the scale provided (1 = extremely likely, 2 = moderately likely, 3 = slightly likely, 4 = neither likely nor not likely, 5 = slightly unlikely, 6 = moderately unlikely, 7 = extremely unlikely):

1. marry an autistic person,

2. have an autistic person as a close friend,
3. accept an autistic person as a neighbor,
4. accept an autistic person as a work colleague,
5. have an autistic person as a casual acquaintance.

Note. Items with * have reversed coding.