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USING POPULAR MEDIA TO CHANGE ATTITUDES AND BOLSTER KNOWLEDGE ABOUT AUTISM SPECTRUM DISORDER

A DISSERTATION APPROVED FOR THE
DEPARTMENT OF PSYCHOLOGY

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## Abstract

Autism Spectrum Disorder (ASD) has become a common topic in popular fiction, with many books, movies, and television shows featuring characters with autism. As such, consumers of popular fiction are being exposed to information about ASD and are given the opportunity to interact with these characters. However, with the exception of one study that found a positive impact of watching a popular television show about ASD (Stern & Barnes, 2019), research has yet to investigate the impact these depictions have on consumers' knowledge about ASD and attitudes towards individuals on the spectrum. The purpose of this research was to investigate the impact popular novels have on knowledge about and attitudes towards ASD, compared to that of traditional college textbooks. Studies 1 and 2 expanded the work of Stern and Barnes (2019) by looking at popular novels featuring main characters with ASD who, in contrast to prior research, were not savants. Study 3 used a pre-/post-test design and modified novel and textbook excerpts that were designed to communicate the same information about ASD, in order to assess for the degree of learning and attitude change that occurs when the same information is being taught through two different types of reading material. In line with prior research, Study 1 found no difference in the number of correct behaviors identified by participants, while participants in the novel condition selected fewer incorrect answers. Participants in the novel condition also showed more positive attitudes towards individuals with ASD. Using an alternative assessment of knowledge and attitudes, Study 2 found that participants in the novel condition chose fewer correct and fewer incorrect responses to questions about ASD, instead reporting that they did not know the answer more often than participants in the textbook condition. Participants did not differ in their desired social distance from individuals with ASD. Using a pre-/post-test design, Study 3 found that participants in the novel and textbook conditions both showed the same

amount of learning, with higher scores on the post-test assessment of knowledge than the pre-test. Participants in the novel condition showed significant improvement in their attitudes towards individual with ASD after reading, while those in the textbook condition showed more negative attitudes after reading the textbook chapter.

KEYWORDS: Autism, Fiction, Education, Attitudes

## Introduction

Autism Spectrum Disorder (ASD) has recently received a great deal of attention in mainstream media (Holmes, 2014). In fact, three of the top 10 most popular television shows in 2018 featured main characters that were either explicitly diagnosed with ASD or speculated to have the disorder: *The Good Doctor*, *The Big Bang Theory*, and *Young Sheldon* (Clark, 2018). Similarly, there have been many best-selling novels featuring characters with ASD, such as *The Curious Incident of the Dog in the Nighttime* (Haddon, 2003), *The Rosie Project* (Simsion, 2013), *House Rules* (Picoult, 2010), and *The Kiss Quotient* (Hoang, 2019). Despite the popularity of mainstream media featuring characters with autism, relatively little research has investigated the effect of these popular media depictions on perceptions of ASD.

Prior research has noted that many stories that feature characters with ASD tend to stigmatize them, and historically, these stories have rarely been told from the perspective of the individual with ASD **(**Holton, Farrell, & Fudge, 2014**).** Many depictions of ASD focus on negative outcomes associated with autism and depict autism as shameful and burdensome, which ultimately devalues individuals who have ASD (Holmes, 2014; Lee, 2019). There is also a prevalent misconception that ASD is caused by cold mothers featured in many popular novels, such as *The Road* by Cormac McCarthy (Lee, 2019). Finally, there tends to be a focus on savants, or individuals on the spectrum with special abilities that distinguish them from other people (Lee, 2019; Draaisma, 2009). Most individuals with ASD are not savants, and this misconception could potentially harm attitudes towards the average person with ASD when they are expected to have a special skill set (Draaisma, 2009). These concerns highlight the importance of understanding what is being communicated to the masses through fictional depictions of ASD. It is especially important that we understand what, if anything, current

popular media sources are teaching audiences about ASD and how they are influencing our attitudes towards individuals on the spectrum.

The popular television show *The Good Doctor* falls into many of these trappings. Much of the show focuses on other characters talking about the main character, Shawn, who has ASD, rather than directly to him in the way we would normally interact with another person. It also focuses on negative experiences from his childhood and clearly depicts Shawn as a savant. Despite adhering to many of the criticisms lodged at popular media depictions of ASD, a recent study found a positive impact of watching the pilot episode of *The Good Doctor* on participants' knowledge about and attitudes towards ASD (Stern & Barnes, 2019). In this study, participants either viewed the pilot episode of the show, featuring a main character with ASD, or an academic lecture on the topic. Participants then completed assessments of knowledge about ASD and attitudes towards individuals with ASD. Participants who watched *The Good Doctor* scored significantly better on the knowledge assessment and reported significantly more positive attitudes towards these individuals than participants in the lecture condition (Stern & Barnes, 2019).

Although these results are promising, it is important to note that Shawn was depicted as being a savant, a fact which might account for the improvement in attitudes found in the study. Thus, it is unclear if popular media featuring a more typical presentation of ASD would yield similar effects. Further, it is unclear whether these results would generalize to other forms of media, such as the dozens of bestselling novels depicting characters with ASD, and whether the pattern of results obtained in this experiment would persist across a variety of knowledge and attitude assessments.

The purpose of the current line of research is to investigate the effectiveness of written fiction (specifically, popular novels) in conveying information about Autism Spectrum Disorder and decreasing stigmatization toward individuals with ASD. As such, Study 1 aimed to replicate the findings of Stern and Barnes (2019) using different stimuli, namely a best-selling mystery novel that depicts a younger protagonist who does not display savantism. Study 2 aimed to broaden the stimuli to a different genre, namely romance, and to broaden the types of assessments used to measure knowledge and attitudes about ASD. The purpose of Study 3 was to control for the content presented across conditions, such that the novel and textbook excerpts contained the same information about ASD, and to incorporate a pre-/post-test design to directly test the degree of learning and attitude change taking place.

Across experiments, it was hypothesized that participants who read a fictional narrative about ASD would learn about autism in line with, or perhaps exceeding, those who read a textbook chapter and that reading popular works of fiction that focus on protagonists with ASD would result in more positive attitudes towards individuals with ASD compared to reading a textbook. These hypotheses were based on three bodies of research: research showing that fiction can be used as a valuable tool to teach people about the world (LaMarre, Landerville, & Beamn, 2009; Marsh, Butler, & Umanath, 2012; Stern & Barnes, 2019**)**; research suggesting that fiction is particularly useful with respect to teaching us about the minds of others (Mar & Oatley, 2008; Kidd & Castano, 2013; Kidd, Ongis, & Castano 2016); and research suggesting that fiction allows us to interact with others who are different from us through parasocial contact, which in return can change the attitudes we hold towards others (Schiappa, Gregg, & Hewes, 2005). Taken together, these theories explain the potential popular fiction has in impacting our

knowledge about and attitudes towards individuals with ASD. Each theory and the body of research supporting it are explored in more detail below.

## Fiction as a Tool for Learning

A growing body of research has examined the degree to which—and the circumstances under which—people learn from fiction (e.g., LaMarre, Landerville, & Beam 2009; Marsh, Butler & Umanath, 2012; Stern & Barnes, 2019). Storytelling has been used throughout history and is thought to transmit knowledge vital to the survival of a community **(**Sugiyama, 2001; 2017**).** Theoretically, the sharing of information embedded in a compelling narrative allows for less experienced individuals to learn without relying on risky first-hand experience, a process that is thought to be adaptive for the survival of our species **(**Sugiyama, 2001; 2017**).** Fiction, specifically, has even been shown to serve as a useful educational tool in the classroom, when the information being communicated is accurate (Dubeck, Moshier, & Boss, 2006; LaMarre, Landerville, & Beam, 2009; Marsh, Butler & Umanath, 2012). It is thought that we may cognitively process information from fiction differently from other learning methods (Gerrig & Prentice, 1991). The narrative nature of fiction fosters processing information by making connections between different aspects of the story, whereas non-narrative prompts readers to focus on individual aspects of a concept (Marsh, Butler & Umanath, 2012). A story also offers a schema that can help the reader encode and remember information (Marsh, Butler & Umanath, 2012).

One possibility is that we incorporate the knowledge we gain from fiction with what we already know about the real world, treating it as real information in a way similar to accommodating a schema (Gerrig & Prentice, 1991). When we read a story, there is a constant stream of information between our memories and the new information we are taking in,

activation of old information that we then integrate with what we are learning (Cook & O'Brien, 2014). These processes, combined with the ability of narrative to engage our attention, make readers susceptible to persuasive messages contained in a story (Moyer-Gusé & Dale, 2017; Green, 2004; Green & Brock, 2000). Remarkably, knowing that a story is fictional does not impact whether or not we learn the information contained in it (Busselle & Bilandzic, 2008). Over time, the knowledge that we gain becomes even more integrated with our understanding of the world (Appel & Richter, 2007).

How easily we learn from fiction depends on the story's ability to capture our attention, and the subsequent extra time we spend considering a topic when it is ingrained in an interesting, transporting fictional story (Green & Brock, 2000; Marsh, Butler & Umanath, 2012; Gerrig & Prentice, 1991). Popular media, specifically, might be useful as an educational tool, since it is designed to engage our attention and is crafted to be easier for the reader to engage with. Kidd (2015) noted that popular fiction often contains simple plots that are easy to follow and characters that are easy to understand. Reading popular fiction has been shown to produce higher levels of positive affect than reading non-fiction (Kidd, 2015). Thus, popular fiction that contains accurate information may be particularly useful in teaching that information to the audience.

Given this context, it is perhaps unsurprising that fiction has been used in the classroom for centuries to bolster learning (Marsh, Butler & Umanath, 2012). Modern day classrooms often rely on fiction to teach students more about important concepts in disciplines as diverse as science, history, and criminology (Geerdts, Van de Walle, & LoBue, 2016; Dubeck, Moshier, & Boss, 2006; LaMarre, Landerville, & Beam, 2009; Pastor Perez, Linde, Molas-Castells, & Fuertes-Alpiste 2018). A study by LaMarre, Landerville, and Beam (2009) found that having student watch the fictional movie *Hotel Rwanda* led to greater knowledge about the Rwandan

genocide in the 1990s compared to watching a documentary on the subject. Another study by Marsh, Meade, & Roediger (2003) found that we use information from stories when answering factual questions. Participants were asked to read a series of short stories containing information about a variety of topics, such as the American Civil War and medical school. They were then asked to complete a general knowledge assessment that included questions about information conveyed in the stories. The more participants read, the more likely they were to answer questions in a way consistent with the short stories, even when the information was false. Research has shown that we sometimes even learn from fiction when the information being communicated is contrary to our existing knowledge **(**Butler, Dennis, & Marsh, 2012). Surprisingly, it has also been shown that the trustworthiness of a character plays a larger role in determining what we learn from a story than labeling a story as factual or fictitious (Appel & Mara, 2013).

In summary, storytelling is a unique part of the human experience (Sugiyama, 2001; 2017) that allows us to communicate important information to one another in ways that capture the audience's attention and facilitate learning (Moyer-Gusé & Dale, 2017; Green, 2004; Green & Brock, 2000**).** But are there things that fiction is particularly good at teaching us? In the next section, I will discuss the theory that fiction is particularly well-suited for learning about the minds of others (Dubeck, Moshier, & Boss, 2006; LaMarre, Landerville, & Beam, 2009; Mar & Oatley, 2008).

## Fiction as Social Simulation

It has been suggested that fiction provides a simulation of the social world (Mar & Oatley, 2008). In order to engage the attention of social beings, stories must replicate many of the same features we find engaging in real life, communicating information about how the social

world functions in a way that requires understanding of social nuances and the minds of others. Moreover, these social elements can be emphasized and the surrounding context simplified through narrative, making them easier to process and generalize (Mar & Oatley, 2008). Fiction, like real-world social interactions, elicits emotions and requires that a reader make inferences about others (Oatley, 2016). Thus, the theory of fiction as social simulation suggests that this interaction with social information in stories allows us to learn about the social world and be changed from the fiction we consume (Mar & Oatley, 2008; Oatley, 2016).

For example, when a reader gets to experience the thoughts and emotions characters experience during a story, they may feel real sadness as a result of a death, actual fear during a terrifying scene, or develop an understanding of certain behaviors exhibited by characters (Mar & Oatley, 2008). During this process, abstraction occurs (Mar & Oatley, 2008). Abstraction is a simplification of content so that the reader can focus on specific pieces of information at the exclusion of other aspects of a situation. Often, these simplifications focus on the important aspects of a story, without getting bogged down in the superfluous features of real life (Mar & Oatley, 2008**).** The combination of simulation and abstraction makes fiction useful as a learning tool by helping readers develop an understanding of how the minds of characters work (Mar & Oatley, 2008). Indeed, it has been suggested that the opportunity to practice figuring out how the minds of characters work is one of the main reason we find fiction compelling (Zunshine, 2006), and that engaging with fiction may serve as practice for our theory of mind capacities in real life (e.g., Kidd, Ongis, & Castano, 2016; Mar, Oatley, Hirsch, dela Paz, & Peterson, 2006).

In line with this theory, the same areas of the brain that we use when interacting with people in real life, such as the network involved in theory of mind and other social processing areas, are activated when consuming fiction (Mar, 2011; Mar, Kelley, Heatherton, & Macrae,

2007). Further, reading fiction has been shown to impact empathy and social cognition. For example, Bal and Veltkamp (2013) found that when participants became emotionally engaged with a work of fiction, they scored higher on a scale of empathic concern. The same effect was not found for readers of non-fiction or participants who were not emotionally transported into the fictional story. Strikingly, this result was found a week after the fiction manipulation, suggesting a long-term impact of fiction on empathy.

