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## College Students' Perceptions of and Behavioral Intentions Toward a Popular Media Character with Qualities of Asperger Syndrome

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**COLLEGE STUDENTS' PERCEPTIONS OF AND BEHAVIORAL INTENTIONS  
TOWARD A POPULAR MEDIA CHARACTER WITH QUALITIES OF  
ASPERGER SYNDROME**

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**DOCTOR OF PHILOSOPHY IN URBAN EDUCATION**

**at the**

**CLEVELAND STATE UNIVERSITY**

**MAY 2014**

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## DEDICATION

It goes without saying that no one completes a dissertation alone. It takes a village, and I was blessed to have the most amazing support throughout this work. First and foremost, this work is dedicated to individuals on the spectrum: To their genius, their talents, and their contributions to world, always embrace your unique qualities.

For my children, Kate and Chris: You are the motivation for everything I do. May you each find your passion and follow it wherever it leads. To my Ph.D. wife, Rose, without whom this dissertation would not exist, from statistics at Panera to rides home from class, you are amazing. To Irina, my best friend, the yin to my yang, my research partner and drinking buddy: I love you with all my heart. For my Yoda, Susan Sampson, who gave me the latitude to serve the population I love most and taught me more about ASD than I ever thought possible. To Tracy Masterson, the strongest, most supportive mentor, friend, and cheerleader in the world.

I further dedicate this work to Anne and Steve, my Cleveland parents who nursed me through illness, sorrow, and stress, always making sure to celebrate my every accomplishment, no matter how small. To Nathaniel, my editor-in life and love, and my very best friend, for reasons too numerous to list. Finally, to my dad, Jim: If he were still here he would say, "I'm so proud of you, baby girl".

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**POPULAR TELEVISION AS A POTENTIAL MEDIATOR FOR COLLEGE  
STUDENTS' PERCEPTIONS OF A PEER WITH ASPERGER SYNDROME**

**LISA MARIE MEEKS**

**ABSTRACT**

This study examines the potential mediating effects of prior knowledge regarding autism spectrum disorders and Asperger syndrome (AS), first and second-generation family ties, college major, gender, and level of exposure to Dr. Sheldon Cooper, the main character of *The Big Bang Theory*, on college students' perceptions of a popular television character who displays traits and characteristics of Asperger syndrome/autism spectrum disorder. Bandura's (1971a) Social Learning Theory and Social Cognitive Theory (2004b) provide the framework through which the researcher attempts to understand how popular media impacts college students' perceptions of autism spectrum disorders. A total of 102 college students (aged 18-40 years) from multiple colleges across the United States completed two instruments that were modified for use in this study: The Autism Spectrum Quotient (AQ; Baron-Cohen, 2001), and the Shared Activities Questionnaire (SAQ; Morgan, Walker, Bieberich, & Bell, 1996). Participants also answered demographic questions relating to age, race, major, exposure to *The Big Bang Theory*, and a researcher-developed knowledge of autism questionnaire. Students overwhelmingly rated Sheldon Cooper as an individual with AS. Findings from the study indicate that gender, ethnicity, income level, and exposure to *The Big Bang Theory* were statistically significant predictors for students' rating of Sheldon Cooper as an individual with AS. Being a math/science/engineering major or having a second degree relationship with a person on the spectrum did not significantly predict students' ratings of Sheldon as

an individual with AS, nor did these variables predict their desire to engage with Sheldon in an academic, social or recreational domain.

Findings from this study suggest that the use of Sheldon from *The Big Bang Theory* may be a valuable tool for working with the peers of students on the spectrum as findings suggest that repeated exposure to *The Big Bang Theory* reduces students' "clinicalization" of Sheldon Cooper's behavior, perhaps through normalization of behaviors or exposure to prosocial modeling via behaviors of the supporting cast.



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Using the existing data set, the researcher plans to conduct further analysis on gender, major, and secondary relationships with an individual with ASD (the sample size for those who reported a primary relationship was too small to analyze), looking for any significant	

differences in response pattern to the SAQ-B as a whole and within the separate domains. This work will build on the existing work of Campbell and will provide a basis for using the SAQ-B with the college/university population. These analyses may also provide additional information on specific domain engagement; for example: Females may be more willing to engage Sheldon in a social setting when compared with their male peers, while students majoring in math/science and engineering may be more willing to engage Sheldon in the academic domain when compared with the non-math/science/engineering peers. Additionally, the researcher will look at college majors in relation to answers on the R-AQ, and will administer an analysis by question, rather than as a whole, to see if any statistical differences are present between questions—perhaps exploring methods of making the integrity of the R-AQ stronger for use in future research with other characters on the spectrum..... 100

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## **CHAPTER I**

### **INTRODUCTION**

Recent reports from the Centers for Disease Control and Prevention (CDC) suggest the prevalence rate for autism spectrum disorders (ASD) is 1 in 68 children, the majority of whom exhibit milder forms of autism such as Asperger syndrome or high functioning autism (CDC, 2014), with between 1 in 130 and 1 in 53 college students likely meeting the criteria for this high functioning form of ASD (White, Ollendick & Bray, 2011). Given the increasing numbers of adolescents being diagnosed with Asperger syndrome, there is a need to examine mechanisms by which their peer group receives information about individuals with ASD and how media characters, presumed to have ASD, are perceived. This information will certainly inform efforts to increase peer acceptance of students on the spectrum. It is well established that persons with disabilities experience high levels of social exclusion, stigma, and discrimination, which are often more extreme during the adolescent years (Corrigan & Watson, 2002). Indeed, in a recent study by White and colleagues (2011), college students who scored higher on a self-screening for ASD experienced higher levels of social anxiety, victimization, aggression, and hostility. These students also reported less overall satisfaction in life and particularly in their college experience.



Adolescents with ASD who are transitioning to higher education or full-time employment are challenged in multiple ways: Not only must they deal with the novel social environment of college, or work while managing their ASD symptoms and behaviors; they must also confront the challenges that result from a lack of peer awareness and misunderstanding of ASD (Geller & Greenberg 2009; Portway & Johnson, 2005; VanBergeijk, Klin, & Volkmar, 2008).

A 2011 study by Nevill and White suggests that peer acceptance and positive peer attitudes toward individuals with ASD actually foster academic and social success for students on the spectrum. In this study, peer acceptance of students with ASD was highly correlated with increased exposure and understanding of ASD through participants interactions with first-degree relatives on the spectrum. College major was also a significant moderator of acceptance, with physical science majors most willing to engage their ASD peers. A newer mechanism for exposure to individuals with ASD is via media (e.g., film and television). If peer acceptance level is indeed mediated by exposure to individuals on the spectrum and knowledge about these individuals, then understanding the effects of media-based exposure to individuals with ASD is paramount.

It is widely documented that individuals learn through observation of others, whether in person or via media. Social learning theory (SLT) suggests that individuals can learn behavior and act on those behaviors without any reinforcement by simply viewing the actions of others (Bandura, 1977). Numerous studies based on Bandura's theory document that vicarious reinforcement (watching others be reinforced for behaviors) from watching media could profoundly change the attitudes and behaviors of individuals (Bandura, 2004a; Cohen, 2011; Moyer-Guse, 2008). Historically, research

highlights the negative effects of television viewing on individuals' perceptions of individuals with mental illness or disabilities (Wahl, 1995). However, the exposure to individuals with disabilities and disorders in the media can also promote awareness and understanding of the disorder while humanizing the individual behind the label. Prosocial and health messages, delivered via mainstream television or entertainment-education programming, have proven a positive influence on awareness, knowledge, attitudes, and/or behaviors (Bandura, 2004; Cohen 2011; Moyer-Guse, 2008). Cohen (2011) asserts that simple identification (e.g., the emotional and cognitive process whereby a viewer takes on the role of a character in a narrative) with a character can cause the viewer to adopt the goals, feelings, or thoughts of the character, extending our social perspectives. Moyer-Guse (2008) suggests that the perceived norms (behavior that is normative in the context of a television series) of characters with whom the viewer identifies may serve to reduce risky health behavior, or alternatively, increase pro-social and healthy behavior. Therefore, exposure to a likeable and appealing media character – despite ASD traits and behaviors– is likely to increase one's acceptance of that character and normalize his/her behavior. Similar studies have been conducted with other marginalized groups. In 2007, Bonds-Raacke and colleagues conducted a study assessing how homosexual characters portrayed in popular media affect general attitudes toward gay and lesbian individuals. The researchers found that a positive portrayal of a homosexual character resulted in a more positive attitude toward gay men when compared with negative portrayals. These findings illustrate the significant effect that media portrayal plays in priming social attitudes.

