

Spring 2015

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“The Autism Adventures of Watson & Holmes”: Puppet Theatre to Improve Elementary
Students’ Knowledge of and Attitudes toward Autism Spectrum Disorder

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Abstract

The prevalence of autism spectrum disorder (ASD) is a growing concern in schools across the nation. More students with high functioning autism are being mainstreamed, and students on and off the spectrum are being exposed to a wider variety of behaviors and new opportunities for friendship in school. Many students who fall on the autism spectrum suffer from the stigmatizing attitudes of their peers, and this stigmatization often stems from a lack of early education about mental health. Puppetry has been proven to captivate young audiences while teaching important messages in an entertaining and relatable way. The purpose of this study is to determine the effectiveness of the puppetry play, “Watson & Holmes: The Friendship Equation” to demystify ASD and reduce stigmatizing attitudes. The play uses a mystery-based storyline to encourage students to observe and investigate their interactions and make positive friendship choices. Using creative audience engagement, “The Friendship Equation” teaches students five ways to be a good friend to someone on the spectrum. Third and fourth grade students were recruited from private schools that volunteered to participate in the study. The students were tested two weeks before and two weeks after the puppet program performance to determine their familiarity with ASD and their attitudes related to the behaviors associated with ASD that may occur in a mainstream classroom. The results show positive changes in knowledge of ASD and a significant reduction of stigmatizing attitudes. These findings suggest that “The Friendship Equation” may be an effective way to reduce stigmatizing attitudes in elementary school students.

Keywords: children, theatre, puppetry, autism, spectrum, disorder

“The Autism Adventures of Watson & Holmes”: Puppet Theatre to Improve Elementary Student’s Knowledge of and Attitudes toward Autism Spectrum Disorder

Students with clinical presentations of autism, including a mix of mild to severe symptoms, are being mainstreamed in school, and students on and off the spectrum are becoming aware of both a wider variety of behaviors and new opportunities for friendship (Deris & DiCarlo, 2013). With these new friendship opportunities come investigations and research on how to reduce stigmatization in educational settings. Of these studies, many use interventions such as lectures or presentations focusing on mental disorder etiology and treatment. Psychology studies have found that the use of a positive narrative regarding those with mental and intellectual disorders have the greatest impact on attitudes toward those individuals (Desforges, Lord, Ramsay, Mason, Van Leeuwen, & West, 1991; Gaertner et al., 1994; Kondrat & Teater, 2009).

Autism in the Classroom

It is noted in many studies that the learning and quality of education of children with autism in a mainstream setting is greatly influenced by interactions and friendships within the classroom (Calder, Hill, & Pellicano, 2013; Deris & Di Carlo, 2013; Humphrey & Symes, 2010). It is believed that many of the central difficulties that pupils with autism spectrum disorder face in a mainstream environment involve their peer group (Humphrey & Symes, 2010). It is important and unfortunate to note that children with autism rate their friendships to be of less quality than their peers who do not fall on the autism spectrum. Students on the autism spectrum often feel that these peer relationships are fractious or one-sided (Calder et al., 2013; Humphrey & Symes, 2010). Their relationships with their peers not only influence their development of social skills but their success in the education system as well. Often, educators find it difficult to negotiate the academic achievement and talents of students on the autism spectrum compared to

their challenges negotiating with their social world. Adolescents with autism were less likely to be called by friends or invited to activities (Shattuck, Orsmond, Wagner, & Cooper, 2011). Children on the autism spectrum can face difficulties maintaining the friendships they do form, and this may be due to the common difficulties in detecting and interpreting social cues or demonstrating the typical reciprocity of pro-social behaviors.

While children on the autism spectrum are aware of and can verbalize their difficulties with friendships, they may not be able to change their behaviors appropriately in real-life situations (Bauminger, Shulman, & Agam, 2003; Calder et al., 2013). As children on the autism spectrum advance through their school years, the gap between their social skills and the social skills of their typically developing peers may grow wider (Lyons, Cappadocia, & Weiss, 2011). These data support the importance of early interventions and education focused on stigma reduction.

Stigma

Gray (2002) defines stigma as a set of negative and often unfair beliefs that a society or group of people has about something, and often connotes something disgraceful or defective. Individuals with mental or developmental disorders are among these stigmatized groups. Stigmatizing attitudes often arise from a lack of knowledge, and this is a reinforcing factor in the stigma toward mental disorder (Shah, 2004).