Similarly, studies have found that having participants engage with various types of fiction, from books to television shows, has both a correlational relationship with (e.g., Kidd and Castano, 2017; Mar et al, 2006; Panero et al, 2016; Samur, Tops, & Koole, 2018) and causal impact on (e.g., Black & Barnes, 2015a, 2015b; Kidd & Castano, 2013; Pino & Mazza, 2016) participants' abilities to read others' emotions. Kidd and Castano (2013) conducted a series of experiments in which participants read literary short stories, popular fiction, and nonfiction. There was a moderately small positive effect of reading literary fiction on theory of mind, compared to reading popular fiction, reading non-fiction, and a control non-reading group. Black and Barnes (2015a) found similar results using award-winning television shows. Participants who viewed award-winning dramas, such as *The West Wing* and *The Good Wife*, outperformed those who viewed non-social documentaries on the Reading the Mind in the Eyes Task (RMET), a test that taps participants' ability to read facial expressions based only on the eye region of the face. A meta-analysis looking at fourteen published and unpublished attempts to replicate the original Kidd and Castano (2013) study showed a consistent, yet small, effect of fiction exposure on social cognitive ability (Dodell-Feder & Tamir, 2018). Despite these results, there have also been numerous failed attempts to replicate Kidd and Castano's (2013) original findings (Panero

et al, 2016). However, there does seem to be a significant correlation between lifetime fiction exposure and the ability to read others' emotions (Panero et al, 2016).

Taken as a whole, this work suggests that, at least in some circumstances, fiction may facilitate our understanding of the minds of others; thus, it was predicted that participants in the current experiment who read fiction focused on a protagonist with ASD would perform as well or better than those who read a textbook on an ASD knowledge test not only because prior research supports the idea that we learn from fiction (LaMarre, LAnderville, & Mean, 2009; Marsh, Butler, & Umanath, 2012; Gerria & Pretnice, 1991; Stern & Barnes, 2019), but also because prior research suggests that fiction may be particularly good at teaching us about the minds of others (Dubeck, Moshier, & Boss, 2006; LaMarre, Landerville, & Beam, 2009; Mar & Oatley, 2008)—including, potentially, neuro-atypical individuals.

## Parasocial Contact Hypothesis

In addition to helping us enhance what we know about others' minds, fiction can also be used to change attitudes toward marginalized groups. The Parasocial Contact Hypothesis states that the same attitude changes that can occur from social interaction with an out-group member can occur from indirect contact in the form of parasocial interactions (e.g., Dovidio, Eller, & Hewstone, 2011; Allport, Clark, & Pettigrew, 1954; Schiappa, Gregg, & Hewes, 2005). A parasocial interaction is a one-sided interaction between a person and a fictional character or celebrity. These interactions typically involve consuming media depicting the character or celebrity, such as a book or articles about them (Horton & Wohl, 1956; Giles, 2002; Schiappa, Gregg, & Hewes, 2005; Cohen, 2003). Just like in real interactions, we construct impressions of characters based off of what we learn throughout the interaction in order to reduce uncertainty or

modify our schemas to help us in future interactions with them (Schiappa, Gregg, & Hews, 2005).

For example, studies have shown that reading fiction about a minority member can reduce bias (Joyce & Harwood, 2014; Kaufman & Libby, 2012; Johnson, Huffman, & Jasper, 2014; Vezzali, Stathi, Giovannini, Capozza, & Trifiletti, 2015**)** and prompt people to feel more positively about future interactions with other out-group members (Hoffner & Cohen, 2012; Vezzali, Stathi, & Giovannini, 2012). In the real world, Intergroup Contact Theory suggests that people's attitudes and behaviors change as a result of contact with one another **(**Allport, Clark, & Pettigrew, 1954). This process is especially important in reducing prejudice. Past research has illustrated that this type of face-to-face contact with out-group members can improve attitudes towards those groups **(**Allport, Clark, & Pettigrew, 1954). For example, research in the 1950s found that exposing white participants to African Americans improved attitudes towards public policy, such as increasing support of desegregation (Deutsch & Collins, 1951; Kephart, 1957). Close friendships or extended contact with an out-group member are thought to be especially impactful on attitudes (Zhou, Page-Gould, Aron, Moyer, & Hewstone, 2018).

Parasocial contact with fictional characters can contribute to the same type of attitude change. For example, Ortiz and Harwood (2007) looked at the impact viewing televisions shows with LGBTQ characters, such as *Will & Grace*, and African American characters, such as *Real World: Austin*, had on college students' attitudes towards these groups. Students who reported spending time watching these shows reported less desire for social distance between themselves and LGBTQ or African American individuals. A similar study, also looking at the popular television show *Will & Grace*, found that participants, particularly those without real-life contact

with lesbians and gay men, who frequently watched the show had lower levels of sexual prejudice (Schiappa, Gregg, & Hewes, 2006).

In an experimental study, Vezzali, Stathi, Giovannini, Capozza, and Trifiletti (2015) found that long-term interaction with the Harry Potter books could be used to improve attitudes towards immigrants. Children in various age groups were brought into lab to read excerpts from the popular novels that focused on the character's interactions with marginalized groups within the fictional world (known in world as "Mudbloods"). Children in these groups showed positive change on a pre-post-test attitude measures about immigrants. The researchers were also able to gather lifetime exposure measures of experience with the Harry Potter books from different samples. Extended contact, or repeated interaction with the character over time related to improved attitudes for specific groups and secondary transfer of attitudes towards unrelated marginalized groups, namely the LGBTQ community (Vezzali et al, 2015). Using parasocial contact as an intervention has been shown to create more attitude change than traditional prejudice reduction approaches, such as imagined contact exercises and reading group malleability articles (Murrar, & Brauer, 2018).

Just as parasocial contact with fictional characters may reduce prejudice, so too may the process of identification with fictional characters. Kaufman and Libby (2012) found that participants in an induced state of lowered self-awareness experienced more identification with a character in a short story and subsequently were more likely to incorporate the characters personality traits into their own self-concept. The same study also found that introducing a character's group membership (LGBTQ or African American) after a reader has had the chance to take on the perspective of the character resulted in decreased stereotype activation and more positive attitudes towards that group after reading.

Despite what we know about the power fiction has to inform our attitudes, relatively little empirical research has explored the effects of fiction that depicts mental health issues or developmental disorders. In one landmark study looking at parasocial relationships between viewers and the character Monk (from the show *Monk*), Hoffner and Cohen (2012) found that stronger parasocial bonds with the character correlated with character-consistent attitudes. The main character in *Monk* had Obsessive Compulsive Disorder (OCD), which was illustrated throughout the show. Participants who reported a stronger relationship with him had more favorable attitudes about OCD and self-reported less desired social distance between themselves and someone with OCD. It is worth noting that around one-third of the participants in this study reported having OCD themselves, implying parasocial relationships may only contribute to attitudes in people with shared group status (Hoffner & Cohen, 2012). Likewise, Stern and Barnes (2019) found that participants who watched an episode of The Good Doctor selected more positive adjectives and fewer negative adjectives than participants who watched a lecture about ASD, when asked to select words they felt described an individual with ASD.

In summary, there is a body of research that suggests that fiction has the power to simulate social contact in a way that engages readers' attention, promotes identification with others, and subsequently changes the way we view people that are different from us. Thus, just as Social Simulation theory suggests that fiction may help us learn about the minds of others, Parasocial Contact Theory suggests that fiction may impact our attitudes toward them. This impact might be especially important with respect to stigmatized groups characterized by minds that operate in a way different from our own. As such, it was predicted that reading popular works of fiction that depict protagonists with ASD would result in more positive attitudes

towards individuals with ASD compared to reading a more traditional source of learning, namely, a textbook.

## Current Research

In summary, research has shown that consuming fiction can teach us a great deal **(**Dubeck, Moshier, & Boss, 2006; LaMarre, Landerville, & Beam, 2009; Marsh, Butler & Umantha, 2012), including information about how the mind works (Mar & Oatley, 2008; Oatley, 2016). Fiction, then, may be able to teach us about minds that are not neurotypical. Stern and Barnes (2019) found support for this, in that participants who watched a television episode about ASD scored better on an assessment that required them to identify behavioral traits common in ASD. Similarly, in the current studies, it was hypothesized that participants who read a fictional narrative about ASD would learn about autism in line with, or perhaps exceeding, those who read a textbook chapter about the disorder.

Prior research has also shown that fiction is a useful tool for improving attitudes (Joyce & Harwood, 2014; Kaufman & Libby, 2012; Johnson, Huffman, & Jasper, 2014; Vezzali, Stathi, Giovannini, Capozza, & Trifiletti, 2015). Parasocial contact, via fiction, allows us to interact, identify with, and form relationships with members of groups we may not interact with in real life (Schiappa, Gregg, & Hewes, 2005). Stern and Barnes (2019) found that this type of contact with a television character with ASD had a positive impact on participants' attitudes towards individuals on the spectrum. Similarly, in the current studies, it was hypothesized that participants who engaged with a fictional narrative about ASD would show more positive attitudes towards individuals with ASD than participants who read a textbook chapter on the subject.

Study 1 looked to replicate the findings of Stern and Barnes (2019), using the same dependent measures, but different stimuli—namely, a psychology textbook and a popular novel. Study 2 then expanded these findings to an additional work of literature and used different methods of assessing knowledge and attitudes. In order to maximize ecological validity, Studies 1 and 2 were both designed to assess popular fiction as it comes, with no modification made to the excerpts participants read. Study 3 addressed the limitations of Studies 1 and 2 by implementing a pre-/post- test design and modifying the textbook and novel excerpts to contain the same information about ASD.

## Study One

In an attempt to better understand the impact of the popular media we consume, Study 1 aimed to replicate and extend Stern and Barnes (2019) to investigate the impact of a best-selling novel, *The Curious Incident of the Dog In the Nightime*. Thus, this study used a popular mystery novel (rather than a popular television drama) that depicts a younger protagonist who is not a savant. As outlined in the introduction, and in line with the results found by Stern and Barnes (2019), it was hypothesized that participants in the novel condition would perform as well or better than those in the textbook condition at a task that asks them to identify behaviors associated with ASD. Reading *The Curious Incident of the Dog In the Nighttime* should also allow for parasocial contact. As such, and in line with the results found by Stern and Barnes (2019), it was hypothesized that participants in the novel condition would select fewer negative and more positive adjectives to describe someone with ASD than participants in the textbook condition.

### Method

### Participants

One-hundred and thirty-three participants were recruited online through the Department of Psychology at a large Midwestern university. Eight participants were excluded from analysis for reading times that exceeded two standard deviations below the mean. An additional four participants were excluded due to technical difficulties during data collection. After applying exclusion criteria, 121 participants were included in the final analyses (female = 100, mean age = 18.6). All participants received class credit for their participation. In addition to demographic information, participants were asked to report whether or not they had ever spent a significant amount of time with someone with ASD and whether some they knew well or they themselves had ever been diagnosed with the disorder. Twenty percent of participants reported having ASD or having a close other with ASD, while 42% of participants had spent a significant amount of time around someone with ASD.

**Procedure**

Participants came into the lab and were randomly assigned to the novel or textbook condition. After consenting to participate, participants responded to questions asking whether or not they had a close other with ASD or had ever spent a significant amount of time around someone with ASD. Participants were then instructed to read their assigned excerpt; after finishing the reading, participants completed the dependent measures outlined below.

**Materials**

*Conditions and Stimuli.* Participants were randomly assigned to one of two conditions: the novel condition or the textbook condition. Participants in the novel condition read a section from the novel *The Curious Incident of a Dog in the Night-Time* by Mark Haddon, chosen because of its popularity and acclaimed accurate depiction of ASD (Beecher & Darragh, 2011; Prater & Dyches, 2008; Burks-Abbott, 2007). Indeed, *Curious Incident* has even been used to

train teachers on how to best work with children with ASD (Beecher & Darragh, 2011). The book is about a teenage boy with ASD, Christopher Boone, who investigates the apparent murder of his neighbor's dog. Throughout his investigation, he interacts with various neighbors and members of the community. These interactions allow readers to experience the thoughts and behaviors of an individual with ASD from his perspective. For example, part of the excerpt shows the character after being arrested under suspicion of killing his neighbor's dog and the negative, often awkward interactions he subsequently has with the police. Participants in the textbook condition read an excerpt from the textbook *Abnormal Psychology, 8th edition* by David H. Barlow, Mark V. Durand, and Stefan G. Hofman (2018). The excerpt was around 2,200 words and covered a general description of ASD, the DSM-V criteria, and etiology. Conditions were matched on word count, with the novel condition have around 2,300 words (Table 1).