In recent years, individuals on the spectrum have been depicted in television programming in greater numbers and with varying levels of accuracy. In September of 2007, a new television situation comedy, *The Big Bang Theory (TBBT)*, introduced audiences to Dr. Sheldon Cooper. The program's protagonist, Dr. Cooper is a theoretical physicist and self-proclaimed genius. Episodes of the show often revolve around his idiosyncratic and rigid behavior. In a pilot study, the researcher conducted a mixed methods content analysis of Sheldon Cooper's traits and behaviors. The results demonstrated that Sheldon represents an individual on the autism spectrum; specifically, the character exhibits all of the criteria for Asperger syndrome set forth in the Diagnostic and Statistical Manual 4<sup>th</sup> edition (DSM-IV), including: (a) qualitative impairments in social interaction of non-verbal behaviors (i.e. eye gaze, facial expression, body posture, and gesture to regulate social interaction); (b) failure to develop peer relationships appropriate to age; (c) lack of spontaneous seeking to share enjoyment, interests or achievements; and (d) lack of social and emotional reciprocity (Meeks, 2013). In addition to these diagnostic criteria, Dr. Sheldon Cooper portrays additional characteristics salient to the Asperger's population, including: (a) restricted and repetitive (or stereotyped) patterns of behavior, interests and activities (e.g., preoccupation with restricted patterns of behavior or an intense interest and focus in one activity); (b) inflexible adherence to specific, nonfunctional routines or rituals; (c) stereotyped and repetitive motor mannerisms (flapping, twisting, or complex body movements); and (d) a persistent preoccupation with parts of objects. Together, the pilot data suggests that Sheldon Cooper is representative of an accurate example of an individual with Asperger syndrome. While Sheldon presents as an individual with Asperger syndrome, his

idiosyncratic behavior is written in an engaging and entertaining manner. For example, Sheldon's rigidity (often a point of contention for those who work with individuals on the spectrum) is written in a manner that couches the rigidity in humorous dialogue. Sheldon's "spot" on the sofa (from which he cannot deviate) is so popular that it has become slang to represent an individual's preference. Sheldon is one of many popular television characters that displays traits and characteristics of Asperger syndrome or autism spectrum disorder, but is, by far, the most popular among college-aged students. This is witnessed by his cult-like following of fans and mass sales of merchandise, often worn by college students that are specific to his character (the green lantern shirt and the "Bazinga!" shirt. As popular media continues to highlight these characters, whether in drama or comedy, television's portrayal of individuals with ASD will certainly have an effect on viewers' perceptions of ASD, as mirrored by their behavioral intentions toward their peers who display similar behaviors.

### **Statement of the Problem**

Adolescents with ASD who are transitioning to higher education or full-time employment must struggle with numerous stressors, including bullying or social alienation that can impede their success (Geller & Greenberg, 2009; Portway & Johnson, 2005, VanBergeijk, et al., 2008). Social learning theory (Bandura, 1977) suggests that exposure to different persons or characters can enhance one's awareness and understanding of differences. Research studies document the profound influence media has on individuals' cognitions, attitudes, and behaviors (Wahl, 1995; Bandura, 2004; Moyer-Guese, 2011). Given that popular media often informs perceptions or knowledge of a construct, the accuracy of the portrayal has significant implications. These

representations will ultimately act as sources from which a layperson understands and perceives a specific population. More specifically, the media is expected to actively contribute to people's perceptions about ASD. Rather than ascertaining information from mental health professionals, peer-reviewed journals, or formal education outlets, most consumers of mental health information derive their knowledge of mental health from those stereotypes present in film, literature, plays, television shows, newspapers, and popular magazines (Wahl, 1995). These often inaccurate, disparaging, and dramatized stereotypes may lead to mass generalizations among the lay population and negative consequences for the autism community. In contrast, media exposure to characters that have complex disabilities, in an accurate and likeable way, can promote tolerance and acceptance (Campbell, 2006).

### **Significance of the Study**

According to Nielsen, today's audiences are spending approximately 20% of each day engaging in television viewing (Neilson, 2012a). Due to advances in technology and globalization, television is now accessible online and in other digital formats, impacting people around the world. Such a heavily utilized and accessible media is bound to act as a primary mode of information for most non-clinical television viewers. Characterizing an individual with traits and behaviors similar to those of an individual on the spectrum will have many implications, especially in such a popular television program. Concern regarding the impact of such a character on viewers' perceptions of and their attitudes toward similar individuals is warranted, given media's historic influence on laypeople's beliefs about autism spectrum disorders. Understanding college-aged peers' and adults' perceptions of children with ASD, as well as their behavioral intentions, can aid support

personnel in developing focused intervention and education about ASD. This study will build on the work of Mahoney (2008), who looked at college students' attitudes toward autism, and Nevill and White (2011) who sought to better understand college students' openness to peers on the spectrum as a function of previous exposure to ASD. While other researchers have analyzed movies and television media with regard to how individuals on the autism spectrum are portrayed (Bethune, 2009), the vast difference is that most of these characters have admittedly been on the spectrum (written into the storyline, as individuals with ASD) and the media has been drama-based. By contrast, *The Big Bang Theory* is a situation comedy in which the writers have never confirmed nor identified that the character has Asperger syndrome or ASD. Indeed, when asked directly, producer Bill Prady denies that Sheldon has Asperger syndrome, leaving viewers to make sense of Sheldon's odd and eccentric behavior.

### **Purpose of the Study**

The purpose of this quantitative study, utilizing a survey research design, was to examine college students' perceptions about and behavioral intentions toward Dr. Sheldon Cooper, the main character in *The Big Bang Theory*, who demonstrates common traits seen in persons with Asperger syndrome. This study also examined the frequency with which college students identify Dr. Sheldon Cooper as having Asperger syndrome-related traits, as well as how college student demographic factors and chosen majors influence their knowledge of Asperger syndrome and their willingness to engage with Sheldon Cooper, who shares traits with individuals on the spectrum.

A correlational design was selected over experimental and quasi-experimental designs because of the research questions being investigated in this study. Quasi-

experimental research typically answers the question of “what if” (Kaplan, 2004), and experimental research seeks to prove cause and effect. Survey studies are designed to answer questions regarding relationships between variables (Kaplan, 2004).

### **Research Questions**

In this research study, four research questions have been posed:

1. What is the total frequency and percentage of students who indicated that the character of Dr. Sheldon Cooper has Asperger syndrome, as evidenced by a Revised Asperger Quotient (R-AQ) score of 13 or higher?
2. To what extent, if any, do the participant variables of gender, race, socioeconomic status, frequency of watching *The Big Bang Theory*, academic major, and pre-existing knowledge of Asperger syndrome predict R-AQ scores?
3. To what extent, if any, do students who are science, mathematics, or engineering majors differ from students who are non-science, mathematics, or engineering majors on their willingness to engage with the character Dr. Sheldon Cooper in the social, academic, and recreational domains, as measured the factors/subscales of the Student Activities Questionnaire Form B (SAQ-B)?
4. To what extent, if any, do students who are science, mathematics, or engineering majors differ from students who are non-science, mathematics, or engineering majors in classifying the character of Dr. Sheldon Cooper as an individual with Asperger syndrome, as evidenced by a R-AQ score of 13 or higher?

## Hypotheses

H<sub>01-2</sub>. The participant variables of gender, race, socioeconomic status, frequency of watching *The Big Bang Theory*, major, and pre-existing knowledge of Asperger syndrome will not significantly predict R-AQ scores.

H<sub>a1-2</sub>. The participant variables of gender, race, socioeconomic status, frequency of watching *The Big Bang Theory*, major, and pre-existing knowledge of Asperger syndrome will significantly predict R-AQ scores.

H<sub>03</sub>. Students majoring in science, mathematics, or engineering will not significantly differ from students who are non-science, mathematics, or engineering majors on their willingness to engage with the character Dr. Sheldon Cooper in the social, academic, and recreational domains, as measured the factors/subscales of the SAQ-B.

H<sub>a3</sub>. Students majoring in science, mathematics, or engineering will significantly differ from students who are non-science, mathematics, or engineering majors in regard to their willingness to engage with the character Dr. Sheldon Cooper in the social, academic, and recreational domains, as measured the factors/subscales of the SAQ-B.

H<sub>04</sub>. Students majoring in science, mathematics, or engineering will not significantly differ from students who are non-science, mathematics, or engineering majors in classifying the character of Dr. Sheldon Cooper as an individual with Asperger syndrome, as evidenced by a R-AQ score of 13 or higher.

H<sub>a4</sub>. Students majoring in science, mathematics, or engineering will significantly differ from students who are non-science, mathematics, or engineering majors in classifying the character of Dr. Sheldon Cooper as an individual with Asperger syndrome, as evidenced by a R-AQ score of 13 or higher.