By five years old, children show significant levels of in-group favoritism and out-group prejudice, along with their developing sense of social cognition (Aboud, 2003). These findings are supported by an earlier longitudinal study that suggests attitudes towards those with mental disorder become stable by the time a child enters kindergarten, and a preference for social distance increases and becomes more adult-like throughout primary school years. Children's

stigmatizing attitudes are very unlikely to change between kindergarten and eighth grade (Angermyer & Matchinger, 2005). By 11 years of age, students are more uncomfortable speaking about mental disorder than in earlier years for fear they may say something wrong or offensive (Shah, 2004).

While the general public has become much more open and accepting of mental health and programs regarding stigmatization (Pescosolido, 2013), 20% of adults in America are unwilling to have children with clinical symptoms in his or her child's classroom, or as his or her child's friend (Martin, Pescosolido, Olafsdittir, & Mcleod, 2007). Stigma has comparatively stable gradients and changes little over time (Pescosolido, 2013). Because of this, children may be a better target audience for educational programs as their attitudes are still evolving and early interventions may be more beneficial (Shah, 2004).

Stigma Interventions in Psychology

Adult studies. In a study investigating the underlying workings of college students' attitudes towards those with mental illness, participants interacted in cooperative learning with a confederate student who they believed was a former mental patient. While many participants indicated a same position on the attitude scale after the intervention, researchers hoped the thought or possibility of adopting views more accepting of a stereotyped group may make a difference in future tests (Desforges et al., 1991). A study with college students enrolled in psychology classes used two methods to teach psychopathology and reduce stigma. The first was a first-person narrative based method, and the other was a typical diagnosis-centered program. The students in the experimental classroom had significant decreases in stigmatizing attitudes while the typically taught students showed no change (Mann & Himelien, 2008).

Adolescent and child studies. Interventions are often tailored to the developmental age of the participants as well as whether the target population has previous experience or knowledge of mental disorder (Angermyer & Matschinger, 2005; Shah, 2004). Students who participated in a public education program made specifically for children with content focusing on facts about mental illness, symptoms, recovery strategies, and personal stories reported more positive views on 7 out of 9 stigma measures that were also tailored for use with children (Spaglano et al., 2008). In a study utilizing storytelling and discussion, adolescent girls ages 13-17 were provided with knowledge and first-person storytelling about mental disorder. The goal was to increase mental health literacy and foster positive contact with those with mental disorder. Intervention increased mental health literacy at 4-8 weeks, but did not reduce stigma (Pinto-Foltz, Logsdon, & Myers, 2011). A study with 6-11 year-old children found that extended contact, defined by reading stories of friendship about the out-group, showed significant improvements in attitudes towards the out-group. Cameron, Rutland, and Brown (2007) found that extended contact through storytelling was an equally effective technique for all ages studied, and therefore was developmentally suitable for all ages. Another study conducted in a school setting with students aged 10-12 involved six classroom sessions focused on information regarding mental health and disorder, where to seek help, and stress management strategies and tips. The sessions involved both presentation of information and open discussion when students were encouraged to ask questions. Using pre- and post-test measures, significant improvements were found in the students' knowledge of mental health and disorder, although there was no significant difference in measures of stigmatization (DeSocio et al., 2006).

Ranson and Byrne's (2014) study involved 7th, 8th, and 9th grade students in a mainstream school. The anti-stigma intervention put in place was focused on peers of students with autism.

After the intervention, knowledge, attitudes and behavioral intentions towards these students were improved. In this study, small attitudinal improvement was found in control conditions as well, which suggests that the topic being presented and talked about allows for information to be transmitted from students to other students, and they may learn by good examples set by those in the intervention groups.

Stigma Interventions in Theatre

In theatre, the goal of changing attitudes and feelings about stigmatized or discriminated groups is not new, yet much of this theatrical work goes without empirical data to support it. Lit (2013) explains the importance of performance, and makes clear the ability of theatre to transform narratives and enable the creation of a free space for discussion between those acting onstage and those in the audience. Theatre has the ability to challenge assumptions and draw attention to social practices in the community and within audience members. It brings awareness to the roles of individual members of the society in which they live and in which the performance takes place (Lit, 2013).