Following the method of Stern and Barnes (2019), the two narratives used in this experiment were coded for the presence or absence of diagnostic criteria for autism. Each excerpt was coded for the inclusion of diagnostic criteria, taken from the DSM-V (American Psychiatric Association, 2013) and the method through which the information was communicated: explicitly stated in the text of the excerpt or illustrated by the character or example. The textbook covered four of the five global criteria for diagnosis (deficits in social communication and interaction across multiple contexts; restrictive, repetitive interests and behaviors; symptoms present early in development; and symptoms cause clinically significant impairment), while the novel covered only two of the five (deficits in social communication and interaction across multiple contexts; restrictive and repetitive interests and behaviors). However, when it comes to diagnostic criteria that specifically reference social, behavioral, or cognitive hallmarks of autism (Criteria A and B), the two sources did not differ, with both sources

covering all seven itemized symptoms listed under these criteria. As was the case in Stern and Barnes (2019), the stimuli varied in *how* information was conveyed. The textbook condition included significantly more explicitly stated information than the novel condition, $X^2$ (1, $N$ = 24) = 13.59, $p < .01$. There was not a significant difference in the amount of illustrated information between the two conditions, $X^2(1, N = 24) = .75$, $p = .39$.

**Dependent Measures**

*Knowledge about ASD.* A 30-item behavioral checklist developed by White, Hiller, Frey, and Makrez (2016) was used to assess for participant's knowledge of ASD post-manipulation. The measure was developed specifically to assess for college students' understanding of behaviors displayed by their peers in a classroom setting. The checklist consisted of a series of behaviors and asked participants to select the ones they believed were typical of an individual with ASD. Fifteen of the behaviors, such as "avoiding eye contact" and "bringing up irrelevant topics in class" were descriptive of individuals with ASD, while the remaining 15 items were not (i.e."trouble learning" and "being overly friendly with other students").

*Attitudes*. To assess for participants' attitudes towards individuals with ASD, an adjective checklist developed by Stern and Barnes (2019) was used. This checklist was modeled after similar methods used to assess for group-based attitudes (Corrigan, 2000; Kapp, 2018; Siperstein, Bak, & Bottlieb, 1977; Sahin, Sihin, & Turner, 1994; Krueger 1996; Niemann, Jennings, Rozelle, Baxter, & Sullivan, 1994; Stephan, Ageyev, Stephan, Abalakina, Stefanenko, & Coates-Shrider, 1993). The checklist consisted of 40 traits (20 positive, 20 negative) with items that corresponded to one another. Items were either opposites ("empathetic"/"unfeeling") or positive and negative synonyms ("confident"/"arrogant"). Scores

were calculated for the total number of positive traits and the total number of negative traits selected by each participant.

*Perceived understanding.* Participants were asked two questions to assess how they perceived their own level of understanding of ASD: how well they felt they understood what ASD was and how well they felt like they understood what it was like to have ASD.

*Interest in learning more.* Participants were asked to report how interested they were in learning more about ASD in the future.

**Results**

*Preliminary analyses.* Person correlations were conducted to examine the relationship between the dependent measures and gender, as well as prior experience with ASD. Initial Analyses did not reveal a significant correlation between gender and most variables of interest. However, gender did correlate with participants' self-reported understanding of ASD ($r$ = -.19, $p$ = .04), such that women (M = 2.44, SD = .06) were slightly more interested than men (M = 2.40, SD = .11). As such, gender was only included in further analysis of participants' understanding of ASD.

There was a significant relationship between participants' personal experience with ASD and their scores on both the knowledge and attitude assessment. Having a close other with ASD was related to the number of positive traits selected in the attitudes checklist ($r$ = .23, $p$ = .01), the number of correct traits selected in the knowledge assessment ($r$ = .27, $p$ < .01), the desire to learn more ($r$ = .23, $p$ = .01), and lower self-reported understanding of ASD ($r$ = .29, $p$ < .01). Spending a significant amount of time with someone with ASD was also related to positive traits ($r$ = .29, $p$ < .01), desire to learn more ($r$ = .27, $p$ < .01), lower self-reported understanding ($r$ =

.45, $p < .01$), and the number of correct traits selected ($r = .18$, $p = .045$). As such, both of these variables were included in further analysis (see Table 2 for correlations between variables).

*Knowledge.* An ANCOVA was conducted looking at participants' knowledge, controlling for their experience with ASD. Participants in the novel and textbook conditions did not differ on the number of correct behaviors selected, $F(1,120) = 2.24$, $p = .14$. However, participants in the novel condition (M = 4.23, SD = 2.79) selected fewer incorrect behaviors than the textbook condition (M = 5.02, SD = 3.19) after controlling for experience with ASD, $F(1,120) = 4.15$ , $p = .04$.

*Attitudes.* A second ANCOVA was conducted, looking at the impact of condition on attitudes, controlling for experience with ASD. Participants in the novel condition attributed more positive traits (M = 6.3, SD = 3.15) to individuals with ASD than those in the textbook condition (M = 3.95, SD = 3.29), $F(1,120) = 10.0$, $p < .01$. Participants did not differ in the number of negative traits attributed to individuals with ASD $F(1,120) = 1.7$, $p = .20$.

*Understanding.* Two more ANCOVAs, controlling for experience with ASD, were conducted, looking at participants' self-reported understanding of ASD. Participants in the textbook condition reported a greater self-perceived understanding of what ASD is (M = 2.95, SD = .62) than those in the novel condition (M = 2.61, SD = .97), $F(1,120) = 7.24$ , $p = .01$. The same was true for understanding about what it is like to have ASD, with the textbook condition reporting greater understanding (M = 2.32, SD = .87) than the novel condition (M = 1.9, SD = 1.10), $F(1,120) = 4.54$, $p = .04$. These results differ from those in Stern and Barnes (2019), where no difference was found.

*Interest in Learning More.* An ANCOVA was conducted looking at participant's desire to learn more about ASD in the future, controlling for experience with ASD. Participants in the

novel condition (M = 2.51, SD = .54) did not differ from those in the textbook condition (M = 2.35, SD = .58) in their desire to learn more about ASD in the future, $F(1,120) = .04$, $p = .84$.

**Discussion**

This preliminary study extended the work of Stern and Barnes (2019) to see if written fiction, featuring a non-savant protagonist, would bolster knowledge about and attitudes toward individuals with ASD, compared to reading a textbook entry on autism. As found by Stern and Barnes (2019), participants in the current experiment did not differ in the number of correct behaviors they selected on the knowledge assessment. In contrast, participants in the novel condition selected fewer incorrect traits than those in the textbook condition, again replicating the results found Stern and Barnes (2019). These results suggest that the same positive impact television shows can have on knowledge can be found with written fiction as well. Given the differences in the stimuli used in Stern and Barnes (2019) and Study 1, it is particularly striking that the same pattern of results emerged. Stern and Barnes (2019) used a medical television drama that focused on an extraordinary savant, whose intellectual gifts allow him to save lives. Study 1 used a mystery novel featuring a young protagonist who is decidedly not a savant and has just been arrested. In both cases, people who were exposed to fiction about ASD were just as good at selecting behaviors that are associated with ASD, and less likely to select incorrect behaviors associated with ASD than those who read the textbook.

Consistent with parasocial contact theory and the results found by Stern and Barnes (2019**)**, participants in the novel condition indicated more positive attitudes towards individuals on the spectrum than those in the textbook condition. This finding is especially enlightening due to the more negative depiction of ASD found in the novel, compared to that of the television character used in the previous study (Stern & Barnes, 2019). The excerpt used from *The Curious*

*Incident of the Dog in the Nighttime* actually involved the character getting arrested for a misunderstanding he had caused due to difficulties with social interaction and communication. This depiction is quite different from the way the surgeon main character in *The Good Doctor* is portrayed. Thus, the current study offers evidence that attitudes can be improved even in the absence of savantism.

Although the results looking at knowledge and attitudes replicated those found in Stern and Barnes (2019), there were differences in participants' self-reported understanding and desire to learn more. Unlike Stern and Barnes (2019), where participants did not differ in their self-reported understanding of ASD and understanding of what it is like to have ASD, in the current study, participants in the novel conditioned reported lower scores on both measures compared to participants who read the textbook. Although the participants in the textbook condition performed *worse* on the knowledge assessment by incorrectly selecting behaviors that are not associated with ASD, they nonetheless rated their level of understanding as higher than those who read the novel. Stern and Barnes (2019) also found that participants who watched *The Good Doctor* had a greater desire to learn more about ASD in the future, compared to those who watched a recorded lecture on ASD, while participants in the current study reported the same degree of interest in learning more across conditions.

The purpose of Study 1 was to extend and replicate Stern and Barnes (2019), using a popular mystery novel whose protagonist is not a savant; however, there are some limitations to this preliminary study—and the study on which it was based—that warrant consideration. The knowledge assessment used in Study 1 was the same measure used by Stern and Barnes (2019), which tested knowledge by having participants select behaviors that were associated with autism from a list containing some behaviors that are associated with ASD and some that are not.

Because most behaviors listed were negative, the more accurate performance by the group who read fiction may, in fact, reflect a difference in attitudes, rather than knowledge. Further, it is likely that the assessment being used underestimates knowledge in the textbook condition, since it only tests knowledge about behaviors associated with ASD and not about etiology or treatment, both of which are addressed by the textbook excerpt. A broader test of knowledge that assesses knowledge about etiology and treatment and takes a more holistic look at symptomology and diagnostic criteria is needed to truly assess the impact that popular media like *The Curious Incident of the Dog in the Night-time* has on the audience's knowledge about ASD.

Further research is also needed to examine whether the attitude assessment used in Study 1, which asks participants to check off attitudes to describe someone with ASD, generalizes to other established approaches to measuring attitudes. An assessment that involved participants' feelings towards interacting with someone with ASD may provide additional insight into real-world attitudes and stigmatization. For example, desire for social distance is a common method used to measure attitudes towards out-group members and is used in research on stereotypes and prejudice by measuring how far removed from another an individual desires to be (Gillespie-Lynch et al., 2015). For example, one question asks participants how comfortable they would be marrying a member of the target group (Gillespie-Lynch et al., 2015). To what degree, if any, does popular media decrease desire for social distance?

Study 1was also limited in that it relied on a single set of stimuli (one textbook, one novel). A more thorough understanding of the impact of popular fiction on knowledge about and attitudes toward ASD should include multiple literary depictions of ASD. Study 2 was designed to address these limitations.

## Study Two

Study 2, which was intended to probe the limits of the effects found in Study 1, focused on the impact of two best-selling novels featuring protagonists with ASD on novel knowledge and attitude assessments. Both Study 1 and Stern and Barnes (2019) likely underestimated the knowledge learned from the textbook condition, because much of the knowledge being taught was not assessed. Thus, Study 2 incorporated a measure of knowledge that included five subscales: etiology, treatment, awareness of the stigma faced by individuals with ASD, and diagnosis/symptoms. To the extent that fiction serves as a social simulation that offers insight into the minds of others (Mar & Oatley, 2008; Oatley, 2016), it was hypothesized that participants who read fiction would perform as well or better on the aspects of knowledge assessment that focus on what it's like to have autism, namely diagnosis and symptoms, and awareness of the kind of stigma people with autism face. In contrast, we predicted that individuals in the textbook condition would perform better on the knowledge assessment with respect to other categories of knowledge, such as etiology and suggested treatments, which tend to be a focus in textbooks but not in fiction.

## Methods

### Participants

One-hundred and fifty-three participants were recruited online through the Department of Psychology at a large Midwestern university. After removing responses from six participants for reading times lower than two standard deviations below the mean, 147 participants (female = 101, mean age = 19.29) remained in the final sample. All participants received class credit for their participation. In addition to demographic information, participants were asked whether or not they had ever spent a significant amount of time with someone with ASD and whether some they knew well or they themselves had ever been diagnosed with ASD. Out of the 147

participant sample, 23.8 % reported having a close other with ASD, while 36.7% reporting spending a significant amount of time around an individual with ASD.

**Procedure**

The same general procedure was used as in Study 1, with participants reporting demographic information (including experience with ASD). They were then randomly assigned to read either fiction (an excerpt from one of two novels) or nonfiction (an excerpt from one of two textbooks). After reading, participants completed the new dependent measures outlined below.

**Materials**

*Stimuli.* The stimuli used in Study 1 were used again in Study 2, along with one additional novel excerpt and one additional textbook. Participants were randomly assigned to either the novel or nonfiction condition, and within each condition, were randomly assigned to one of the two texts. The fiction texts used were *The Curious Incident of the Dog in the Night-time* (used in Study 1) and *The Rosie Project* by Graeme Simsion. *The Rosie Project* is a best-selling romance novel that depicts an adult male with ASD, Don Tillman, who is in search of a wife. Don's interactions with friends and potential wife candidates allow readers to experience the thoughts and behaviors of an individual with ASD. *The Rosie Project* and *The Curious Incident of the Dog in the Nighttime* are both best-selling novels. Although both stories are told from the point of view of a character with ASD and contain explicit discussion of behaviors associated with ASD, neither book is about autism per se. While *Curious Incident* focuses on a mystery about a teenager and conflict between him and his parents, *The Rosie Project* depicts a romance between an adult man and his romantic partner and has a more comedic and lighthearted tone. Participants assigned to the nonfiction condition were randomly assigned to

read the textbook excerpt used in Study 1 or a second textbook chapter (*Abnormal Psychology: Clinical Perspectives on Psychological Disorders* by Susan Whitbourne) that covered the DSM-V criteria for ASD, etiology, and treatment of ASD. Word counts for stimuli ranged from 2,100 to 2,400 words.

Similar to Study 1, both of the new stimuli were coded for their inclusion of the DSM criteria for ASD (American Psychiatric Association, 2013). *The Rosie Project* illustrated three of the five criteria and explicitly stated that ASD is associated with deficits in social communication. The second textbook excerpt explicitly stated four of the five criteria and illustrated deficits in social communication. The textbook excerpt explicitly stated significantly more aspects of ASD than *The Rosie Project*, $X^2(1, N = 24) = 10.67$, $p < .01$, while The Rosie Project illustrated more of the criteria than the textbook excerpt, $X^2(1, N = 24) = 8.71$, $p < .01$ (Table 3).