## **Research Design**

A quantitative survey research design is used in this study. Data were gathered from the study participants via self-report measures, and statistical analyses were conducted on the data to capture the relationships among study phenomena (Rosenthal & Rosnow, 2008). A quantitative survey research method was selected due to its precision in establishing statistical relationships among numerically coded variables, allowing for a more objective assessment of the proposed research questions (Rosenthal & Rosnow, 2008). Two instruments were modified for use in this study: The Autism Spectrum Quotient (AQ) (Baron-Cohen, Wheelwright, Skinner, Martin, & Clubley, 2001), a self-report survey of autistic traits in adults with normal intelligence; this instrument was previously modified from a first person format to third person to allow for parent interpretation of behaviors. The parent version of the AQ omitted 10 items out of 50 (items 3, 5, 6, 8, 12, 20, 23, 27, 36, and 42), given that these could only be answered subjectively. Baron-Cohen reported a slight difference in scores between third parties and self-reports (2.8 points,  $SD = .06$ ) with parents scoring their children slightly higher than the self-reports. Additionally, the Shared Activities Questionnaire (SAQ) (Morgan, Walker, Bieberich, & Bell, 1996), a self-report measure of an individual's behavioral intentions toward a peer, was used to assess participants' willingness to engage with peers with disabilities, in this case, the character of Dr. Sheldon Cooper. In addition, a researcher-designed questionnaire was used to measure participants' knowledge about, and experience with, autism spectrum disorders and Asperger syndrome.

Participants answered questions that assessed their knowledge and familiarity with Asperger syndrome and autism. A demographic questionnaire elicited general

information about participants' gender, age, ethnicity, socioeconomic status, student ranking, and academic major. Exposure to *The Big Bang Theory* were examined through a question that asked for frequency in viewing. Participants began the research module by answering the demographic questionnaire. Next, participants viewed a 12-minute video containing randomly selected clips from *The Big Bang Theory* that include Dr. Sheldon Cooper in both solitary and social situations. Two-minute clips were randomly selected (using a randomizer) from each of six seasons of *The Big Bang Theory*. Immediately after the video, participants completed the research Autism Spectrum Quotient (R-AQ), followed by the research version of the Shared Activities Questionnaire (R-SAQ). After completing the surveys, participants completed a knowledge of ASD/Asperger's and responded to a question regarding the frequency with which they watch *The Big Bang Theory*.

### **Theoretical Framework**

Social learning theory is the guiding framework for this study. The supporting characters in *The Big Bang Theory* cushion many of Sheldon's odd and aberrant behaviors and generally accept these idiosyncrasies. It was hypothesized that Sheldon's supporting cast might act as a model of appropriate behavior and acceptance towards an individual with ASD. These hypotheses are best addressed through research focused on viewers' perceptions of, and willingness to engage with, an individual on the spectrum.

According to Bandura, a model allows for learning to occur *vicariously*, or without direct participation (Bandura, Ross, & Ross, 1963a). These models are often figures of authority or higher status (e.g., parent or other adult relative, older sibling, friend, teacher, etc.) Indeed, the higher the status of the models, the more readily people

imitate their actions (Bandura et al., 1963a). Other model attributes show similar influence on the behavior of viewer for example, gender (Bandura, Ross & Ross, 1961) and attractiveness (Bandura, Ross & Ross, 1963b) have shown measurable effects on learned behavior. Bandura (1969) suggests that these attributes (e.g., attractiveness, gender, status) may command heightened attention, and an increased desire to emulate the observed behavior. In the case of *TBBT*, the lead female character, Penny, is attractive and demonstrates consistent kindness and acceptance toward Sheldon. Due to the tolerant nature of the remaining main characters, viewers have an opportunity to witness the patience, kindness, and support that are often necessary when maintaining a relationship with an individual who displays the same characteristics and traits as an individual with Asperger syndrome.

### **Limitations of the Study**

The conclusions of any research study must be viewed through the lens of its limitations. One limitation is the show's popularity and use of humor. Participants might unknowingly respond in a positive manner to the supporting cast, unable to isolate their feelings for Sheldon versus the other characters. The aforementioned issues may skew the results of the Shared Activities Questionnaire-version B (SAQ-B), thus inflating the respondents' scores, indicating a high likelihood of sharing an activity with Sheldon. Additionally, with the use of any questionnaire, one cannot assume that questions are answered honestly and that responses from participants predict actual behavior. This study uses a convenience sample consisting of college students. Such a narrowly defined population makes generalizing the findings difficult outside of the college population. Also, given the data collection method, one can assume that students' self-selection

yielded individuals who (a) are interested in being participants in research, or (b) are interested in winning an iPad Mini. Although measures were taken to collect data about previous knowledge of ASD/Asperger syndrome, we cannot account for the quality of sources of prior knowledge of ASD. Measuring perceptions of any construct is a lofty goal, and while this project attempted to gain reliable insight into college students' perceptions of ASD, time warrants a limitation in the number of variables and questionnaires used. Finally, while the research module is self-contained and mandates that students completed the research in one setting, it was accessed via a personal computer at the comfort and convenience of the participant. As such, we cannot account for the amount of time taken to complete the module and the potential for interfering variables between sections of the module (e.g., interruptions, web surfing, taking unplanned breaks, phone calls).

## **CHAPTER II**

### **LITERATURE REVIEW**

#### **Asperger Syndrome and Autism Spectrum Disorders**

Recent reports from the Centers for Disease Control and Prevention (CDC) suggest the prevalence rate for autism spectrum disorders (ASD) is 1 in 88 children, the majority with milder forms of autism such as Asperger syndrome (AS) or high functioning autism (HFA) (CDC, 2012). Likewise, recent investigations of students in higher education suggest that similar ratios exist within the college environment, where between 1 in 130 and 1 in 53 college students will meet the criteria for this high functioning form of ASD (White et al., 2011). The American Psychiatric Association recently updated the Diagnostic and Statistical Manual 4<sup>th</sup> edition (DSM-IV) to the 5<sup>th</sup> edition, eliminating Asperger syndrome as a separate condition from autism spectrum disorder; however, for the purposes of this paper deference were given to the DSM-IV's terminology of Asperger syndrome, while also recognizing the new diagnosis of autism spectrum disorder (ASD). Accordingly, I will use Asperger syndrome, ASD and student on the spectrum, synonymously throughout the paper.

**DSM-IV diagnosis.** According to the DSM-IV-TR (American Psychiatric Association, 2000), an individual must meet the following seven criteria in order to be

diagnosed with Asperger syndrome: (a) qualitative impairments in social interaction of non-verbal behaviors (i.e. eye gaze, facial expression, body posture, and gesture to regulate social interaction); (b) failure to develop peer relationships appropriate to age; (c) lack of spontaneous seeking to share enjoyment, interests or achievements; (d) lack of social and emotional reciprocity; (e) restricted and repetitive (or stereotyped) patterns of behavior, interests, and activities (e.g., preoccupation with restricted patterns and abnormality in intensity or focus); (f) inflexible adherence to specific, nonfunctional routines or rituals; (g) stereotyped and repetitive motor mannerisms (flapping, twisting, or complex body movements); or (h) a persistent preoccupation with parts of objects (American Psychiatric Association, 2000). In addition to the diagnostic criterion of the DSM-IV, a myriad of other characteristics are prominent in the Asperger's population in the domains of language, sensory sensitivities, and executive functioning. These are discussed in detail in the following sections.

**Use of language.** The determinate difference between autism and Asperger syndrome is the absence of delayed speech found in individuals with Asperger syndrome. Although speech is not delayed, the use of language as a communication tool is stunted in multiple ways. In 2009, Woodbury-Smith and Volkmar conducted an analysis of the literature in an effort to present a cohesive understanding of Asperger syndrome. In this analysis, the researchers discuss the prevalent language difficulties for individuals with ASD (all notably absent in the DSM-IV), including verbose and tangential speech, lack of regulation in volume and speed, and additional irregularities in prosody (Shriberg, Paul, McSweeney, Klin, Cohen, & Volkmar, 2001). Pragmatic language impairments are also common in individuals with Asperger syndrome, but are de-emphasized in the DSM-

IV (Woodbury-Smith & Volkmar, 2009). Other researchers note these salient, yet non-diagnostic, characteristics of individuals with Asperger syndrome. In his 2007 book, *The Complete Guide To Asperger's Syndrome*, Tony Attwood discusses his frustration with the absence of these unique language deficits from the DSM-IV, stating that they are “an essential characteristic of Asperger syndrome and should be included in future revisions of the DSM criteria” (p. 203). For individuals with Asperger's, language deficits often play a critical role in their social deficits. Failure to filter their thoughts before speaking and failure to modify language according to context will impair social communication and can lead to hurt feelings and misunderstandings. Woodbury-Smith & Volkmar (2009) and Attwood (2007) recognize non-sequiturs and verbosity in language as an additional language barrier that impedes social conversation. Finally, understanding how and when to start a conversation can elude the individual with Asperger syndrome. When individuals with Asperger's do speak, it is often described as a rambling monologue rather than a conversation (Woodbury-Smith & Volkmar, 2009). Conversations with an individual with Asperger's disorder tend to “lack flexibility of themes and thoughts” (Attwood, 2007, p. 209) and to be dominated by odd and unrelated comments, making it difficult to follow the individual's thought process.