According to the playwrights of a research-based drama presenting stories of people and loved ones with dementia, their play showed the ability to shift understanding in an innovative and creative way (Mitchell, Dupuis, & Jonas-Simpson, 2011). In the work, a 6-week and 6-month follow-up questionnaire was given to adult audience members with experience with dementia in their family to determine the play's effects. In interviews and questionnaires, audience members described an increased personal understanding of the disorder, and some spoke about how the play prompted them to act differently in everyday interactions with their loved ones with dementia. The audience members said that seeing their own behaviors, symptoms of dementia, and the inner thoughts of their loved ones in situations when symptoms were apparent connected

them to the play and had them feeling about the subject matter rather than just reading about it (Mitchell et al., 2011). A theatrical research model from a troupe called “The Mad Hatters” (1992) used sensitive storytelling, artistic portrayals, and direct interaction with the audience to increase understanding of mental disorder and stigma and increase social interaction with those with special needs. This troupe also produced a video to compare the effectiveness of video performances to their live performances. They found that their live performance was associated with significant positive change, while the video presentation was not. The researchers felt that this difference was probably due to the direct contact between the performers and the audience, along with the opportunity for discussion after the live performance (“Overcoming Stigma: The Mad Hatters”, 1992).

Use of puppetry in interventions. Children frequently use puppets in individual or partner play to act out interpersonal conflicts and situations; they may act out certain feelings that they may feel are unacceptable or against the rules (Bromfield, 1995). In performance, puppets are animated and active. Research has shown that children may better remember concepts presented using puppetry, and it “provides different pathways for reaching a child who is unable to express his or her feelings, and in some cases come to term with their fears” (Pitre, Stewart, Adams, Bedard, & Landry, 2007, p. 420). Puppetry also allows for opportunities for students to interact directly with the characters, a key factor needed to lead to more enlightened attitudes (Pinfold, Thornicroft, Huxley, & Farmer, 1993). The young audience of a puppet show dealing with sensitive subjects like developmental disorder can distance themselves from reality while participating and interacting with it.

A study done on the effects of “Sesame Street” and “Mister Roger’s Neighborhood”, both programs that utilize puppetry, found that both programs increased preschool childrens’ giving

of positive reinforcement to other children. The children who watched “Mister Roger’s Neighborhood” also had an increase of positive reinforcement and social contacts with the adults in the preschool. Not only did the children learn pro-social behavior from these programs, but showed this pro-social behavior in real-life situations (Coats, Pusser, & Goodman, 1976).

In a study conducted by Pitre et al. (2007), a puppetry program was used to help elementary school students form positive opinions of individuals with mental disorders. The play used three small vignettes focusing on etiology and treatment of three disorders: schizophrenia, dementia, and depression/anxiety. After the performances, the students were less concerned with keeping social distance from those with mental disorder and found individuals with a mental disorder to be less threatening and having a mental disorder less shameful. The problematic behavior that did not manifest significant improvements were stereotyping, pessimistic prediction, or benevolence (Pitre et al., 2007).

The Current Study

In this study, third and fourth grade students were assessed before and after attending a performance of “The Autism Adventures of Watson & Holmes” for knowledge of and attitudes toward autism spectrum disorder. “The Autism Adventures of Watson & Holmes” is a puppet play developed to teach elementary students about autism spectrum disorder using highly interactive theatre to show them effective ways to interact with their peers on the autism spectrum using 5 simple strategies (1. Being friendly is easy! 2. Get your friend’s attention. 3. Speak softly and clearly. 4. Wait for your friend to respond. 5. Show and tell by using gestures.) It is hypothesized that after attending a performance of “The Autism Adventures of Watson and Holmes: The Friendship Equation”, third and fourth grade students’ (1) knowledge of autism

spectrum disorder will increase and (2) stigmatizing or negative attitudes regarding ASD will be reduced.

Method

Participants

In two weeks of touring performances, “The Autism Adventures of Watson and Holmes” was performed at 11 schools for a total of 15 performances. It is estimated that 1,200 students attended performances. For the study, 126 participants from third and fourth grade classes from three elementary schools in Minnesota participated in the study with permission from the principal of the school and parents of the students. The schools that agreed to participate in the study received a discount of \$25 from the booking price of the performance of the play, “The Autism Adventures of Watson & Holmes.”

Materials

The script for “The Autism Adventures of Watson and Holmes” used in this study was created by the researcher through a summer collaborative research program at Hamline University. Through a January term class, the play was cast and directed by the researcher to prepare for touring to elementary schools.