**Transportation**

Past research has shown that how much a reader is impacted by fiction can depend on the degree to which they engage with the story or are transported into the narrative (Green & Brock, 2000). As such, a measure of transportation was included. Participants in the novel condition completed a state transportation scale (Green & Brock, 2000). Items asked questions targeted at measuring participants emotional, cognitive, and attentional absorption in the narrative, such as "I could picture myself in the scene of the events depictures in the story" and "While I was reading the story, I could easily picture the events in it taking place," rated on a seven-point scale with higher scores indicating greater transportation.

**Dependent Measures**

*Knowledge about ASD.* To assess for broader knowledge about ASD than the behavioral checklist measure used in Study 1, a 50-item test developed by Harrison, Bradshaw, Naqvi, Paff, and Campbell (2017) was used. This test assesses participants' knowledge in four domains: diagnosis/symptoms, etiology, treatment, and awareness of stigma. Diagnostic/symptom questions looked at traits associated with ASD, such as problems with verbal and nonverbal communication, adherence to routine, and sensitivity to stimulation. This subscale was most similar to the method in which knowledge was assessed in Study 1. Etiology questions focused on hypothesized causes of ASD, as well as common misinformation associated with autism. Treatment questions focused on the importance of early intervention, whether or not ASD is curable, and different types of therapies found to help with symptomology. Questions about stigma assessed participants' knowledge about stigma commonly held about ASD.

Participants were presented with 50 statements about ASD. Some of the statements were true ("Many children with Autism have trouble understanding facial expressions" or "Some children with Autism do not talk") and some were false ("Autism exists only in childhood" or "We now have treatments that can cure Autism"). Participants were asked whether each statement was true or false and also had the option to select "I do not know." Items that were correctly labeled by participants as true or false were coded as correct responses, while items incorrected labeled as true or false were coded as incorrect. Although Harrison, Bradshaw, Naqvi, Paff, and Campbell (2017) coded "I don't know" responses as incorrect, we chose to keep them separate from incorrect responses. Indicating that you do not know the answer to a question is, in some sense, preferable to choosing an incorrect answer.

*Attitudes.* In line with other research investigating attitudes toward individuals with ASD, a social distancing scale was used (Gillespie-Lynch, et al., 2015). This 6-item scale asked

participants to report how comfortable they would be with a series of increasingly close associations with a person with ASD, such as moving next-door to someone with ADS and dating a person with ASD on a scale of one to four, with higher scores indicating a greater desire for distance and, thus, a more negative attitude.

**Results**

*Preliminary Analyses.* T-tests were first conducted looking at potential difference between the two different novel conditions and two different textbook conditions across the dependent measures. There were no significant differences within the two novel conditions or the two textbook conditions on any of the dependent variables of interest: knowledge, attitude, understanding, or desire to learn more (see Table 4 and Table 5). Conditions were thus collapsed for all further analyses, resulting in one combined novel condition and one combined textbook condition.

In order to examine the relationship between transportation into the fictional narratives and the effect of reading on various outcome measures, Pearson correlations were conducted. Participants who reported greater transportation into the narrative showed higher self-reported understanding of ASD ($r$ = .30, $p$ = .01) and desire to learn more ($r$ = .30, $p$ = .01). There was also a significant relationship between transportation and desire for social distance, such that the more transported participants were into the narrative, the less social distance they reported desiring from individuals with ASD, $r$ = -.28, $p$ = .01. Transportation did not correlate with the number of correct ($r$ = .06, $p$ = .65), incorrect ($r$ = .11, $p$ = .36), or "I don't know" responses ($r$ = -.20, $p$ = .08). Since transportation was only measures in the novel condition, it was not included as a factor in subsequent analyses.

Pearson correlations were conducted to examine the relationship between gender, prior experience with autism, and dependent measures. These analyses revealed a significant relationship between gender and variables of interest (Table 6). Women (M = 34.12, SD = 4.8) scored significantly higher than men (M = 31.52, SD = 6.58) in regards to number of correct answers ($r$ = .22, $p$ = .01), while men (M =12.04, SD 8.37) were more likely to respond that they did not know the answer to a question than women (M = 9.02, SD = 5.73), $r$ = -.21, $p$ = .01. Men (M = 5.21, SD = 3.45) and women (M = 4.90, SD = 2.61) did not differ in their number of incorrect responses, $r$ = -.05, $p$ = .55. Women (M = 2.95, SD = .68) also self-reported a greater understanding of ASD than men (M = 2.70, SD = .81), r = .20, p = .01. There was also a significant relationship between gender and desire for social distance ($r$ = -.18, $p$ = .03), such that men (M = 1.67, SD = .76) reported a greater desire for distance than women (M = 1.45, SD = .49). There were no significant correlations between gender and desire to learn more about ASD in the future. Gender was subsequently included in analyses for all variables with which it was significantly related.

Correlational analyses also showed a significant relationship between participants' personal history with ASD and their desire for social distance, such that individuals who reported having a close other with ASD (M = 1.34, SD = .35) desired less distance than those who did not (M = 1.56, SD = .62), $r$ = .21, $p$ = .01. Individuals with a close other who has ASD also reported more interest in learning more about ASD (M = 2.46, SD = .51) than those without a close other (M = 2.25, SD = .56), $r$ = -.21, $p$ = .01, and less understanding of what it's like to have ASD, $r$ = .18, $p$ = .04. There was no relationship between having a close other with ASD and knowledge about ASD. Individuals who reported spending time with individuals with ASD (M = 2.44, SD = .50) also showed more interest in learning more about ASD in the future than those who had not

(M = 2.20, SD = .58), $r$ = -.22, $p$ < .01. There was no relationship between participants' history with ASD and their knowledge about ASD. Experience with ASD was included in subsequent analyses on variables with which it was significantly related.

*Attitudes.* An ANCOVA was conducted looking at the impact of condition on participants' desire for social distance from individuals with ASD, controlling for gender and participants' personal history of having a close other with ASD. There was no difference in the desired social distance between participants in the textbook condition (M = 1.58, SD = .56) and novel condition (M = 1.46, SD = .60), $F(2, 147) = .007$, $p = .93$.

*Understanding*. Two ANCOVAs were conducted looking at the impact of condition on participants' self-reported understanding of ASD and understanding of what it is like to have ASD. Participants in the novel condition reported less perceived understanding of ASD (M = 2.62, SD = .78) than participants in the textbook condition (M = 3.08, SD = .60), $F(1, 147) = 16.60$, $p < .01$, controlling for gender. Participants in the novel condition (M = 2.33, SD = 1.04) also reported less understanding of what it is like to have ASD than participants in the textbook condition (M = 2.56, SD = 1.04), $F(1, 116) = 4.41$, $p = .04$, controlling for gender and experience with a close other. These results replicate those found in Study 1.

*Interest in Learning More.* An ANCOVA was run looking at the impact of condition on participants' desire to learn more about ASD in the future, controlling for time spent around others with ASD and participants' experience with a close other with ASD. Participants in the novel conditions (M = 2.39, SD = .56) reported a greater desire to learn more about ASD than those in the textbook condition (M = 2.18, SD = .56), $F(1,147) = 5.40$, $p = .02$

*Knowledge*. ANCOVAS were conducted looking at the impact of condition on the number of correct and incorrect responses on the knowledge assessment, controlling for gender.

Individuals in the novel condition chose fewer correct answers (M = 31.31, SD = 5.91) than participants in the textbook condition (M = 35.43, SD = 4.16), $F(1,140) = 34.03$, $p < .01$. Participants in the novel condition also chose fewer incorrect answers (M =4.01, SD = 2.69) than those in the textbook condition (M = 6.00, SD = 2.74), $F(1, 140) = .49$, $p < .01$. That participants in the novel condition chose fewer correct *and* incorrect answers is explained by the fact that they were nearly twice as likely to select "I don't know" (M = 12.90, SD = 7.20) as participants in the textbook condition (M = 6.90, SD = 4.70), $F(1,147) = 42.40$, $p < .01$.

Analyses then examined performance at the sub-scale level. As predicted, participants in the textbook condition significantly outperformed those in the novel condition on items assessing knowledge about etiology and treatment; however, contrary to our predictions, those in the textbook condition also scored higher on items assessing knowledge about diagnostic and symptom knowledge. There was no difference between conditions on items assessing knowledge about stigma (see Table 7).

*Post-hoc Analyses.* One explanation for the fact that participants in the novel condition were significantly more likely than those in the textbook condition to select "I do not know" as their answer is that the novel excerpts they read, though ecologically valid and widely read, may have contained fewer of the test's answers than the textbook excerpts or expressed them less explicitly. To examine this possibility, we coded all four stimuli for the presence/absence of the answer to each of the items on the test. As indicated in Table 8, there was significantly more information about ASD contained in the textbook excerpts.

In order to examine the performance on the textbook versus novel conditions only on items for which the correct answer appeared in both conditions, new versions of the knowledge assessment were created for each possible novel-textbook pairing. The specific items contained

in each novel stimulus were compared to the specific items included in each textbook stimulus, and a composite test was created for each pairing consisting only of items for which the answer was included in both the novel and the textbook entries. Thus, four new knowledge assessments were created and analyses were conducted comparing the number of correct and incorrect answers for the revised assessment for each of the textbook pairings. The test comparing textbook 1 and *Curious Incident* included 8 items (five diagnostic/symptom items, one stigma item, two etiology items, and one treatment item); the comparison between textbook 2 and *Curious Incident* included 9 items (six diagnostic/symptom items, one stigma item, two etiology items, and one treatment item). In contrast, the composite tests for *The Rosie Project* include more items: 16 for the test comparing it to textbook 1 (six diagnostic/symptom items, three stigma items, nine etiology items, and two treatment items) and 17 for the test comparing it to textbook 2 (six diagnostic/symptom items, five stigma items, nine etiology items, and two treatment items).

ANOVAs were conducted to compare participants' knowledge across each comparison. For three of the four textbook/novel pairings, participants in the textbook condition provided significantly more correct answers than participants in the novel condition (see Table 9 for breakdown). In contrast, for incorrect answers, though participants in the textbook condition tended to choose more incorrect answers than those in the novel condition across pairings, this difference only reached significance for one of the four novel/textbook pairings (see Table 10).

**Discussion**

In Study 2, participants read either one of two novels depicting ASD or one of two textbook chapters about ASD. They then completed two new assessments measuring their

knowledge and attitudes. Participants in the novel conditions chose fewer correct *and* fewer incorrect responses to questions assessing their knowledge about ASD, preferring to report that they did not know the answer to questions more than participants in the textbook condition. Because more information was included in the textbook conditions, a second set of analyses was conducted, looking only at items for which the correct answer appeared in the text, and a somewhat similar pattern appeared. More correct answers were given by participants who read the textbook for three of the four textbook-novel pairings, and more incorrect answers were chosen by participants who read one of the two textbooks than participants who read *The Curious Incident*. Strikingly, and in contrast to the attitude measure taken in Study 1, Study 2 found no difference in participants' desired social distance from individuals with ASD across the novel and textbook conditions.

Although transportation did not differ between the two novel conditions or relate to knowledge, participants who experienced greater levels of transportation into the narrative did report greater understanding of ASD and greater desire to learn more about it in the future. For participants in the novel condition, greater transportation was also related to less desire for social distance from individuals with ASD. Because no measure of engagement was taken in the textbook condition, comparisons across condition could not be made.

Comparing across Studies 1 and 2, several striking patterns emerge. In line with Study 1, participants in the novel condition chose fewer incorrect answers than participants in the textbook condition, despite Study 1 asking participants to select behaviors that apply to ASD and Study 2 requiring participants to respond to true or false questions. Participants in Study 2 also had the option to respond that they did not know the answer to questions, which participants in Study 1 did not. Participants in the fiction condition readily reported that they did not know

answers to questions. These results may be in part because there really was more information in the textbooks, but the fact that the textbook participants selected more wrong answers suggests that they are less aware of what they don't know. This might indicate a degree of overconfidence for participants in the textbook condition, with participants potentially feeling more comfortable and familiar with textbooks as a tool for learning. This is reflected in participants' self-reported perceptions of their own level of understanding, with participants in the novel condition in both Study 1 and 2 reporting less understanding of both ASD itself and the experience of having ASD. Contrary to Study 1, in which participants in the textbook and novel conditions selected the same number of correct responses, participants in the textbook conditions selected more correct answers, confirming that the measure used in Study and in Stern and Barnes (2019) underestimated the knowledge acquired in the nonfiction conditions by focusing on a narrow subset of knowledge learned. When assessing across a large degree of information that included etiology, treatment, and more material addressing diagnostic information and symptomology, participants did seem to learn more correct information from the textbooks.

Contrary to the results of Study 1, in which participants selected either positive or negative adjectives to describe someone with ASD, there were no differences in the desired social distance from individuals with ASD between conditions. However, there appears to be a floor effect, with participants in both groups reported means around one-and-a-half on a five-point scale. Attitudes were either quite positive or participants were less willing to self-report negative attitudes on more direct measures. Significantly, participants who reported greater transportation into the fictional narratives showed less desire for social distance, indicating that fiction may have the potential to impact attitudes to a greater extend when the reader is engaged with the narrative. It might also be the case that individuals with more positive attitudes towards

ASD are more likely to be transported into a narrative about the disorder or that another variable impacts both our attitudes and ability to become engrossed in a story.