**Prosody.** As mentioned above, individuals with Asperger syndrome have difficulty with *prosody*, or the use of volume, rate, and pitch, which are methods of implying meaning in language (Shriberg, et al., 2001). Indeed, prosody allows the listener to differentiate between multiple meanings of one phrase, such as, “Come over here.” Depending on how this is communicated it could be stern, sensual, or a statement of excitement or surprise. In individuals with Asperger syndrome, prosody is often distorted

and “flat” (Attwood, 2007, p. 206). These pragmatic language skills, or the collective “social dialogue,” are also impaired.

**Pragmatics.** Pragmatics involves the ability to differentiate language use and rules based on context or company; for example, knowing how to greet someone, ask for something, the idea of share or take turns, and modify vocabulary use and tone to reflect the relational role of the individual with whom one is speaking (Attwood, 2007). While prosody and pragmatics often interfere with intent or meaning behind words, pedantic speech can cause the individual with Asperger syndrome to stand-out as odd, further eroding social exchange with overly sensitive focus on the rules of language, typically delivered in an academic, monotonous manner using complex vocabulary ill-suited for the context.

**Pedantic speech.** Pedantic patterns of speech also present as rigid interpretation of language, which can lead to constant correction and frustration with peers who use language loosely or euphemistically (Attwood, 2007). Other distinctions in language use among individuals on the spectrum are their tendency to make literal interpretations of dialogue (Attwood, 2007).

**Literal meaning.** Literal interpretation renders the individual with Asperger’s blind to the ideas of sarcasm, figures of speech, and innuendo. Attwood (2007) noted the potential for miscommunication and frustration when conversing with an individual who responds to “the literal, not implied, meaning,” stating that the individual with Asperger’s can appear “annoying or stupid” when he/she is ignorant to the hidden or multiple meanings of language (p. 216). While unique language skills contribute to the lack of



social graces observed in individuals with Asperger syndrome, sensitivity to sensory stimuli also contributes to the social and daily functioning difficulties of the population.

**Sensory sensitivities.** Sensory sensitivities are another common characteristic of Asperger syndrome absent from the diagnostic criterion of the DSM-IV, and can include sensitivity to touch, sound, and light. In 2007, Billestedt, Gillburg, and Gillburg published the summary of their longitudinal, community-based study of adult symptom patterns for individuals who received the diagnosis of autism (classic and atypical) in childhood. This study included 105 adults, with over 93% reporting sensory sensitivities so severe that it impaired their functioning. Touch (including being held) was the most frequently noted sensitivity, with over 60% of participants reporting abnormal reactions to mild touch, followed by auditory sensitivity (53%) and visual sensitivity (45%). Sensory sensitivities greatly affect the behavior of persons with Asperger syndrome; overstimulation of the sensory system often leads to anxiety and withdrawal, leading to emotional meltdowns, fits of anger, and physical pain (Attwood, 2007; Wing, Gould & Gillburg, 2011). Most guides about Asperger syndrome include a section on sensory sensitivities, even though they are absent from the DSM-IV. Rudy Simone, author of *Asperger's on the Job*, and an adult with Asperger syndrome, notes that sensory sensitivities often derail individuals with Asperger syndrome in the workplace (Simone, 2010). Many of these same issues apply to the educational setting and community living situations on college campuses.

**Sound.** Overstimulation from noise causes confusion and can lead to irritability, headaches, or the sense of being overwhelmed (Simone, 2010). Sound sensitivity can be specific to a particular sound (e.g., vacuum, telephone ringing, voices, or loud unexpected

noises), or it can manifest as a hypersensitivity to sounds that would go relatively unnoticed by others (e.g, hearing the buzzing in a florescent light fixture, noises from insects or birds, trains, and cars from a distance). These sound sensitivities can prove so disabling that individuals with Asperger's often choose to defend themselves by withdrawing or using preventative devices such as noise canceling headphones (Attwood, 2007).

**Touch.** Tactile sensitivity is also a challenge for most individuals with Asperger syndrome (Billstead et al., 2007). Indeed, in a study investigating hypersensitivity to touch in individuals with Asperger syndrome, Blakemore and colleagues (2006) found that individuals with Asperger's have a lower threshold for tactile stimulation, offering abnormal development of peripheral sensory receptors as a potential cause. Attwood's (2007) book on Asperger syndrome supports this idea, finding that over 50% of individuals with Asperger's experience tactile sensitivity. Socially, this sensitivity can alienate the individual with Asperger's. When physical forms of affection, such as hugs, pats on the back, or hand holding, are sources of pain, they are avoided, thereby further distancing the individual from social and romantic relationships. Despite the potential impact and clinical value as a symptom of Asperger's, tactile sensitivity is not a diagnostic criteria or consideration in the DSM-IV.

**Light.** Visual overstimulation is another hazard for individuals on the spectrum, and like noise and touch, it too is excluded the DSM-IV. Visual stimulation can come in many forms, but often yields the same distracting result. Computer screens and flickering or florescent lights are some of the biggest culprits of overstimulation in the individual on the spectrum (Simone, 2010). In a study comparing individuals with high-

functioning autism (HFA), often used synonymously with Asperger syndrome, a significant difference was noted in visual sensory sensitivity when compared with matched controls (Minshew & Hobson, 2008). Attwood (2007) also endorses frequent visual sensitivity to bright and fluorescent lights, certain colors, and glare.

While these characteristics are not a technical part of the criteria used to diagnose individuals with Asperger syndrome, they are among the most commonly portrayed traits of television characters with Asperger syndrome, including Sheldon Cooper. These highlighted characteristics may significantly inform people's perceptions about Asperger syndrome, without a full understanding of the syndrome leading to further marginalization of this minority population.

### **Knowledge of Autism**

Individuals acquire information about autism from a number of sources, which collectively work to inform their perceptions. As such, peers' knowledge of autism is important to understand, as it informs the interventions that promote inclusion of students with autism. Sources of knowledge vary in quality, leading to disparate views of autism. In an effort to better understand elementary and middle school students' knowledge of autism, Campbell and Barger (2011) developed the Knowledge of Autism scale. The scale is designed to measure students' knowledge of the cause, course, symptoms, and communicability of autism. Using the newly developed Knowledge of Autism scale (KOA), Campbell and Barger (2011) examined over 1,000 middle school students across three different schools, to better understand their knowledge of autism as a function of age, grade, school, and prior awareness of autism. In this study, just under half of middle school students reported prior knowledge of autism; some mistakenly endorsed that

autism is not chronic, is not neurologically based, and that it can be transmitted in a similar fashion to a cold. Those students who had prior knowledge of autism scored significantly higher on each of the ten KOA items. Age and grade had no effect on the knowledge of autism; however, students varied in their awareness and knowledge of autism across the three schools. The study concluded that, while almost half of middle school students questioned were unaware of autism, those who had previous knowledge were better able to correctly identify autistic traits. The variance between the schools was thought to be a product of intervention differences. It was Campbell and Barger's (2011) belief that education about autism spectrum disorders should be part of the curriculum to facilitate an inclusive middle school environment.