Data were collected using the ASD Knowledge and Attitudes Questionnaire designed for this experiment (*see Appendix A*).

Design

The current study was a pre- and post-test design with knowledge of ASD and attitudes toward ASD as the within-subjects variables. Paired samples t-tests were used to compare scores on measures from the ASD Knowledge and Attitudes Questionnaire pre- and post- viewing the play.

Procedure

Principal and parent consent forms were sent to schools and distributed one month before testing. Two weeks before the performance, a researcher visited participating classrooms to give the “ASD Knowledge and Attitudes Questionnaire” to the students as a group. The researcher followed a script to explain the questionnaire. The students were told the questionnaire was to test how much they knew about autism, and that it was okay if they didn’t know an answer or weren’t sure. This script included instructions to not put down a name on the questionnaire to protect the students’ anonymity. The students were informed this survey would not be for a grade or an assignment and they did not have to complete the survey if they did not want to. The students who did not receive parental permission to participate in the study sat in the classroom and did not complete a survey or were sent to do another activity outside the classroom as decided by the teacher.

The students were asked to complete the first section of the questionnaire by marking their gender and current grade. They were then asked to complete the first written question of the survey. The prompt was read aloud to the class by the researcher: “What is autism? Can you describe it in your own way? If you can’t explain it, write anything that autism makes you think of.” The students were instructed to put their pencils down when they were done with the first question. When all pencils were down, the researcher moved on to the next section.

To explain the structure of the multiple-choice questions, the researcher used a “hands up” or “hands down” activity to ask if students agreed or disagreed with a statement (e.g “I like pizza” or “I feel like going outside”). This was done to familiarize the students with the structure of the questionnaire and get them engaged in the activity by pairing the prompts with a physical activity. The researcher read each question out loud and students were instructed to follow along

and circle the answer they felt best applied to them. For the social distance section of the questionnaire, students were instructed to make a mark next to the statement if they felt the sentence applied to them. These statements went from “I would feel comfortable sitting next to a kid with autism in my classroom” to “I would feel comfortable inviting a kid with autism to my house for a sleepover.” To practice, students were led in a similar “hands up” activity. The researcher again prompted the students again with statements similar in structure to the questionnaire (e.g “I would feel comfortable dancing like a noodle in front of the class” and “I have a brother or sister”). Once completed, surveys were collected and filed by class. Two weeks after students attended the performance of the play, the same procedure was followed for the post-test.

The open ended responses to the prompt “What is autism? Can you describe it in your own way? If you can’t explain it, write what autism makes you think of” were coded by two raters on a scale developed to assess the students’ knowledge of ASD on a scale of 0 to 3. A score of 0 indicated responses that were left blank or were incorrect. A score of 1 indicated a response that included one example of a symptom or experience of someone with ASD or a way to interact with someone with ASD. A score of 2 indicated a response that included two examples of symptoms or experience of someone with ASD or ways to interact with someone with ASD. A score of 3 indicated a response that included three or more specific examples of symptoms or experiences of someone with ASD or ways to interact with someone with ASD. An inter rater reliability analysis using the Kappa statistic was performed to determine consistency among raters. The pretest and posttest scores were analyzed using a paired samples t-test.

Multiple choice question responses were coded for analysis (1=Agree, 2=Disagree, 3=Not Sure). Each question was analyzed individually using paired samples t-tests. Multiple

choice questions were grouped into two categories: Knowledge and Attitude. The multiple choice questions included one question used for descriptive statistics (e.g. “I have seen a kid with autism being teased”). One question was used to determine if students knew another student with autism, or if they had it themselves. This question was scored similarly to the multiple choice responses (1=I know a kid with autism, 2=I do not know a kid with autism, 3=I have autism). The social distance scale was scored 0 to 8. A score of 0 indicated the student did not endorse any of the statements, suggesting they wished for the most social distance and 8 indicated the student endorsed all of the statements, suggesting they did not feel a need for social distance from someone with autism spectrum disorder.

Results

The results are presented in four parts. The first section provides information about the reliability of the questionnaire as well as inter-rater reliability. The second section presents the descriptive statistics. The third section presents analysis focused on knowledge of ASD for all students. The last section presents analysis focused on stigma and attitudes of ASD for all students. It should be recalled that students are expected to have significant differences in scores for before and after tests.

Reliability of Questionnaire and Inter-rater Reliability

The ASD Knowledge and Attitudes Questionnaire included 8 multiple choice items. Chronbach’s alpha for these items was .44. This score reflects a low reliability of the questionnaire.