Study 1 and Study 2 looked at popular novels as they were, maximizing ecological validity. However, the results of Study 2 are difficult to interpret, since each stimulus contained different information about ASD. When tests were conducted looking specifically at items shared between conditions, the results were more mixed and, unfortunately, the number of items included in these analyses were relatively small. Thus, Study 3 was designed to address these limitations by modifying stimuli to contain the same information about ASD.

## Study 3

Study 3 was designed to look at the impact reading has on learning and attitudes when the same information is conveyed in each narrative. A pre-test-post-test design was also used to directly assess for learning and attitude change in each condition. The novel and textbook excerpts were modified to include the answers to the questions in the knowledge measure, allowing us to test the degree to which information included in the stimuli was learned. If narratives—and particularly engrossing, popular media—facilitate learning (LaMerre, Landerville, & Beamn, 2009), then we would predict that participants who read the novel excerpt, containing the same information included in the textbook condition, would show the same, if not greater, degree of learning as those in the textbook condition. In contrast, if the results seen in Study 2 indicate that participants are more apt to learn from textbooks because textbooks cue learning, then we would expect participants in the textbook condition to show a greater degree of learning, contrary to the overall hypothesis set forth in the introduction.

With respect to attitudes, prior research has shown that fiction can bring about a change in attitude, via parasocial contact (Davido, Eller, & Hewstone, 2011; Stern & Barnes, 2019). This

was supported by the results of Study 1, but a floor effect was found for our social distancing measure in Study 2. Study 3 incorporated both attitude tests. By employing a pre-/post-test for the attitude measures, Study 3 aimed to examine whether reading changes attitudes. It was hypothesized that participants in the novel condition (compared to the textbook condition) would show a greater increase in positive attitudes towards individuals with ASD, measured as an increase in the number of positive adjectives selected to describe someone with ASD, a decrease in negative terms used to describe individuals with ASD, and a decrease in participant's desire for social distance.

## Methods

### Participants

One-hundred-and-sixty-two participants were recruited online through the Department of Psychology at a large Midwestern university. After removing responses from three participants due to incomplete responses, six participants for reading times shorter than two standard deviations below the mean, and 21 participants for failing to complete the pre-test, 133 participants (female =108, mean age = 18.56) remained in the final sample. All participants received class credit for their participation. Out of the 133 participants, 27.1% reported having a close other with ASD, while 46.6% reporting spending a significant amount of time around an individual with ASD.

### Procedure

Prior to coming in to the lab, participants completed the pre-test portion of the study as part of a larger online departmental prescreening survey. Participants responded to a demographic questionnaire and completed an assessment of their knowledge about ASD and two attitude assessments. A minimum of one week later, participants came into the lab, were

randomly assigned to the novel versus textbook condition, read their assigned material, and completed the same knowledge and attitudes assessments a second time.

**Materials**

*Conditions and Stimuli.* To better assess the impact of medium on learning, we generated modified stimuli that contained the answers to twenty-five of the items on the Harrison and colleagues (2017) knowledge assessment used in Study 2. To start, researchers referred to the coding from Study 2 to decide which of the two fiction stimuli and which of the two textbook stimuli to modify. The *Rosie Project* excerpt was selected to modify, since it contained the most information, and the first textbook excerpt was selected, as it had the most existing overlap with *The Rosie Project*. The questions from the knowledge assessment used in Study 2 were then translated from questions into facts (such as "Autism is not caused by cold parents"), and a list of 25 target facts were selected that were either already in both excerpts or could easily be added.

The excerpt from *The Rosie Project* was then modified by a professional fiction writer with the following process. First, excerpts from other sections of the book that contained the facts were taken and added into the original text; cuts were made to the original story to make room for this information, and segues were added to make the transitions between the old and new sections appear seamless. The same writer then went through the *Rosie Project* excerpt and added the remaining facts from the list of twenty-five, while maintaining narrative integrity.

The original textbook excerpt was then modified to contain the facts that it was missing, by pulling information from the second textbook used in Study 2 and adding text in logical places as necessary. After modification, each condition was 2565 to 2592 words in length and contained all 25 pieces of information tested on the knowledge assessment used in Study 2.

*Narrative Engagement.* To determine how participants' engagement with the content in both excerpts impacted their knowledge and attitudes, a subset of items taken from the narrative engagement scale was included (Busselle & Bilanzic, 2008). These items were chosen because they pertained to both fiction and textbook reading. Items that did not apply to both types of narrative were not included. The scale assessed engagement across seven items, such as "At points, I had a hard time making sense of what was going on in the text" and "I found my mind wandering while reading." Participants responded to each item on a seven-point scale, with high scores indicating greater engagement with the text.

*Knowledge.* The knowledge assessment used in Study 2 was modified to only contain the items included in the two modified stimuli. The final assessment consisted of 24 questions: 10 diagnostic/symptom questions, 6 etiology questions, and 8 questions about treatment. Each question was presented with a "true", "false", and "I do not know" response option. All items appeared in both the pre-test and post-test.

*Attitudes.* Two methods of assessing participants' attitudes towards individuals with ASD were included in both the pre- and post-tests. Both the adjective checklist from Study 1 and the social distancing scale from Study 2 were included.

*Other Measures.* The same self-report questions assessing participants perceived understanding of ASD, perceived understanding of what it is like to have ASD, and their desire to learn more were included in the post-test.

**Results**

*Preliminary Analyses.* Participants in the novel condition (M = 4.50, SD = 1.46) and textbook condition (M = 4.53, SD = 1.43) did not differ in the amount of narrative engagement experienced, $t(130.57) = -.11$, $p = .91$. Narrative engagement did not show a significant

relationship with any variables of interest: positive traits selected ($r$ = .09, $p$ = .30), negative traits selected ($r$ = -.15, $p$ = .09), social distance ($r$ = -.14, $p$ = .10), "I don't know" responses ($r$ = -.01, $p$ = .94), incorrect answers ($r$ = .01, $p$ = .90), correct answers ($r$ = .01, $p$ = .99), understanding of ASD ($r$ = .04, $p$ = .61), understanding of what it is like to have ASD ($r$ = -.04, $p$ = .67), or desire to learn more ($r$ = .06, $p$ = .47). It was excluded from further analyses.

*Learning.* To assess the degree of learning taking place from pre-test to post-test assessment, repeated measures ANOVAs were conducted for each knowledge variable: number correct, number incorrect, and number of "I don't know" responses. There was a significant main effect of reading on the number of correct responses selected. Participants selected more correct answers in the post-test after reading (M = 18.23, SD = 2.86) than in the pre-test (M = 15.53, SD = 4.41), $F(1,130) = 68.24$, $p < .01$. There was no effect of condition (novel versus textbook), $F(1,130) = .124$, $p = .73$, or interaction between condition and time, $F(1,130) = 27.18$, $p = .07$. There was also a significant decrease in the number of times participants reported not knowing the answer to in both conditions between the pre-test (M = 6.77, SD = 4.91) and post-test (M = 3.91, SD = 2.97), $F(1,130) = 65.37$, $p < .01$. There was no effect of condition on the change in number of times participants indicated that they did not know the answer to a question, $F(1,130) = .54$, $p = .46$, or interaction between condition and time, $F(1,130) = 3.30$, $p = .07$. There was not a significant change in the number of incorrect responses selected between the pre-test (M = 1.90, SD = 2.16) and post-test (M = 1.84, SD = 1.82), $F(1,130) = .10$, $p = .76$. Once again, there was no impact of condition, $F(1,130) = .84$, $p = .36$, or interaction between condition and time, $F(1.130) = .01$, $p = .95$.

*Attitudes.* Repeated measures ANOVAs were then conducted looking at the impact of reading on attitudes towards individuals with ASD as measured by the number of positive traits

and negative traits selected by participants and participants' desire for social distance. There was a main effect of reading on the number of negative traits selected, such that participants selected more negative traits after reading than before, $F(1,121) = 14.13$, $p < .01$; however, this was qualified by a significant interaction of condition and reading (pre-/post-) on the number of negative traits selected, $F(1,121) = 12.13$, $p < .01$. Participants in the textbook condition showed a significant increase in the number of negative traits selected (before reading: M = 3.69, SD = 2.25, after reading: M = 5.51, SD = 2.63), $t(58) = -5.55$, $p < .01$. In contrast, participants in the novel condition did not differ in the number of negative traits they attributed to individuals with autism before (M = 3.97, SD = 2.46) and after reading (M = 4.00, SD = 2.31), $t(65) = -.10$, $p = .92$ (Figure 1).

Similarly, there was a main effect of reading on the number of positive traits selected by participants, such that participants selected significantly more positive traits before reading (M = 6.50, SD = 3.22) than after reading (M = 6.33, SD = 2.98), $F(1,121) = .43$, p = .01. However, there was also significant interaction of condition and reading (pre/post) on the number of positive traits selected, $F(1,121) = 9.37$, $p < .01$. Participants in the novel condition selected more positive traits after reading (M = 7. 29, SD = 2.54) than before (M = 6.46, SD = 3.21), $t(68) = -2.09$, $p = .04$. Participants in the textbook condition selected fewer positive traits after reading (M = 5.31, SD = 3.05) than before (M = 6.49, SD = 3.23), t(60) = 2.48, p = .02 (Figure 2).

A main effect of reading was also found for participants' desire for social distance, such that participants desired significantly more social distance before reading (M = 1.70, SD = .61) than after reading (M = 1.66, SD - .57), F(1,121) = .55, p < .01. There was also a significant interaction of condition and reading (pre-/post-), $F(1,121) = 5.67$, $p = .02$. Participants in the novel condition showed less desire for social distance after reading (M = 1.57, SD = .36) than

before (M = 1.72, SD = .60), $t(68) = 2.81$, $p < .01$. Participants in the textbook condition, however, did not show a significant difference in desire for social distance before (M = 1.65, SD = .63) and after reading (M = 1.73, SD = .72), $t(63) = -.99$, $p = .33$ (Figure 3).

*Understanding.* Two ANCOVAs were conducted, looking at participants' understanding and controlling for their experience with ASD. Participants in the novel (M = 2.80, SD = .92) and textbook (M = 3.02, SD = .68) conditions did not differ in their self-reported understanding of ASD, $F(1,124) = .001$, $p = .97$. Likewise, there was no difference in self-reported understanding of what it is like to have ASD between the novel (M = 2.19, SD = 1.07) and textbook (M = 2.38, SD = 1.09) conditions, $F(1,124) = .005$, $p = .94$.

*Desire to Learn More*. An additional ANCOVA was conducted looking at participants' desire to learn more about ASD in the future, controlling for gender and experience with ASD. There was no difference between the novel (M =2.29 , SD = .60) and textbook (M = 2.25, SD = .59) conditions, $F(1,118) = 1.43$, $p = .24$.

**Discussion**

In Study 3, modified novel and textbook excerpts were created to contain the same information about ASD. Participants' knowledge about and attitudes towards ASD were assessed prior to and immediately after reading a textbook or novel excerpt that had been modified to include answers to the 25 knowledge items on which participants were assessed. In contrast to Study 2, the same degree of learning occurred in both the novel and textbook conditions, indicating that when the same information was included in both texts, the type of narrative did not impact learning. Both groups saw an increase in correct responses and a decrease in the number of times they reported not knowing the answer to a question. In contrast, very different patterns of results were found for the attitudes measures: participants in the novel condition

showed more positive attitudes after reading, while participants in the textbook condition actually showed more negative attitudes after reading. After reading the novel excerpt, participants desired less social distance, reported fewer negative traits, and reported more positive traits than they had before reading. In contrast, after reading the textbook excerpt, participants saw an increase in negative traits and a decrease in positive traits selected, indicating that they felt more negatively about people with ASD after reading the textbook, and no change was found in terms of desire for social distance.

The knowledge results found in Study 3 support the hypothesis that participants would learn as well from fiction as from the textbook. In contrast to some prior research, participants did not learn better from fiction than nonfiction (LaMarre, Landerville, & Beam 2009; Marsh, Butler & Umanath, 2012 Dubeck, Moshier, & Boss, 2006), but rather just as well. While knowledge did improve after reading, the number of incorrect answers did not change. It does not appear that reading the excerpts provided corrected misconceptions, but rather resulted in more correct and few I don't know answers.

Taken as a whole, these results are significant for several reasons. First, they support the hypothesis that reading fiction can have a positive impact on attitudes towards individuals with ASD. This offers further evidence that parasocial contact with non-neurotypical individuals via the popular fiction we consume can generates positive attitude change (see Schiappa, Gregg, & Hewes, 2005). Notably, however, these results also suggest a downside to reading a traditional college textbook chapter on Autism Spectrum Disorder. It appears that, at least with respect to the specific textbook used in this study, the information presented and the way that it is presented might result in the readers adopting more negative attitudes towards individuals with ASD. This negative impact of the textbook excerpt might be caused by the types of examples often given in

the textbook excerpt. For example, to provide an illustration of what ASD is like, the textbook excerpt included the following:

> Amy, 3 years old, spends much of her day picking up pieces of lint. She drops the lint in the air and then watches intently as it falls to the floor. She also licks the back of her hands and stares at the saliva. She hasn't spoken yet and can't feed or dress herself. Several times a day she screams so loudly that the neighbors at first thought she was being abused. She doesn't seem to be interested in her mother's love and affection but will take her mother's hand to lead her to the refrigerator. Amy likes to eat butter- whole pats of it, several at a time. Her mother uses the pats of butter that you get at some restaurants to help Amy learn and to keep her well-behaved. If Amy helps with dressing herself, or if she sits quietly for several minutes, her mother gives her some butter. Amy's mother knows that butter isn't good for her, but it's the only things that seems to get through to the child. The family's pediatrician has been concerned about Amy's developmental delays for some time and has recently suggested that she be evaluated by specialists. The pediatrician thinks that Amy may have Autism Spectrum Disorder and the child and her family will probably need extensive support (Whitebourne, 2016).