Campbell and colleagues continued their work with middle school students in a study documenting the content and accuracy of middle-school students' conceptions of ASD (Campbell, Morton, Roulston, & Barger, 2011). In this study, spontaneously generated definitions of ASD were elicited from the students in order to help researchers better understand both the true and false beliefs of this population to inform future peer education interventions. The researchers found that three-fourths of the students accurately defined autism, but that the students were likely to define autism simply as a disability and failed to accurately identify the etiology, core symptoms, and associate issues of autism. Campbell et al. (2011) again called for peer education wherein students learn about autism, especially as it relates to their own social expectations and behaviors toward students with autism spectrum disorders. The greatest concerns of the researchers across both studies were the peer responses and attitudes towards – indeed the stigmatization of – peers who display autistic symptoms. Campbell et al. (2011) noted

that “peers’ misattribution of unusual social behaviors is a potential problem,” likely to result in the social exclusion and avoidance of peers with Asperger syndrome. This bears significant social implications, as one student’s negative response to a peer with ASD could escalate to include an entire classroom of students stigmatizing the peer. The researchers felt that a clear message about the etiology and associated autism symptoms could provide middle school (and presumably high school and college) students with the correct information and verbiage to engage in a dialogue that encourages support of peers with autism spectrum disorders. This is critical, given that students with ASD are already at increased risk of bullying due to deficits in social skill development (Frith & Hill, 2004) and difficulty forming friendships (Chamberlain, Kasari, & Rotheram-Fuller, 2007). In fact, the prevalence of bullying and victimization among adolescents with ASD in a special education setting is reportedly between 7-30% (van Roekel, Scholte & Didden, 2010) and 75% for children and adolescents in a general education setting (Little, 2001). In a 2005 quantitative study on the risks of having a non-obvious disability, researcher found that bullying was a universal experience among students with ASD, with many reporting feeling ridiculed, teasing, name calling, exploitation and feelings of being ostracized (Portway & Johnson, 2005).

Middle school children are not the only individuals with incorrect information regarding ASD. The implications for adult misperceptions can have similar implications as those for middle and high school students, translating into discriminatory employment practices of hiring and promotion, manipulation regarding money or other goods, and exclusion of individuals with ASD in social settings. In fact, studies of adult perceptions yield more misperceptions than those in middle and high school. In a 2009 study,

Russell, Kelly, and Golding conducted a qualitative analysis of lay adult individuals' beliefs about the etiology and prevalence of ASD. Through an analysis of unsolicited letters on the topic, 96% of those respondents who provided a cause of autism stated that autism resulted from environmental factors directly tied to modern technology (e.g., ultrasound scans, birth trauma, low-level radiation, carbon monoxide poisoning, exposure to chemicals, pollutants in the waters, molds). With regard to prevalence, many of the respondents cited that autism was an "epidemic problem resulting from environmental factors rather than the improved efficacy of its diagnosis by professionals" (Russell et al., 2010, p. 435). In 2003, Furnham and Buck conducted a study among 92 individuals who stated having varying levels of autism knowledge. During the study, participants were asked open-ended questions about the etiology of ASD. Seven participants said the etiology was genetic in nature; however, these same respondents added that environmental factors (e.g., diet, vaccinations) were additional contributing variables. Of the 29 respondents, two cited vaccinations as the primary cause of ASD, while two other respondents blamed the development of ASD on poor parenting. Five participants thought allergies or diet were the sole cause of ASD, and 11 others reported that complications of pregnancy/birth or vaccinations during that time were responsible for a child developing ASD.

Given Campbell's assertion that education on the etiology, course, symptoms, and communicability of ASD lead to inclusive behavior, it seems likely that educating adults about autism would lead to similarly inclusive behavior and mitigate potential discrimination. Likewise, adult parents with correct information about the etiology,

course, symptoms and communicability of ASD may transfer that information to their own children, increasing the effect of adult education.

Although the aforementioned studies focused on individuals' perceptions of autism etiology and prevalence, other studies have focused on lay individuals' general ideas about autism. In 2010, Huws and Jones conducted a qualitative study of how individuals with no prior experience or knowledge of autism conceptualized ASD. The findings highlighted four types of generalizations about individuals with ASD: (a) individuals with ASD cannot and do not abide by social norms; (b) individuals with ASD are completely dependent on others and cannot live in society; (c) individuals with ASD suffer from a mental disability or illness; and (d) individuals with ASD developed the disorder as a result of genetic abnormalities combined with poor environmental factors. Huws and Jones (2010) noted that they were shocked by "the confidence with which the opinions of the participants were expressed," even though the respondents had little to no first hand or professional knowledge of ASD (p. 341). In this same study, some participants also noted the savant-like skills inherent in individuals with ASD. Critical to this study and its focus on the potential mitigating power of television is that when reporting these skills, participants often referenced media as the source of information. For example, one participant stated having the knowledge of "special kids, the gifted autism, the ones that can do amazing art, and things. I suppose that's because that's the people you see on television" (p. 338). This dichotomous view of the capabilities of individuals with ASD – as completely incompetent, even cognitively limited, or highly gifted, having unique, almost "super power" abilities – adds to the misperceptions about the population as a whole. If the media heavily influences adults' perceptions of ASD,

then any portrayal of ASD is a potential opportunity to educate the public with correct information.

### **Autism in the Academy**

Secondary to advances in diagnosis and intervention services, students on the autism spectrum, particularly students with Asperger syndrome, are able to realistically consider higher education (VanBergeijk et al., 2008). While students with ASD have many positive attributes that are conducive to higher education (e.g., above average intelligence, strong language skills, persistence, and attention to detail), the opportunity to fully express those skills is often blocked by the challenges of the population (i.e., sensory difficulties, difficulty maintaining peer relationships, time management, and organizational difficulties). The core deficits in autism spectrum disorders directly relate to difficulties with socializing and communicating (Adreon & Durocher, 2007; Sperry & Mesibov, 2005).

While there has been a great deal of time and commitment given to individuals with ASD at the K-12 level, there still exists a fundamental lack of awareness regarding students with ASD in higher education. The higher education setting is stressful for most late adolescents, regardless of disability. For individuals with Asperger syndrome entering the higher education setting, there are numerous novel social situations that require awareness and adaptation to different communication processes, social norms, and social expectations (Jobe & Williams White, 2007). Primary deficits in social and communicative skills further hinder the development of social support networks (e.g., friends, significant others, professor/student relationships), contributing to feelings of loneliness (Jobe & White, 2007; Locke, Ishijima & Kasari, 2010), reduced academic



success (Howlin, Mawhood, & Rutter, 2000; Humphrey & Lewis, 2008), rejection (Humphrey & Lewis, 2008) and a lack of connection to the greater college community (Hart, Grigal, & Weir, 2010). Without the internal capacity and external support necessary, students with ASD often become lost in the higher education setting (Hart et al., 2010). This places these students at risk with professors, peers, and administrators, as research suggests that individuals unfamiliar with ASD tend to underestimate their ability while simultaneously thrusting unwarranted clinical attributes upon them (Huw & Jones, 2010).

Indeed, research has documented that peer stigma occurs when a child or adolescent simply possesses some traits of Asperger syndrome (Swaim & Morgan, 2001). Despite the increasing number of individuals with Asperger syndrome attending colleges and universities, and despite the understanding and awareness of the numerous social situations that are unique to the higher education setting, very little research has examined how college peers perceive and respond to a person with Asperger syndrome. One exception is a study by Mahoney (2008) examining predictors of college students' attitudes and intentions towards people with ASD. In this study, Mahoney found that college students generally have positive attitudes towards individuals with autism with moderate support for academic integration for the population. Also in this study, Mahoney found that knowledge of autism was predictive of students support for academic integration and well as students' desire for less social distance. Females in this study more likely to desire less social distance, showed more support for academic integration (than their male counterparts) and were more likely to offer to volunteer with the autism community.

Butler and Gillis (2010) conducted a similar study with college students looking at peer-based stigma (as measured by the social distance scale) associated with Asperger syndrome. Interestingly, Butler and Gillis (2010) also looked at behavioral intentions of college students towards their peers with ASD. They found that the label of Asperger syndrome itself was not predictive of peer-based stigma, but having behaviors associated with Asperger syndrome was. In direct contrast to Mahoney (2008) Butler and Gillis (2010) found no predictive relationship between knowledge of ASD and stigmatization. Gender, age, ethnicity, and level of education were also not predictive of stigmatization. While the aforementioned study cited no relationship between quantity of contact and stigmatization, another study by Gardiner and Iarocci (2013), looking at peer acceptance, produced results similar to Mahoney (2008). Results from this study suggest that quantity of contact is associated with being more accepting of ASD. In this study, female participants who majored in the social sciences were also more likely to volunteer to work with individuals with ASD than their male counterparts. Central to the current study, Gardiner and Iarocci (2013) noted that when asked about indirect contact with an individual with ASD, 42.3% reported being exposed to ASD through the media (e.g., movie, television show or documentary). Conflicting results among these few studies highlight the need for additional research on peer perceptions of college students with Asperger syndrome and ASD in general, especially in regard to college students' understanding and acceptance – versus stigmatization – of their peers on the spectrum. Increasing peer awareness of autism spectrum disorders, and the associated behaviors, in addition to providing interventions designed to engage college students with ASD, may help to promote the college development and success of individuals on the spectrum. As

such, this study extends prior work by (a) examining college students' understanding of Asperger syndrome, through a popular media portrayal; as well as (b) focusing on student factors that may promote the social inclusion of college students with Asperger syndrome.