The inter-rater reliability was found to be Kappa = 0.94 ($p < .001$). This score reflects a high reliability between raters.

Descriptive Statistics

The sample included 126 students from 4 third grade classes (N=68, 54%) and 4 fourth-grade classes (N=58, 46%) from three elementary schools of varying sizes in Minnesota. Class sizes ranged from 3-22 students. The school with the smallest class sizes utilized a mixed-grade classroom setting. Sixty-three students identified as female (50%) and 63 students identified as male (50%).

A measure was used to determine if students had seen a student with autism being bullied. Students responded to the prompt “I have seen a kid with autism being teased by someone else”. The post-test showed that 36 students reported “Agree” (28.6%), 55 reported “Disagree” (43.7%), and 23 reported “Not Sure” (18.3%). For this measure, pre- and post- tests showed no significant difference.

A reporting measure to determine the students’ familiarity with ASD showed that in the pre-test, 23 students (18.3%) reported “I know a kid with autism”, 94 students (75.8%) reported “I do not know a kid with autism”, and 7 students (5.6%) reported “I have autism”. In the post-test there was a shift in responses. 34 students (27%) reported “I know a kid with autism”, 73 students (57.9%) reported “I do not know a kid with autism”, and 7 students (5.6%) reported “I have autism”, see Table 1.

Hypothesis 1: Change in Knowledge of ASD

Open-ended Responses. The open-ended written responses to “What is Autism? Can you describe it in your own way?” showed a significant difference from pre-test ($M=.14$, $SD=.633$) to post-test ($M=.65$, $SD=.433$); $t(-7.19)=$, $p=.000$ with a shift towards more correct responses.

Multiple Choice Responses. Four multiple-choice questions were used to determine the students’ knowledge of ASD. Each question was analyzed individually. There was a significant

difference in the scores for pre-test ($M=1.48$, $SD=0.83$) and post-test ($M=1.16$, $SD=0.55$); $t(111)=3.541$, $p = 0.001$ for Question 1 (Friends 1 and 2). There was a significant difference in the scores for pre-test ($M=1.84$, $SD=.916$) and post-test ($M=1.36$, $SD=.771$); $t(111)=4.461$, $p = 0.000$ for Question 2 (Born 1 and 2). There was a significant difference in the scores for pre-test ($M=1.59$, $SD=.754$) and post-test ($M=1.95$, $SD=.804$); $t(111)=-3.670$, $p = .000$ for Question 3 (Attention 1 and 2). There was a not a significant difference in the scores for pre-test ($M=2.15$, $SD=.633$) and post-test ($M=2.04$, $SD=.433$); $t(111)=1.401$, $p = 0.164$ for Question 6 (Contagious 1 and 2), see Table 1. As shown in Table 1, in three of the four multiple choice questions, there was a significant difference between before and after scores reflecting a positive change in knowledge of ASD.

Hypothesis 2: Change in Attitudes towards ASD

Multiple Choice Responses. There was a marginally significant difference in the scores for pre-test ($M=1.80$, $SD=.757$) and post-test ($M=1.99$, $SD=.741$); $t(111)=-1.869$, $p = .064$ for Question 4 (Problems 1 and 2). There was a significant difference in the scores for pre-test ($M=1.66$, $SD=.876$) and post-test ($M=1.37$, $SD=.723$); $t(111)=3.233$, $p = 0.002$ for Question 5 (School 1 and 2). There was a marginally significant difference in the scores for pre-test ($M=1.62$, $SD=.903$) and post-test ($M=1.39$, $SD=.787$); $t(111)=1.826$, $p = 0.070$ for Question 7 (Friend 1 and 2). There was no significant difference in the difference in the scores for pre-test ($M=1.32$, $SD=.716$) and post-test ($M=1.30$, $SD=.682$); $t(110)=.294$, $p = 0.769$ for Question 9 (Recess 1 and 2), see Table 3. As it can be seen in Table 3, one of the four multiple choice questions, there was a significant difference in before and after scores, reflecting a positive change in attitudes toward ASD. In two of the four multiple choice questions, there was a

marginally significant difference, and in one of the four multiple choice questions there was no significant difference.

Social Distance Scale. As predicted, there was a significant difference in the scores on the Social Distance Scale for pre-test ($M=5.98$, $SD=2.15$) and post-test ($M=6.5$, $SD=1.88$); $t(111)=2.114$, $p = 0.037$, see Table 4. This difference reflects a positive change in attitudes toward ASD.