While an accurate reflection of some common symptoms of ASD, this excerpt focuses on the negative impact ASD has on both Amy and her mother. Having examples such as this serve as the only peak into the life of someone with ASD could account for the decrease in attitudes seen post-test in Study 3. Interestingly, the novel excerpts used did include negative aspects of ASD, but the story was told from the perspective of a highly intelligent character with ASD from that character's own perspective.

It is also worth noting that there were some similarities in the way information was presented in the novel and textbook conditions. In the excerpt used from *The Rosie Project,* a character with autism is giving a fictional lecture about autism. Some information about ASD is stated explicitly as fact in the character's spoken dialogue during his lecture, while other information is depicted in the character's behavior. For example, the main character tells his audience that Autism is a brain-based disorder, while exhibiting some of the socioemotional problems common to ASD in his interactions with other characters. While

the textbook excerpt is heavily weighted toward explicit explanation of autism, it does offer one narrative component, when it depicts an interaction between a low-functioning young girl with ASD and her mother. In light of these similarities, and the differences found in attitudes after reading the novel and textbook excerpts, it might be the case that if you are only given one exemplar when learning, attitudes are going to depend on who that exemplar is and whether they are depicted in a positive or negative manner.

The unique characteristics of the chapter of *The Rosie Project* used in this study also highlight one of the study limitations: the excerpts used in Study 3 were modifications of existing text and, thus, might vary from actual popular media, and the specific excerpt in *The Rosie Project* may be unique in that it focuses on teaching about autism. Thus, these results, unlike the results of Study 1 and Study 2, don't necessarily reflect what popular fiction *does* teach us, but rather what it has the potential to teach us.

## General Discussion

Across three experiments, the current research examined the impact two popular novels about ASD had on knowledge and attitudes about ASD, testing the hypotheses that reading novel excerpts about ASD would cause participants to learn as much or more information about ASD and improve attitudes towards ASD, compared to participants who read a textbook chapter. The results of Study 1 replicated the findings of Stern and Barnes (2019)**,** showing that a popular novel depicting a character with ASD who is not a savant, *The Curious Incident of the Dog in the Nighttime*, had the same positive impact on knowledge and attitudes found in prior research focused on *The Good Doctor*, a popular television show featuring a main character with autism. Participants who read an excerpt from *The Curious Incident of the Dog in the Nighttime*

identified the same number of correct behaviors and fewer incorrect behaviors associated with ASD and attributed more positive adjectives to individuals with ASD.

Study 2 attempted to extend these findings using a wider array of knowledge and attitudes measures and looking at a wider variety of stimuli. In line with the results from Study 1, participants in the novel condition selected fewer incorrect answers; however, they also selected fewer correct answers and were more likely to report that they did not know the answer to questions, implying less confidence in their knowledge. Post hoc tests controlling for information contained in each excerpt yielded more mixed results. Some of the comparisons showed the same trend, while others trended in the same direction and may have suffered from having a low number of shared items to compare. In terms of attitudes, no differences were found across conditions in participants' desire for social distance from individuals with ASD, likely due to a floor effect. Studies 1 and 2 also found that participants in the textbook condition reported having a greater understanding of ASD and what it is like to have ASD, while those in the novel condition reported a greater desire to learn more about ASD in the future only in Study 2. These results indicate that participants were more confident in their knowledge after reading an information-dense textbook chapter and may have even felt like there was less for them to learn going forward. Taken together, these results highlight the importance of the quantity and type of information embedded in narratives about autism, as well as the importance of using multiple measures when assessing knowledge and attitudes. While Study 1 and 2 looked at the impact of excerpts from best-selling novels that have been widely read and may well be impacting audiences in the real world, Study 3 traded some of the ecological validity associated with this approach in order to have more control over the information embedded in each excerpt.

Study 3 used a pre-post-test design and utilized stimuli modified to include the same information about ASD in both the novel and textbook conditions. Participants in both conditions saw the same increase in knowledge after reading. Participants in the novel condition also saw improved attitudes after reading, while participants in the textbook condition actually reported more negative attitudes after reading the textbook excerpt about ASD. When the information contained in the novel and textbook were matched, no effects were found in self-perceived understanding or desire to learn more.

These findings indicate that reading a novel about ASD can be just as effective at teaching individuals about ASD as reading about it in a textbook. Past research on learning from stories more broadly suggests that consuming these stories about ASD may allow readers to experience the world of an individual with autism in a way that engages attention, connects the story with our own experiences, and simulates what the character's world is like (Green & Brock, 2000; Gerrig & Prentice, 1991; Mar & Oatley, 2008). When we read, we integrate the new information being consumed into our understanding of the real world, regardless of the fictionality of the story being read (Appel & Richter, 2007; Busselle & Bilandzic, 2008). However, you can only learn what is included in the text, and popular fiction likely presents less information and a narrower array of information than textbooks. Thus, in Study 1, where the array of knowledge tested was suitably narrow, participants in the knowledge condition outperformed those in the textbook condition, but in Study 2, where a wider array of knowledge was tested, a very different pattern of results was found. It is also worth noting that in contrast to past research, which found an advantage to fiction, in Study 3, where content was controlled, the current study found no difference in learning across conditions. Notably, however, the current

studies used *excerpts* from novels, not the entire novels. It is possible that reading the novels in their entirety may have had a different effect.

Future research is also needed to examine the combined effect of reading fiction and a textbook chapter; it is possible that assigning fiction and nonfiction to be read in tandem might result in greater learning than reading one alone or even repeated exposure to either condition. This approach to learning allows for reprocessing of information and has been shown to increase recall (Marsh, Butler, & Umanath, 2012). Future research incorporating fiction on ASD into an actual classroom environment as part of the curriculum may be particularly enlightening, as past research has shown that it can increase interest and promote learning (Kennedy, Senses, & Ayan, 2011; Ventura & Osman, 2009; Marsh, Butler, & Umanath, 2013). It is also possible that reading these excerpts in the context of a lab setting might prompt people to engage with the content differently than how they would consume them on their own. Past research has shown similar learning outcomes when consuming fiction in a classroom versus a laboratory setting (Marsh, Butler, & Umanath, 2012), but it is less clear whether the same type of learning occurs when reading in a more naturalistic setting.

It also remains to be seen what variables increase or decrease the likelihood that an individual will learn from a work of fiction. Study 2 attempted to answer this question by looking at participant transportation into the story (Green & Brock, 2000). Participants who were more transported into the story felt that they understood ASD more and reported more positive attitudes. However, when Study 3 attempted to look at engagement across both conditions, by measuring narrative engagement, no relationship was found (Busselle & Bilanzic, 2009**).** A better understanding of this, along with a better understanding of the individual differences that might contribute to someone learning from fiction, might allow us to better incorporate fiction

into the classroom and produce fiction that effectively educates those who consume it. To this end, it is noteworthy that although the stimuli used in the current research extended past research to a new medium, including two new genres, both novels used here focused on male protagonists and are written in the first person. Future research should consider the impact these variables might have on learning and attitude change, particularly given that many works on ASD approach autism from the perspective of family and friends, rather than the individual themselves (Holton, Farrell, & Fudge, 2014).

Another interesting outcome of the current research that merits further investigation is the degree to which reading textbooks may cause students to overestimate their own level of knowledge about clinical populations. When asked how well they felt they understood ASD and what it is like to have ASD, participants in the textbook conditions in Studies 1 and 2 reported higher levels of perceived understanding, but also gave more incorrect answers. This is in line with prior research that has shown that college students are often overconfident in their judgements of the knowledge they gain from traditional course materials, such as textbooks, with students' self-assessments of their own accuracy often outscoring their actual performance on assessments (Dunlosky, Hartwig, Rawson, & Lipko, 2011). However, there was no difference in participant's perceived understanding of ASD between the conditions used in Study 3. Perhaps mere exposure to information about ASD is driving participants self-reported understanding, rather than the format the information is in. While perceived understanding may be a function of the total amount of information delivered (and a corresponding increase in knowledge), it is worth noting that neither the textbook nor fiction excerpts affected the number of incorrect answers given.

Learning about ASD from the textbook excerpt also had the added effect of worsening attitudes towards individuals with ASD, while the opposite occurred when reading a novel. However, the stark contrast in the exemplars given in the textbook and novel conditions also suggest that learning about ASD through parasocial contact with a character who has autism might buffer against these negative attitude changes. The current studies suggest that it may be important to consider the types of examples we are exposing students to in traditional educational media, particularly if only one or two exemplars are given. Similarly, given that the popular media focused on a single exemplar character with ASD, it is possible that reading bolstered attitudes because the excerpt did not depict the full range of the autism spectrum. Notably, both attitude measures used asked participants to respond about "a person with ASD," therefore capturing their attitudes towards individuals labeled as having ASD. Research on the effects of labeling suggests that there is power in the labels we apply to people, such that the judgements we make about others are often lead by the stereotypes we hold about their group (Scheff, 1966; Jussim, Nelson, Manis, & Soffin, 1995); however, in the real world, we do not always know whether someone has a disorder or not. For example, it might be the case that participants who read *Curious Incident* might judge a classmate who shows symptoms of ASD, without having been confirmed as having a diagnosis, more harshly. Wright, Jorm, and Mackinnon (2011) found that teenagers and young adults rated others more harshly after they exhibited atypical behaviors when they were not labeled as having a disorder. Similarly, Brosnan and Mills (2016) found that college students rated peers more positively after seeing them display symptoms of ASD when they were told that the person had autism, compared to when they were not labeled. Future research should assess whether the positive impact of fiction and negative impact of textbooks on attitudes persists in the real world in the absence of a label.

Taken as a whole, the current studies suggest that popular media can be a powerful tool for teaching about conditions like autism. Although the excerpts chosen for these studies were selected for their accurate portrayal of ASD, many shows and books that feature autism contain inaccurate depictions (Lee, 2019; Holton, 2013; Holmes, 2014) and there is a need for ongoing research that continually explores the effects of specific, widely consumed media properties. Extending this research to an even wider array of popular media properties is particularly important given that a single depiction of someone's life might only scratch the surface of the many potential ways ASD can present itself (Holton, 2013; Draaisma, 2009). Nonetheless, the current research highlights the potential popular fiction has for teaching us about Autism Spectrum Disorder in a way that does not carry with it the negative effects of traditional textbooks, while improving our attitudes towards others whose minds may work differently from our own.

## References


Allport, G. W., Clark, K., & Pettigrew, T. (1954). The nature of prejudice.

American Psychiatric Association. (2013). Diagnostic and statistical manual of mental disorders (5th ed.). Washington, DC: American Psychiatric Association.

Appel, M., & Mara, M. (2013). The persuasive influence of a fictional character's trustworthiness. *Journal of Communication, 63*(5), 912-932.

Appel, M., & Richter, T. (2007). Persuasive effects of fictional narratives increase over time. *Media Psychology, 10*(1), 113-134.

Bal, P. M., & Veltkamp, M. (2013). How does fiction reading influence empathy? An experimental investigation on the role of emotional transportation. *PloS one*, *8*(1), e55341.

Barlow, D. H., Durand, V. M., Lalumiere, M. L., & Hofmann, S. G. (2018). *Abnormal psychology: An integrative approach*. Toronto, Ontario: Nelson Education.

Beecher, C. C., & Darragh, J. J. (2011). Using literature that portrays individuals with autism with pre-service teachers. *The Clearing House: A Journal of Educational Strategies, Issues and Ideas, 84*(1), 21-25.

Black, J., & Barnes, J. L. (2015). Fiction and social cognition: The effect of viewing award-winning television dramas on theory of mind. *Psychology of Aesthetics, Creativity, and the Arts, 9*(4), 423.

Brosnan, M., & Mills, E. (2016). The effect of diagnostic labels on the affective responses of college students towards peers with ‘Asperger’s Syndrome’ and ‘Autism Spectrum Disorder’. Autism, 20(4), 388–394.

Burks-Abbott, G. (2007). 16 Mark haddon's Popularity and Other Curious Incidents in My life as an Autistic. *Autism and representation*, 289.

Busselle, R., & Bilandzic, H. (2008). Fictionality and perceived realism in experiencing stories: A model of narrative comprehension and engagement. *Communication Theory*, *18*(2), 255-280.

Butler, A. C., Dennis, N. A., & Marsh, E. J. (2012). Inferring facts from fiction: Reading correct and incorrect information affects memory for related information. *Memory*, *20*(5), 487-498.

Clark, T. (2018). *The 9 most popular TV shows of 2018, according to Nielsen ratings.* Retrieved from https://www.businessinsider.com/most-popular-tv-shows-of-2018-according-to-nielsen-ratings-2018-12

Cohen, J. (2003). Parasocial breakups: Measuring individual differences in responses to the dissolution of parasocial relationships. *Mass Communication & Society*, *6*(2), 191-202.

Cook, A. E., & O'Brien, E. J. (2014). Knowledge activation, integration, and validation during narrative text comprehension. *Discourse Processes*, *51*(1-2), 26-49.