### **Stereotypes, Stigma and Perceptions of Autism Spectrum Disorders**

Stereotypes are representations of an individual's social knowledge of a subject, person, place, or other item (Fazio & Olson, 2003). They allow our brains to make fast, efficient decisions when little other information is available and can be positive (assuming something positive about a person, place, or thing based on little information) or bad (assuming something negative about a person, place, or thing based on little information). Certain stereotypes (e.g., the schizophrenic who murders people) can lead to stigmatization or "stigma" of a group of people. Historically, individuals with psychological disabilities were stigmatized due to the label associated with their condition (i.e. schizophrenia, bipolar, depression, antisocial personality disorder), and not necessarily grounded in the actual behaviors of the individual (Wahl, 1995). Perception is the organization, identification and interpretation of specific sensory information (e.g., visual, auditory, etc.) in order to understand a construct, in this case Asperger syndrome and autism spectrum disorder. Together, stereotypes can affect people's perceptions leading to stigma of a specific group of people. Currently, there is a dearth of information about how college students perceive people with autism spectrum disorders, including Asperger syndrome, and how these stereotypes might affect the individual with ASD. In her article, "Trapped Children: Popular Images of Children with Autism in the 1960s and 2000s," Jennifer Sarrett (2011) argues that stereotypes about autism are mostly shaped by

movies, novels, plays, and magazine accounts of autism rather than informed, clinical fact. Sarrett (2011) also speaks to several accounts of popular media involving ASD and asserts that these representations promote a very distinct version of the ASD reality. According to her research, these media portrayals are almost exclusively of “fragmentation and imprisoned children” that are “non-normative and damaging” to society (Sarrett, 2011, p., 152). If media is society’s primary opportunity to engage with the construct of autism or Asperger syndrome, the greater public might believe that all individuals on the spectrum exhibit savant-like capabilities or are “trapped” and non-verbal. As noted earlier, one study showed that 42.3 % of students reported media as their secondary source of information about Autism Spectrum Disorders (Gardiner & Iarocci, 2013). Accurate portrayals of individuals on the spectrum in everyday life are rare. Even rarer are instances in which the person with ASD is portrayed in stable relationships and career situations. Researchers need to gain more information about how individuals on the spectrum are perceived in order to thoughtfully develop accurate, public education about individuals on the spectrum. Other researchers note the importance of gauging how individuals with ASD are conceptualized by their peers. Kite, Tyson, and Gullifer (2011) recently highlighted the need for research about people’s perceptions of Asperger syndrome through a qualitative study using eight focus groups made up of various professions and parents of individuals on the spectrum. The researchers sought to gain information about perceptions of Asperger syndrome to inform the development of a quantitative questionnaire that explores beliefs about the disorder. Thematic analysis was utilized to interpret participants’ comments and resulted in five themes: (1) an uncertain etiology (with subtext of parenting, immunization,

environmental toxins; (2) challenging behavior (e.g., non-compliance, disrupting others, aggression and violence towards others); (3) barriers in service provision (i.e. not enough services for families and individuals who live with ASD); (4) terminology confusion (i.e. not understanding when to use the terms: Asperger syndrome; high functioning autism; autism spectrum disorder); (5) label stigma (that Asperger's carried far less stigma than autism). Most recently, Butler and Gillis (2011) researched the origin of college students' stigma towards individuals with Asperger disorder (AD)<sup>1</sup>, looking at whether the *label* or the *behaviors* associated with AD were most predictive of stigma. According to their findings, the behaviors associated with AD were predictive of stigma while the label of AD was not. These findings support previous research by Campbell, Ferguson, Herzinger, Jackson, and Marino (2004) wherein school aged children responded negatively to a video of a peer with ASD like behaviors, in the absence of any ASD label. Individuals with ASD are at higher risk for stigmatization, which carries a myriad of consequences, which includes discrimination in housing, employment, and difficulty forging relationships (Read & Harre, 2001; Swaim & Morgan, 2001). Therefore, it is essential to determine what, if any, mediators exist to change people's perceptions of individuals with ASD.

### **Potential Mediators Knowledge, Gender, Major and First-Degree Relations**

Several researchers have investigated attitudes and behaviors towards individuals with ASD as one potential consequence of stereotypes. Nevill and White (2011) suggested that peer attitudes, openness, and acceptance serve to reduce the risks associated with ASD (loneliness, reduced academic success, lack of connectivity). In

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<sup>1</sup> Butler and Gillis used the term Asperger's Disorder in their research, thus the use of the term when referring to the research. Asperger's Disorder is often used synonymously in the literature with Asperger syndrome and ASD.

their study, Nevill and White recruited 685 college students to complete the Autism Spectrum Quotient (Baron-Cohen et al., 2001) and Harnum, Duffy and Furguson's (2007) Openness Scale (modified for college students) to measure whether college students who had first-degree relatives with ASD would be more open to a peer's ASD characteristics than those without intimate knowledge of ASD behaviors and characteristics. In this study, the researchers also looked for variances in response patterns based on gender and college major (predicting that those students majoring in engineering and physical sciences would be more accepting of a peer with ASD like behaviors). While overall gender differences were not identified, individual item differences existed between the sexes, with males reporting significantly more openness than females on items about "hanging out with this person" and "feeling comfortable with this person." When compared with matched samples controlled for gender, those participants reporting having a first-degree relative with ASD versus those without scored significantly higher on the on the openness scale, indicating that exposure or first-hand knowledge of an individual with ASD mediates openness to individuals with ASD, or who display ASD-types of behaviors. With regard to college majors, there were significant group differences, with social science majors indicating less fear of those individuals who display ASD-type behaviors while engineering and science majors indicated that they would be more likely to hang out with an individual who displayed ASD-type behaviors. Differences were also noted between groups when asked if they identify with the person with ASD-type behaviors, with engineering and science majors noting that the individual with ASD was more similar to them. In the original development of the AQ (Baron-Cohen, et al., 2001) the researchers found a distinct and

significant difference in ratings, with more mathematics, science, and engineering students scoring higher on the AQ when compared with students of humanities and social science. Taken together, the finding suggests that more math/science/engineering students will test higher on the AQ and may be more open to individuals who display ASD-type behaviors, as they view the individuals as more like them than non-math/science/engineering students.

In a similar study, Mahoney (2008) researched college students' attitudes about individuals with ASD through their knowledge of ASD, and the quality of their experiences with individuals on the spectrum. In this study, students' acceptance levels of individuals on the spectrum were positively correlated with knowledge of and high quality interaction with individuals with ASD. Likewise, in 2009, Petalas, Hastings, Nash, Dowey, & Reilly used semi-structured interviews to investigate the perceptions and experiences of middle-school aged siblings of boys with ASD. Their findings support Mahoney's (2008) assertion that first-generation connections, with an individual with ASD, yielded greater acceptance of individuals on the spectrum.

Many researchers have investigated attitudes and intentions towards peers with autism in younger populations (e.g., elementary and middle school). Campbell (2006) reviewed the literature on changing children's attitudes regarding autism and suggests that persuasive communication acts to produce behavioral and attitudinal change through the following components: Source (credibility, likeability, power, status and authority); message (explanatory, directive and descriptive of similarities); the audience (gender, age, prior knowledge and personality characteristics); medium (high trustworthy media sources, videotapes); and characteristics of the individual with autism (demographics-

similar, behavioral-prosocial behavior). Understanding how attitudes are influenced is essential to interventions; however, understanding current attitudes is equally important and the baseline from which to build educational programs. In 2001, Swaim and Morgan sought to conduct research that would give readers a clearer understanding of children's stereotypes of and behavioral intentions towards students with ASD. Given the inclusion trend in the school system, many children with and without ASD currently share the same classroom. In light of historical evidence that suggests students with disabilities are at risk for stigmatization and bullying, the researchers hoped to identify a mediating factor for use in reducing these stereotypes and fostering positive attitudes for peers of students with ASD. In Swaim and Morgan's (2001) study, students were introduced to a peer, via video, who displayed autistic behaviors. The researchers used two measures; the Adjective Checklist (Siperstein & Bak, 1977) that measures stereotypic attitudes and the Shared Activities Questionnaire (SAQ) (Morgan et al., 1996). The SAQ measures three domains: Social, academic, and recreational. To determine children's willingness to engage in activities with peers with ASD, researchers used three conditions (1) video with peer with autism; (2) video with peer with no autism; and (3) video with peer with autism plus information about autism, to measure differences in participant's attitudes and intentions between the three conditions. The researchers found that children did not differ in their preference for sharing activities with the peer with ASD, regardless of condition 1, 2 or 3; however, grade (i.e. 3<sup>rd</sup> or 6<sup>th</sup> grade) was a significant mediating variable, with sixth grade peers showing significant differences between conditions on the SAQ that indicate sixth graders would socialize with the no-autism peer in greater numbers than they would the autism or autism with information about autism conditions.