Discussion

The measure used to determine the students' familiarity with ASD showed there were 7 students who indicated "I have autism". Since 8 third and fourth grade classrooms participated, it seems likely that a majority of the classrooms had one student on the autism spectrum. Despite this, the survey shows that in the pre-test only 18.3% of students indicated they knew someone with autism. There was an increase in the post-test to 27% of students who indicated they knew someone with autism. This change may be due to the increased knowledge of common behaviors associated with ASD that allowed students to identify their peers on the spectrum, classroom discussions about ASD, or talks with parents at home that may have included a mention of a friend or relative on the autism spectrum. The high percentage of students who indicated they did not know someone with autism on the pre- (75.8%) and post-test (57.9%) may suggest that students or parents with students on the spectrum may not feel comfortable sharing this information with their teachers or classmates. Because the character on the autism spectrum is portrayed in a positive light, given the opportunity to talk directly to the audience, and the other characters work to become friends with him, it may have given students with ASD more confidence to share with their peers.

In the post-test assessment for the measure “I have seen a kid with autism being teased by someone else”, 28.6% of students indicated they had seen a student with autism being teased by someone else in the pre-test. It is interesting to note that in the post-test assessment for the measure related to familiarity with ASD, 27% of students indicated they knew someone with autism. This may suggest that those who knew someone with autism have seen this person being teased or bullied.

As predicted, there were significant differences in knowledge of ASD before and after students attended a performance of “The Autism Adventures of Watson & Holmes”. While the significant difference in pre- and post-tests for the open-ended question was expected, the results may have shown a more dramatic shift in means towards more correct responses if the students had more room to write on the questionnaire, or had encouraged the students to write more than one or two things they knew about ASD. Means for the post-test scores of the three multiple-choice questions regarding knowledge of ASD shifted towards more correct responses from pre-test to post-test, suggesting that students learned from the performance. The measure of knowledge of ASD that did not show a significant difference in before and after assessment was for the question “I think autism is contagious. I could catch it like I could catch a cold”. It was expected that the students would have little knowledge of ASD, but the mean for the before tests show that a majority of students already knew the correct response.

In the multiple choice questions regarding attitudes toward ASD, one question showed a significant difference in pre- and post-test scores, and two showed marginally significant differences. The means of these responses all shifted towards more positive attitudes and more socially desirable answers in the after tests, suggesting that the play had a positive effect of the students’ attitudes towards their peers with ASD. The response to the question that did not show

a significant difference in before and after scores was “If I saw a kid standing alone during recess, I would ask them to play with me”. Similar to the trend observed in the non-significant finding in the knowledge section of the questionnaire, the pre-test scores showed that a majority of the students chose the most socially desirable answer. This may be because the question prompted the correct answer and students already knew this to be a socially desirable response. The mean for the social distance portion of the questionnaire showed a significant positive shift as well. This may suggest that seeing the play or education about autism positively affected their attitudes of students on the autism spectrum.

While the questionnaire’s reliability score determined by Chronbach’s alpha was not desirable, it should be remembered that the focus of the questionnaire was a survey of knowledge and attitudes, rather than an internally consistent measure. Although a higher score would have been preferable, the score is likely due to the multiple aspects of knowledge and stigma that were being assessed. Relatively few questions were included to prevent students from becoming bored with a long questionnaire. In the future, given more time, it would be beneficial to have the opportunity to test and re-test the questionnaire used to ensure inferred reliability.

In future studies, it would be beneficial to use a similar pre- and post-test research design with the addition of a control group to see how much attendance of “The Autism Adventures of Watson and Holmes” affected the students’ attitudes and knowledge of ASD, and how much of this change may have been due to classroom discussion or talks among family and friends after the questionnaire and presentation of the play. It would be beneficial to include follow-up interviews and surveys of teachers to determine the differences in classroom behaviors before and after performances.