Corrigan, P. W. (2000). Mental health stigma as social attribution: Implications for research methods and attitude change. *Clinical psychology: science and practice*, *7*(1), 48-67.

Dovidio, J. F., Eller, A., & Hewstone, M. (2011). Improving intergroup relations through direct, extended and other forms of indirect contact. *Group processes & intergroup relations*, *14*(2), 147-160.

Deutsch, M., & Collins, M. E. (1951). *Interracial housing: A psychological evaluation of a social experiment*. U of Minnesota Press.

Dubeck, L. W., Moshier, S. E., & Boss, J. E. (2006). *Fantastic voyages: Learning science through science fiction films*. Springer Science & Business Media.

Dodell-Feder, D., & Tamir, D. I. (2018). Fiction reading has a small positive impact on social cognition: A meta-analysis. *Journal of Experimental Psychology: General*. *147*(11), 1713.

Draaisma, D. (2009). Stereotypes of autism. *Philosophical Transactions of the Royal Society B: Biological Sciences*, *364*(1522), 1475-1480.

Dunlosky, J., Hartwig, M. K., Rawson, K. A., & Lipko, A. R. (2011). Improving college students' evaluation of text learning using idea-unit standards. *The Quarterly Journal of Experimental Psychology*, *64*(3), 467-484.

Geerdts, M. S., Van de Walle, G. A., & LoBue, V. (2016). Learning about real animals from anthropomorphic media. *Imagination, Cognition and Personality*, *36*(1), 5-26.

Gerrig, R. J., & Prentice, D. A. (1991). The representation of fictional information. *Psychological Science*, *2*(5), 336-340.

Giles, D. C. (2002). Parasocial interaction: A review of the literature and a model for future research. *Media psychology*, *4*(3), 279-305.

Gillespie-Lynch, K., Brooks, P. J., Someki, F., Obeid, R., Shane-Simpson, C., Kapp, S. K., ... & Smith, D. S. (2015). Changing college students' conceptions of autism: An online training to increase knowledge and decrease stigma. *Journal of Autism and Developmental Disorders*, *45*(8), 2553-2566.

Gjerde, P., Sand, R., & Kleiven, J. (1979). An experimental investigation of the labelling effect of psychiatric diagnosis. *Scandinavian Journal of Psychology*, *20*(3), 187-192.

Green, M. C., & Brock, T. C. (2000). The role of transportation in the persuasiveness of public narratives. *Journal of personality and social psychology*, *79*(5), 701.

Green, M. C. (2004). Transportation into narrative worlds: The role of prior knowledge and perceived realism. *Discourse processes*, *38*(2), 247-266.

Haddon, M. (2003). *The curious incident of the dog in the nighttime*. Brantford, Ont.: W. Ross MacDonald School Resource Services Library.

Harrison, A. J., Bradshaw, L. P., Naqvi, N. C., Paff, M. L., & Campbell, J. M. (2017). Development and psychometric evaluation of the autism stigma and knowledge questionnaire (ASK-Q). *Journal of autism and developmental disorders*, *47*(10), 3281-3295.

Heilker, P. (2012). Autism, rhetoric, and whiteness. *Disability Studies Quarterly*, *32*(4).

Hoang, H. (2019). The kiss quotient. Crows Nest, NSW: Allen & Unwin.

Hoffner, C. A., & Cohen, E. L. (2012). Responses to obsessive compulsive disorder on Monk among series fans: Parasocial relations, presumed media influence, and behavioral outcomes. *Journal of Broadcasting & Electronic Media*, *56*(4), 650-668.

Holmes, S. (2014). Mental health matters: Addressing mental illness in young adult fiction. *Language Arts Journal of Michigan*, *30*(1), 14.

Holton, A. E. (2013). What's wrong with Max? Parenthood and the portrayal of autism spectrum disorders. *Journal of Communication Inquiry*, *37*(1), 45-63.

Holton, A. E., Farrell, L. C., & Fudge, J. L. (2014). A threatening space?: Stigmatization and the framing of autism in the news. *Communication Studies*, *65*(2), 189-207.

Horton, D., & Richard Wohl, R. (1956). Mass communication and para-social interaction: Observations on intimacy at a distance. *Psychiatry*, *19*(3), 215-229.

Johnson, D. R., Huffman, B. L., & Jasper, D. M. (2014). Changing race boundary perception by reading narrative fiction. *Basic and Applied Social Psychology, 36*(1), 83-90.

Joyce, N., & Harwood, J. (2014). Improving intergroup attitudes through televised vicarious intergroup contact: Social cognitive processing of ingroup and outgroup information. *Communication Research, 41*(5), 627-643.

Jussim, L., Nelson, T. E., Manis, M., & Soffin, S. (1995). Prejudice, stereotypes, and labeling effects: Sources of bias in person perception. *Journal of Personality and Social Psychology, 68*(2), 228-246.

Kapp, S. K. (2018). Social support, well-being, and quality of life among individuals on the autism spectrum. *Pediatrics*, *141*(Supplement 4), S362-S368.

Kaufman, G. F., & Libby, L. K. (2012). Changing beliefs and behavior through experience-taking. *Journal of personality and social psychology*, *103*(1), 1.

Kennedy, N., Şenses, N., & Ayan, P. (2011). Grasping the social through movies. *Teaching in Higher Education*, *16*(1), 1-14.

Kephart, W. M. (1957). Racial factors and urban law enforcement. Baltimore, MD, US: University of Pennsylvania Press.

Kidd, D. C. (2015). *The effects of reading literary and popular fiction on theory of mind*. Available from APA PsycInfo. (1767656521; 2015-99240-555).

Kidd, D. C., & Castano, E. (2013). Reading literary fiction improves theory of mind. *Science*, *342*(6156), 377-380.

Kidd, D., & Castano, E. (2018). Reading Literary Fiction and Theory of Mind: Three Preregistered Replications and Extensions of Kidd and Castano (2013). *Social Psychological and Personality Science,* 1948550618775410.

Kidd, D., Ongis, M., & Castano, E. (2016). On literary fiction and its effects on theory of mind. *Scientific Study of Literature*, *6*(1), 42-58.

Krueger, J. (1996). Personal beliefs and cultural stereotypes about racial characteristics. *Journal of personality and Social Psychology*, *71*(3), 536.

LaMarre, H. L., Landreville, K. D., & Beam, M. A. (2009). The irony of satire: Political ideology and the motivation to see what you want to see in The Colbert Report. *The International Journal of Press/Politics*, *14*(2), 212-231.

Lee, M. M. (2019). The trouble with autism in novels. Retrieved from https://www.nytimes.com/2019/02/04/books/review/autism-marie-myung-ok-lee.html

Mar, R. A. (2011). The neural bases of social cognition and story comprehension. *Annual review of psychology*, *62*, 103-134.

Mar, R. A., Kelley, W. M., Heatherton, T. F., & Macrae, C. N. (2007). Detecting agency from the biological motion of veridical vs animated agents. *Social cognitive and affective neuroscience*, *2*(3), 199-205.

Mar, R. A., & Oatley, K. (2008). The function of fiction is the abstraction and simulation of social experience. *Perspectives on psychological science*, *3*(3), 173-192.

Mar, R. A., Oatley, K., & Hirsch, J. Paz, Jennifer dela, & Peterson, Jordan.(2006). Bookworms versus nerds: Exposure to fiction versus non-fiction, divergent associations with social ability, and the simulation of fictional social worlds. *Journal of Research in Personality*, *40*(5), 694-712.

Marsh, E. J., Butler, A. C., & Umanath, S. (2012). Using fictional sources in the classroom: Applications from cognitive psychology. *Educational Psychology Review*, *24*(3), 449-469.

Marsh, E. J., Meade, M. L., & Roediger III, H. L. (2003). Learning facts from fiction. *Journal of Memory and Language*, *49*(4), 519-536.

Matthews, M. (2019). Why Sheldon Cooper Can't Be Black: The Visual Rhetoric of Autism and Ethnicity. *Journal of Literary & Cultural Disability Studies*, *13*(1), 57-74.

Murrar, S., & Brauer, M. (2018). Entertainment-education effectively reduces prejudice. *Group Processes & Intergroup Relations*, *21*(7), 1053-1077.

Moyer-Gusé, E., & Dale, K. (2017). Narrative persuasion theories. *The international encyclopedia of media effects*, 1-11.

Niemann, Y. F., Jennings, L., Rozelle, R. M., Baxter, J. C., & Sullivan, E. (1994). Use of free responses and cluster analysis to determine stereotypes of eight groups. *Personality and Social Psychology Bulletin*, *20*(4), 379-390.

Oatley, K. (2016). Fiction: Simulation of social worlds. *Trends in Cognitive Sciences*, *20*(8), 618-628.

Ortiz, M., & Harwood, J. (2007). A social cognitive theory approach to the effects of mediated intergroup contact on intergroup attitudes. *Journal of Broadcasting & Electronic Media*, *51*(4), 615-631.

Panero, M. E., Weisberg, D. S., Black, J., Goldstein, T. R., Barnes, J. L., Brownell, H., & Winner, E. (2017). No support for the claim that literary fiction uniquely and immediately improves theory of mind: A reply to Kidd and Castano's commentary on Panero et al.(2016). *Journal of Personality and Social Psychology*, 112(3), e5-e8.

Pastor Pérez, L., Linde, A., Molas-Castells, N., & Fuertes-Alpiste, M. (2018). The use of novelettes for learning in a criminology degree course. *Studies in Higher Education*, 1-15.

Picoult, Jodi. *House Rules*. Allen & Unwin, 2010.

Pino, M. C., & Mazza, M. (2016). The use of "literary fiction" to promote mentalizing ability. *PloS one*, *11*(8), e0160254.

Prater, Mary Anne, and Tina Taylor Dyches. "Books that portray characters with disabilities: A top 25 list for children and young adults." *Teaching Exceptional Children* 40, no. 4 (2008): 32-38.

Sahin, N., Sahin, N. H., & Turner, S. (1994). Stereotypes of suicide causes for three age/gender cohorts. *International Journal of Psychology*, *29*(2), 213-232.

Samur, D., Tops, M., & Koole, S. L. (2018). Does a single session of reading literary fiction prime enhanced mentalising performance? Four replication experiments of Kidd and Castano (2013). *Cognition and Emotion*, *32*(1), 130-144.

Schiappa, E., Gregg, P. B., & Hewes, D. E. (2005). The parasocial contact hypothesis. *Communication monographs*, *72*(1), 92-115.

Schiappa, E., Gregg, P. B., & Hewes, D. E. (2006). Can one TV show make a difference? A Will & Grace and the parasocial contact hypothesis. *Journal of Homosexuality*, *51*(4), 15-37.

Scheff, T. J. (1966). *Being mentally ill: A sociological theory*. Transaction Publishers.

Simsion, G. (2013). *The Rosie project: A novel* (Vol. 1). Simon and Schuster.

Siperstein, G. N., Bak, J. J., & Gottlieb, J. (1977). Effects of group discussion on children's attitudes toward handicapped peers. *The Journal of Educational Research*, *70*(3), 131-134.

Stephan, W. G., Ageyev, V. S., Stephan, C. W., Abalakina, M. A., Stefanenko, T., & Coates-Shrider, L. (1993). Measuring stereotypes: A comparison of methods using Russian and American samples. *Social Psychology Quarterly*.

Stern, S. C., & Barnes, J. L. (2019). Brief Report: Does Watching The Good Doctor Affect Knowledge of and Attitudes Toward Autism?. *Journal of autism and developmental disorders*, 1-8.

Sugiyama, M. S. (2001). Food, foragers, and folklore: The role of narrative in human subsistence. *Evolution and Human Behavior*, *22*(4), 221-240.

Sugiyama, M. S.(2017). Oral storytelling as evidence of pedagogy in forager societies. *Frontiers in psychology*, *8*, 471.

Ventura, S., & Onsman, A. (2009). The use of popular movies during lectures to aid the teaching and learning of undergraduate pharmacology. Medical Teacher, 31, 662–664.

Vezzali, L., Stathi, S., Giovannini, D., Capozza, D., & Trifiletti, E. (2015). The greatest magic of Harry Potter: Reducing prejudice. *Journal of Applied Social Psychology*, *45*(2), 105-121.

White, D., Hillier, A., Frye, A., & Makrez, E. (2016). College students' knowledge and attitudes towards students on the autism spectrum. *Journal of autism and developmental disorders*, 1-7.

Whitebourne, S. (2016). *Abnormal psychology: Clinical perspectives on psychological disorders*. Mcgraw-Hill.

Wright, A., Jorm, A. F., & Mackinnon, A. J. (2011). Labeling of mental disorders and stigma in young people. *Social science & medicine*, *73*(4), 498-506.

Zhou, S., Page-Gould, E., Aron, A., Moyer, A., & Hewstone, M. (2018). The extended contact hypothesis: A meta-analysis on 20 years of research. *Personality and Social Psychology Review*, 1088868318762647.

Zunshine, L. (2006). *Why we read fiction: Theory of mind and the novel*. Ohio State University Press.