With regard to gender, girls showed significant differences in all three conditions (social, academic and recreational), with a preference for the no-autism condition. The findings that sixth graders and girls rate the conditions differently, with preference for the no-autism condition, when compared with third graders hints that age is a significant discriminator regarding behavioral intentions on peers with ASD. The current work will build on this research, investigating whether the effects of gender and age persist in a higher education population.

Law, Sinclair, and Fraser (2007) showed patterns similar to Swaim and Morgan (2001) when they explored children's attitudes and behavioral intentions toward a peer with Attention Deficit Hyperactivity Disorder (ADHD). ADHD has similar social consequences, as children with ADHD often experience difficulty maintaining control over their behavior and filtering their speech for appropriateness. Children with ADHD can exhibit similar styles of conversational faux pas as children with ASD, such as interrupting a peer, not focusing on the conversation, and holding one-sided conversations. Similar to the present study, Law et al. (2007) utilized the Shared Activities Questionnaire (SAQ) to elicit behavioral intentions of the participants toward the peer with ADHD. Their findings suggest that the added explanation about ADHD did not serve to mediate attitudes or intention about the peer and participants focused more on the behavior of the individual with ADHD than the label. Taken together with the aforementioned information on how behavior, rather than label, effects stigma, it does not appear that neither labels nor explanation are sufficient mediators for reducing stigma. If information about the etiology and symptoms of the disorder do not mediate peer intentions than educational programming designed to de-stigmatize specific disorders

(e.g., autism, ADHD, depression) may not have the intended result. Other methods, mainly media portrayal, may carry greater weight when forming opinions about individuals with these diagnosis or behaviors. As previously stated, media's presentation of individuals with these diagnoses has traditionally been negative; however, if a character with such behaviors/diagnosis can engage and capture an audience in a positive manner, the connection and assumptions of that character may generalize to the greater population.

In 2008, Morton and Campbell took a broader approach to investigating peers' attitudes towards autism by looking at sources of information as potential mediators to attitude. Morton and Campbell randomly assigned students to one of four sources of information about autism: teacher, mother, father or doctor. The researchers measured student's attitudes and intentions, looking for differences in attitudes based on source of information and interactions between source of information, age and grade. A video of an autistic child was shown to students followed by an explanation for the behavior from one of the aforementioned sources after which students completed both the Adjective Checklist (Siperstein & Bak, 1977) and the Shared Activities Questionnaire (SAQ) (Morgan et al., 1996). The findings suggest that information source has a bearing on attitudes about an individual with autism, especially in higher vs. lower grades. As reported in other studies, older children were less likely to want to engage with a peer as measured by the SAQ, with parent information source less of a mediator than teacher or doctor. In a prior study, Campbell et al. (2004) found that even when paired with explanatory information, descriptive information had limited effect on children's attitudes and intentions in third and fourth grade, and no effect after fifth grade. Clearly, providing

information about autism as a potential mediator of attitudes and intentions is not enough to influence attitudes in older children.

### **Popular Media's Influence on Perceptions of Persons with Asperger Syndrome**

Media, particularly television, inform society's perceptions on a myriad of topics - including beliefs about psychological disorders. Rather than ascertaining information from mental health professionals, peer-reviewed journals, or formal education on the matter, Wahl (1995) suggested that most consumers of mental health information would derive their knowledge from those stereotypes present in film, literature, plays, television shows, newspapers, and popular magazines. In his book, *Media Madness*, Wahl (1995) argues that viewers derive information about health issues, like psychological disorders, via media portrayals, and that most people tend to "believe what they see and hear" (p. 88) regarding psychological disorders presented in television. Today's audiences are spending approximately 20% of each day engaging in television viewing (Neilson, 2012a). Such a heavily utilized and accessible medium is bound to act as a primary mode of information for most non-clinical television viewers. Rightfully, the impact of the characterization of an individual in such a popular show has many implications, most notably the potential of television to shape beliefs and stereotypes about specific populations.

Popular media is increasingly highlighting, overtly or covertly, the idiosyncratic quirks of individuals with Asperger syndrome or presumed Asperger syndrome. Characterizations of Asperger's in television vary widely; for example: Max, a character on *Parenthood*, is an adolescent with Asperger's who is diagnosed as part of the show's plot, as is Jerry Espenson on *Boston Legal*. Both of these programs include Asperger's as

a descriptor for their characters. Other television programs, however, present characters with traits associated with Asperger's, without expressly stating or confirming a diagnosis. Examples include Dr. Spencer Reid on *Criminal Minds*, Dr. Sheldon Cooper on *The Big Bang Theory*, and Dr. Temperance Brennan on *Bones*. Given that popular media often influence perceptions or knowledge of a construct, in this case a specific psychological disorder, the accuracy of the portrayal becomes critical, regardless of whether the diagnosis is expressly stated. Representations of Asperger syndrome in television may ultimately act as sources from which the layperson understands and perceives this population.

In print and media characterizations, individuals with Asperger's are typically known for their lack of social graces, perseverating interests, stereotyped and repetitive behaviors, and difficulty with social interactions (Volkmar, 2011). Juxtaposed to the notion of social ineptitudes lies the genius or savant perceptions that people have about individuals with Asperger syndrome and Autism (Draaisma, 2009), many of which are the result of movie and television depictions of this population. Until recently, accurate portrayals of individuals with Asperger syndrome were absent in the media.

### **The Big Bang Theory**

In September of 2007, a new television situation comedy called *The Big Bang Theory* (*TBBT*) introduced audiences to Dr. Sheldon Cooper, a theoretical physicist who displays some idiosyncratic and eccentric behaviors similar to those of an individual with Asperger syndrome. Set in Pasadena, California, the show includes five main characters: three physicists at California Institute of Technology, an aerospace engineer, and a waitress. Dr. Sheldon Cooper, the main character, is a theoretical physicist and a genius

whose peculiar behavior is present in each episode. His character is believed by many to have Asperger syndrome. Dr. Cooper exhibits many criteria for Asperger syndrome set forth in DSM-IV-TR, including qualitative impairments in social interaction of non-verbal behaviors (i.e. eye gaze, facial expression, body posture, and gesture to regulate social interaction) and failure to develop peer relationships appropriate to age. A lack of spontaneous seeking to share enjoyment, interests, or achievements and lack of social and emotional reciprocity are also present in both Dr. Cooper and the Asperger's population. The most notable DSM-IV-TR criteria present in Sheldon Cooper's behavior are restricted and repetitive behaviors and an inflexible adherence to routines or rituals (i.e., Sheldon's rigid eating schedule "oatmeal day", or his specific seating area in the shared living room known as "Sheldon's spot," Sheldon even subscribes to a bathroom timetable (noting his exact bowel movement times).

**Television ratings of The Big Bang Theory.** The popular media has an extraordinary ability to shape our perception of individuals with Asperger syndrome, and the more popular the media, the greater the influence. The popularity of television shows is measured by their Nielsen rating, which is comprised by a detailed analysis of viewers' behaviors, along with demographic information (i.e. gender, income, race, education). According to the Nielsen ratings for the week of November 26<sup>th</sup>, 2012, "The Big Bang Theory" was the 5<sup>th</sup> highest rated television show, with over 17 million viewers (Nielsen, 2012b) per week. Previous seasons, now in syndication, are (at the time of this paper) ranked first in viewership, with over 10 million viewers. *The Big Bang Theory* has won several awards, including the Television Critics Association's Best Comedy Series award in 2009 and The People's Choice Award for Favorite Comedy in 2010. Due to his

portrayal of Sheldon, Jim Parsons counts two Emmys and a Golden Globe among his achievements.

**Dr. Sheldon Cooper.** Dr. Sheldon Cooper has become the model of the individual with Asperger syndrome and the subject of vigorous debate on his status as an individual with the disorder. There are a number of websites, non-academic articles, and blogs dedicated to the issue of whether or not Sheldon Cooper has Asperger's, with titles like: *Big Bang Theory's* Sheldon Cooper: Asperger's Syndrome's Poster Boy?" "Why Sheldon Cooper Matters - Asperger's or Nerd?" "Does *Big Bang's* Sheldon Have Asperger's Syndrome?" "Aspie or Not?," "What Sheldon Cooper Brings to TV," "Is the World Ready for an Asperger's Sitcom?," Sheldon's idiosyncratic behavior is written in an engaging manner and the supporting characters accept him as a friend while recognizing his quirky and often peculiar behavior, including his need for consistency, his rigid thought patterns, verbose and sophisticated language, lack of social graces, lack of empathy, and pedantic speech. In fact, Sheldon's friends often anticipate his reaction to events and avoid any behaviors that would upset Sheldon or evoke his odd behavior.