The results of this study reflect that of similar studies in the past related to stigma, social distance, and pro-social behaviors (Coates, et al. 1976; Pitre et al., 2007). “The Autism Adventures of Watson and Holmes” used many techniques shown in previous research to improve attitudes towards those with mental or developmental disorder such as utilizing a positive narrative shift, providing information about behaviors and experiences of those on the spectrum, and interaction between performers and characters in the play (Desforges et al., 1991; Gaertner et al., 1994; Kondrat & Teater, 2009; “Overcoming Stigma: The Mad Hatters”, 1992; Spaglano, Murphy, & Librera, 2008). Since stigmatizing attitudes often arise from a lack of knowledge (Shah, 2004), it is expected that with the shown increase in knowledge of ASD, the attitudes of ASD should improve as well. This study does not support or refute previous research regarding the stability of stigmatizing attitudes between kindergarten and eighth grade, since the positive shift in attitudes was marginal in most cases. The same study showed that preferences for social distance increased and became more adult-like throughout primary school years (Angermyer & Matchinger, 2005). It is hoped that the changes seen in this intervention will create lasting effects in the students’ attitudes towards their peers with ASD and affect their interactions with their peers in the future.

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Table 1

Pre-test and post-test for 'familiarity with ASD' measure

	Pre-test Frequency	Pre-test Percentage	Post-test Frequency	Post-test Percentage
I know a kid with autism	23	18.3%	34	27%
I do not know a kid with autism	94	75.8%	73	57.9%
I have autism	7	5.6%	7	5.6%
Note.				

Table 2

Multiple Choice Questions: Knowledge of ASD

	Pre-test Mean	Post-test Mean	Significance (p-value)
Question 1 ("Friends" pre- and post-test)	1.48	1.16*	.001
Question 2 ("Born" pre- and post-test)	1.84	1.36*	.000
Question 3 ("Attention" pre- and post-test)	1.59	1.95*	.000
Question 6 ("Contagious" pre- and post-test)	2.15	2.04*	.164

Note. * = Mean after score shifted toward correct response, significant difference shown in bold.

Table 3

Multiple Choice Questions: Attitudes of ASD

	Mean Before	Mean After	Significance (p-value)
Question 4 ("Problems" pre- and post-test)	1.80	1.99*	.064**
Question 5 ("School" pre- and post-test)	1.66	1.37*	.002
Question 7 ("Friend" pre- and post-test)	1.62	1.39*	.070**
Question 9 ("Recess" pre- and post-test)	1.32	1.30	.769

Note. * = Mean score shifted toward socially desirable response, **=Marginally Significant Difference, significant difference shown in bold

Table 4

Social Distance Scale

	Mean Before	Mean After	Significance (p-value)
“Social Distance” pre- and post-test	5.99	6.50*	.037

Note. * = Mean after score shifted toward socially desirable response, **=Marginally Significant Difference, significant difference shown in bold.

Appendix A. ASD Knowledge and Attitudes Questionnaire

Please Mark: Grade 3 _____ Grade 4 _____
 Girl _____ Boy _____

What is autism? Can you describe it in your own way?
If you can't explain it, write anything that autism makes you think of.

Please circle Agree, Disagree, or Not Sure:

I think kids with autism would like to have friends, just like me and other kids.

Agree Disagree Not Sure

I think kids with autism are born that way, just like some kids are born with blue eyes.

Agree Disagree Not Sure

I think when a kid has trouble focusing in class, it is probably just because they aren't paying attention.

Agree Disagree Not Sure

I think a kid with problems should be in a special class for kids with problems, not in a regular class like mine.

Agree Disagree Not Sure

I think a kid with autism can do well in school, just like me and other kids.

Agree Disagree Not Sure

I think autism is contagious. I could catch it like I could catch a cold.

Agree Disagree Not Sure

I think a kid with autism would be a good friend.

Agree

Disagree

Not Sure

I have seen a kid with autism being teased by someone else.

Agree

Disagree

Not Sure

If I saw a kid standing alone during recess, I would ask them to play with me.

Agree

Disagree

Not Sure

What are the kinds of things you would feel okay about doing with a kid with autism?

You can choose as many, or as few, as you like.

- _____ Sitting next to a kid with autism in my classroom
- _____ Working on a group project in my classroom with a kid with autism
- _____ Sitting next to a kid with autism in the lunchroom
- _____ Playing with a kid with autism during recess or on the playground
- _____ Standing up for a kid with autism who was being teased
- _____ Trusting a kid with autism with a secret
- _____ Inviting a kid with autism to play at my house
- _____ Inviting a kid with autism to my birthday party or to a sleepover

Which of the following best describes you?

- _____ I know a kid (a brother, sister, a friend) with autism.
- _____ I do not know a kid with autism.
- _____ I have autism.