# Appendix

**Table 1.** Study 1 diagnostic criteria representation in the textbook and novel stimuli

| Criteria | Textbook | | Novel | |
|---|---|---|---|---|
| | Explained | Illustrated | Explained | Illustrated |
| **Criteria A**<br>Deficits in social communication and interaction across multiple contexts | X | X | X | X |
| 1. Deficits in Social-emotional reciprocity | X | X | | X |
| 2. Deficits in nonverbal communication | X | | | X |
| 3. Deficits in relationships | X | X | | X |
| **Criteria B**<br>Restricted, repetitive patterns of behavior, interests, or activities | X | X | | X |
| 1. Stereotypes or repetitive motor movements, use of objects, or speech | X | X | | X |
| 2. Insistence on sameness, inflexibility, or ritualized patterns of behavior | X | X | | X |
| 3. Highly specific, fixed interests | X | | | X |
| 4. Hyper- or hyporeactivity to sensory input | | | | X |
| **Criteria C**<br>Symptoms present in early development | X | | | |
| **Criteria D**<br>Symptoms cause clinically significant impairment | X | X | | |
| **Criteria E**<br>Disturbances not better explained by intellectual disability or developmental delay | | | | |

**Table 2.** Study 1 correlations between variables of interest

| Variables | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| (1) Gender | - | | | | | | | | | |
| (2) Time spent with someone with autism | -0.04 | - | | | | | | | | |
| (3) Close other with autism | -0.06 | 0.39** | - | | | | | | | |
| (4) Correct Behaviors | 0.08 | 0.18* | 0.27* | - | | | | | | |
| (5) Incorrect Behaviors | 0.13 | 0.01 | 0.01 | 0.44** | - | | | | | |
| (6) Positive Traits | -0.08 | 0.29** | 0.23* | 0.32** | 0.04 | - | | | | |
| (7) Negative Traits | -0.07 | -0.03 | -0.06 | 0.26** | 0.36** | -0.28** | - | | | |
| (8) Interest in learning more | 0.01 | 0.27** | 0.23* | 0.06 | 0.02 | 0.07 | -0.06 | - | | |
| (9) Understanding of autism | -0.19* | 0.45** | 0.29* | 0.24** | 0.01 | 0.07 | 0.02 | 0.24** | - | |
| (10) Understanding having autism | -0.06 | 0.16 | -0.02 | -0.05 | 0.04 | -0.03 | -0.03 | 0.10 | 0.52 | - |

*p < .05, ** p < .01

**Table 3.** Study 2 diagnostic criteria representation in the new textbook and novel stimuli

| Criteria | Textbook 2 | | Novel 2 | |
|---|---|---|---|---|
| | Explained | Illustrated | Explained | Illustrated |
| **Criteria A** Deficits in social communication and interaction across multiple contexts | X | X | X | X |
| 1. Deficits in Social-emotional reciprocity | X | | X | X |
| 2. Deficits in nonverbal communication | X | | | X |
| 3. Deficits in relationships | X | | | X |
| **Criteria B** Restricted, repetitive patterns of behavior, interests, or activities | X | | | X |
| 1. Stereotypes or repetitive motor movements, use of objects, or speech | X | | | |
| 2. Insistence on sameness, inflexibility, or ritualized patterns of behavior | X | | | X |
| 3. Highly specific, fixed interests | | | | X |
| 4. Hyper- or hyporeactivity to sensory input | X | | | |
| **Criteria C** Symptoms present in early development | X | | | |
| **Criteria D** Symptoms cause clinically significant impairment | X | | | |
| **Criteria E** Disturbances not better explained by intellectual disability or developmental delay | | | | X |

**Table 4.** Dependent variable comparisons between the two fiction excerpts used in Study 2

| Variable | Condition | Mean | SD | P-Value |
|---|---|---|---|---|
| *Understanding autism* | Dog in the Nighttime | 2.58 | .84 | .65 |
| | Rosie Project | 2.67 | .74 | |
| *Understanding having autism* | Dog in the Nighttime | 2.11 | 1.05 | .13 |
| | Rosie Project | 2.53 | 1.01 | |
| *Interest in learning more* | Dog in the Nighttime | 2.36 | .54 | .70 |
| | Rosie Project | 2.41 | .55 | |
| *Social Distance* | Dog in the Nighttime | 1.57 | .74 | .12 |
| | Rosie Project | 1.35 | .42 | |
| *"I do not know" responses* | Dog in the Nighttime | 13.61 | 7.66 | .42 |
| | Rosie Project | 12.26 | 6.78 | |
| *Correct responses* | Dog in the Nighttime | 31.15 | 6.10 | .83 |
| | Rosie Project | 31.46 | 5.81 | |
| *Incorrect responses* | Dog in the Nighttime | 3.53 | 1.99 | .14 |
| | Rosie Project | 4.50 | 3.16 | |

**Table 5.** Dependent variable comparisons between the two textbook excerpts used in Study 2

| Variable | Condition | Mean | SD | P-Value |
|---|---|---|---|---|
| *Understanding autism* | Textbook 1 | 2.97 | .65 | .12 |
| | Textbook 2 | 3.20 | .52 | |
| *Understanding having autism* | Textbook 1 | 2.58 | 1.12 | .87 |
| | Textbook 2 | 2.54 | .96 | |
| *Interest in learning more* | Textbook 1 | 2.14 | .49 | .54 |
| | Textbook 2 | 2.22 | .64 | |
| *Social Distance* | Textbook 1 | 1.63 | .56 | .38 |
| | Textbook 2 | 1.52 | .56 | |
| *"I do not know" responses* | Textbook 1 | 7.00 | 5.13 | .86 |
| | Textbook 2 | 6.81 | 4.30 | |
| *Correct responses* | Textbook 1 | 35.00 | 4.33 | .38 |
| | Textbook 2 | 35.88 | 3.99 | |
| *Incorrect responses* | Textbook 1 | 6.26 | 3.26 | .43 |
| | Textbook 2 | 5.74 | 2.11 | |

**Table 6.** Study 2 correlations between variables

| **Variables** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** |
|---|---|---|---|---|---|---|---|---|---|---|
| (1) Gender | - | | | | | | | | | |
| (2) Close other with autism | -0.14 | - | | | | | | | | |
| (3) Time spent with someone with autism | -0.11 | 0.46** | - | | | | | | | |
| (4) I do not know responses | -0.21* | 0.04 | 0.10 | - | | | | | | |
| (5) Correct responses | 0.22** | -0.04 | -0.11 | -0.90** | - | | | | | |
| (6) Incorrect responses | -0.05 | 0.09 | 0.08 | -0.57** | 0.15 | - | | | | |
| (7) Social distance | -0.18* | 0.21* | 0.15 | -0.05 | 0.01 | 0.14 | - | | | |
| (8) Understanding having autism | 0.04 | -0.19* | -0.01 | -0.30** | 0.18 | 0.28** | -0.10 | - | | |
| (9) Understanding autism | 0.20* | -0.12 | 0.11 | -0.60** | 0.50** | 0.35** | -0.18* | 0.54** | - | |
| (1) Interesting in learning more | 0.14 | -0.21* | -0.22 | -0.04 | 0.03 | -0.05 | -0.17* | 0.24* | 0.07 | - |

* $p < .05$, ** $p < .01$

**Table 7.** Study 2 subscale comparisons between conditions for correct responses

| Subscale | Novel | Textbook | *t*/*F*-value | *p*-value |
|---|---|---|---|---|
| **Etiology** | M = 10.59, SD = 2.14 | M = 11.82, SD = 2.12 | $t = 3.51$ | $p < .01$ |
| ***Diagnostic/Symptoms** | M = 11.45, SD = 2.94 | M = 13.31, SD = 1.80 | $F = 31.90$ | $p < .01$ |
| ****Treatment** | M = 9.03, SD = 2.37 | M = 10.11, SD = 2.08 | $F = 4.45$ | $p = .04$ |
| ***Stigma** | M = 6.04, SD = 1.46 | M = 6.00, SD = 1.29 | $F = .01$ | $p = .91$ |

*ANCOVA controlling for sex, **ANCOVA controlling for sex and close other with ASD

**Table 8.** Knowledge assessment items included in Study 2 stimuli

| **Subscales** | **Textbook 1** | | **Textbook 2** | | **Curious Incident** | | **Rosie Project** | |
|---|---|---|---|---|---|---|---|---|
| | Explain | Illustrate | Explain | Illustrate | Explain | Illustrate | Explain | Illustrate |
| **Diagnosis/Symptoms** | 12 | 3 | 12 | 0 | 0 | 8 | 0 | 7 |
| **Stigma** | 4 | 0 | 5 | 0 | 0 | 4 | 4 | 3 |
| **Etiology** | 13 | 0 | 12 | 0 | 0 | 2 | 11 | 1 |
| **Treatment** | 5 | 1 | 10 | 0 | 0 | 1 | 1 | 2 |
| **Totals:** | 34 | 4 | 39 | 0 | 0 | 15 | 17 | 13 |

**Table 9.** Study 2 post-hoc analysis of the total number of correct answers, looking only at items for which the answer was included in both stimuli

| Pairing | Items | Fiction Mean/SD | Textbook Mean/SD | P-Value |
|---|---|---|---|---|
| *Curious Incident* and Text 1 | 8 | 5.72/1.42 | 6.44/.88 | $p$ =.01 |
| *Curious Incident* and Text 2 | 9 | 7.11/1.35 | 7.86/.83 | $p$ =.01 |
| *Rosie Project* and Text 1 | 17 | 12.05/2.48 | 12.56/1.92 | $p$ < .01 |
| *Rosie Project* and Text 2 | 16 | 11.69/2.05 | 12.53/1.84 | $p$ = .07 |

**Table 10.** Study 2 post-hoc analysis of the total number of incorrect answers, looking only at items for which the answer was included in both stimuli

| Pairing | Items | Fiction Mean/SD | Textbook Mean/SD | P-Value |
|---|---|---|---|---|
| *Curious Incident* and Text 1 | 8 | .47/.65 | .97/.84 | $p$ = .01 |
| *Curious Incident* and Text 2 | 9 | .34/.49 | .61/.55 | $p$ = .05 |
| *Rosie Project* and Text 1 | 17 | 1.54/1.39 | 1.83/1.38 | $p$ = .36 |
| *Rosie Project* and Text 2 | 16 | 1.41/1.29 | 1.86/1.25 | $p$ = .12 |

**Figure 1.** Interaction between condition and negative traits selected in Study 3

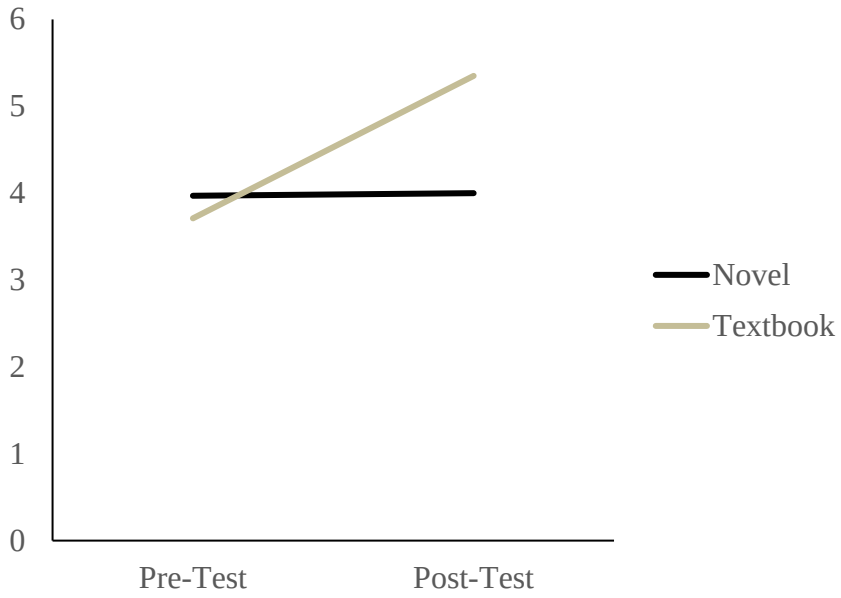



**Figure 2.** Interaction between condition and positive traits selected in Study 3

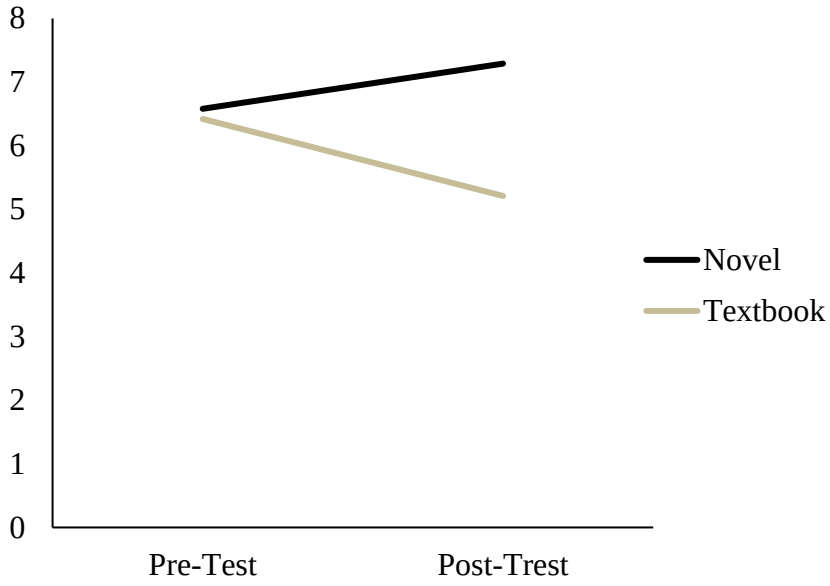


**Figure 3.** Interaction between condition and desire for social distance in Study 3