In the television show, Dr. Cooper readily admits that he has difficulty understanding social norms and often seeks help from his colleagues by asking about the appropriate "social convention" for a given situation. Sheldon abides by a rigid schedule that dictates his diet, the clothing he wears each day, and weekly activities like "laundry day" and "comic book night." He also displays a rigid system of rules; each of his close relationships is governed by an "agreement," a signed and notarized document that lists detailed expectations and responsibilities for his relationships with his best friends and his girlfriend, Amy. Sheldon is also extraordinarily sensitive to change, as evidenced by

his extreme discomfort when anyone sits in “his spot” on the couch, which is invariably accompanied by a monologue regarding the reasons why he initially chose and claimed it.

While the average viewer may assume that Sheldon has Asperger syndrome, the writers of the show vehemently deny that rumor. In a 2012 article, the show’s co-creator, Chuck Lorre, stated that there was a conscious decision not to diagnose Sheldon, while his co-creator Bill Prady maintained that labeling Sheldon Cooper as having Asperger’s would be a huge responsibility for the writers, in ensuring that his behavior is on target with the diagnosis. Instead, Prady suggests that Dr. Sheldon Cooper is a montage of computer programmer colleagues from his past (Sepinwall, 2010). In an interview with David Bianculli of National Public Radio, Jim Parsons said:

I did not know enough about Asperger's to be utilizing any Asperger-y traits early on. And I still didn't know what it meant exactly to have Asperger's until we were being asked about midway through the first season, after having aired several episodes, “Does Sheldon have Asperger's?” And I went to the writers and I asked and they said, “no.” And then I began a very slight foray into just researching, like, “what is this?” And, you know, then I read and was like, “oh, well, okay, they say he doesn’t have Asperger's and they wrote it and so I trust them, but good grief, he certainly has a lot of the traits” (Bianculli, 2010).

In an unpublished pilot study, the researcher aligned Dr. Cooper’s behavior with the requisite diagnostic criteria for Asperger syndrome. Two criteria could not be verified but are assumed present in Sheldon; for example, we can assume that Sheldon meets the DSM–IV–TR (2000) criteria of *no clinically significant delay in cognitive development*. While we cannot verify the requirement that he was verbal before age 3, all indications

are that he has always been verbally precocious. Additionally, in order to be diagnosed with Asperger syndrome, the DSM–IV–TR states that disturbance in these impairments and behaviors must cause clinically significant impairments in social, occupational, or other important areas of functioning. Throughout the first season Sheldon is fired from his job for saying inappropriate things to his boss, alienates friends and colleagues as a result of his poor social dialogue, and admittedly reports no interest in increasing or improving relationships. In most situations, Sheldon Cooper’s behavior would prove detrimental to his wellbeing; however, this is not necessarily the case, as the supporting characters often work around his oddities. Sheldon also portrays some positive attributes, hopeful to the ASD community: he maintains a relationship, albeit non-physical and slow moving, with his girlfriend of several years, Amy Farrah-Fowler, and also maintains a prestigious job while living independently.

### **Social Learning Theory**

Albert Bandura (1977b) stated:

Learning would be exceedingly laborious, not to mention hazardous, if people had to rely solely on the effects of their own actions to inform them what to do.

Fortunately, most human behavior is learned observationally through modeling: from observing others one forms an idea of how new behaviors are performed, and on later occasions this coded information serves as a guide for action.

To what extent does viewing *The Big Bang Theory* influence how individuals view Dr. Sheldon Cooper? As stated previously, the supporting characters cushion many of Sheldon’s odd and aberrant behaviors and accept, for the most part, these quirks and



idiosyncrasies. This led to questions about how viewing the show might influence people's perceptions and treatment of individuals with ASD in real life.

In their book, *Social Learning and Personality Development*, Bandura and Walters (1963) laments ineffective attempts to account for the social influence on behavior. Learning theories of the time arose out of behaviorist ideals grounded in animal and individual human studies at the expense of understanding humans' interaction with society. Bandura and Walters' social learning theory sought to expand these ideas to include the "acquisition and modification of human behavior in dyadic and group situations" (Bandura & Walters, 1963, p. 1). Learning theories also failed to account for the acquisition of novel behavior in the absence of expectancy and reinforcement. Bandura's theory is thought to build a connection between the opposing behaviorist and cognitive learning paradigms, focusing on attention, memory and motivation for learning.

Bandura believed that theories grounded in behaviorist or constructivist theory were inadequate. While behaviorism revealed the influence of reinforcement and punishment on the shaping of individual behaviors, he argued that its outside-in unilateral explanation was inadequate in explaining the complex nuances of individual development. Cognitive theory recognized that capacity of individuals to acquire, store, and retrieve information but espoused cognition in a manner detached from behavior (Bandura, 1974). Instead, Bandura proposed that a comprehensive theory of learning must marry the space between cognition and behavior. He also espoused the necessity of a clear understanding of how information is organized and used to regulate behavior. At the heart of social learning theory are the concepts of observational learning (*modeling*), cognition, and motivation.

**Modeling.** If individuals are influenced by the portrayal of Sheldon Cooper on *TBBT* and learn, via modeling, to treat an individual with the characteristics of ASD with respect and understanding, then modeling may impact how people perceive people on the spectrum. Learning through observing the behavior of other people demonstrates that individuals do not require direct reinforcement for learning to occur; rather, individuals can develop new behaviors by viewing a model (Bandura et al., 1963a). A model allows for learning to occur *vicariously*, or without direct participation. In social learning, behavior and consequences are observed, recorded and committed to memory for future use. A model is often a figure of authority or higher status (e.g., parent or other adult relative, older sibling, friend, teacher, etc.). Miller and Dollard (1941) highlighted the importance of novelty and distinctiveness in determining the likelihood of repeating the modeled behavior. Indeed, the higher the status of the models, the more readily people imitate their actions (Bandura et al., 1963a). Given the popularity of the show, and the fame of the actors, we can assume that *TBBT* models carry a high status. Other model attributes show similar influence on the behavior of those who observe. Gender (Bandura et al., 1963a) and attractiveness (Bandura, 1961), also show measureable effects on learned behavior. Bandura (1969) suggests that these attributes (e.g., attractiveness, gender, status) may command heightened attention, and an increased desire to emulate the observed behavior.

**Observational learning.** Bandura proposed that learning could occur via observation (Bandura et al., 1961). Whether consciously or unconsciously, individuals interact with their environments and adapt their behavior according to environmental demands. When observing other, novel acts, helps shape new patterns of behavior and

inform individuals' perceptions or constructs of reality. This, in turn, influences future behavior (Bandura, 1971a).

According to Bandura (1974), observational learning is ruled by four factors: attention, retention, reproduction and motivation. Observational learning is not a pure recitation of observed behavior, but, more accurately, the complex interplay of factors. This is important when considering the impact of television viewing on how individuals on the spectrum are perceived and treated. Observational learning can be viewed as a dynamic and dependent process whereby appropriate responses following observation must occur in order to translate modeled behavior into action (Bandura, 1969).

**Attentional processes.** In order to learn from observation, discriminate attention must accompany modeled behavior (Bandura, 1969a, 1974). Attentional processes regulate the sensory input of an observed behavior and influence perception of said behavior (Bandura 1969a, 1974). Potential mediators that influence attention include incentives to attend, observer characteristics, and model characteristics (Bandura, 1969a, 1969b).

Miller and Dollard (1941) found that the distinctiveness of the model is especially important in social learning. For this reason, celebrities, persons of high authority, large or loud models, or particularly novel model scenarios are more likely to capture and hold the attention of observers (Bandura, 1969a, 1977b). Sheldon Cooper is both a celebrity of popular television and a distinct model. Further, this television program is the first of its type to offer a comical ASD stereotype, making it novel for the viewer. As stated previously, studies also suggest that gender (Bandura et al., 1963b), authority (Bandura et al., 1963a), and attractiveness (Bandura & Huston, 1961) increase the likelihood of

observer imitation. In the case of *The Big Bang Theory*, the character Penny is considered highly attractive and is often the kindest character to interact with Sheldon. If Bandura's assumptions stand, this would influence audience members' perceptions of and intentions toward Sheldon, as they would model the kindness.

In addition to model characteristics, observer characteristics also influence the likelihood that the observer will attend to the model's behavior. An individual's skill level, beliefs about his or her abilities and prior experiences mediate the response acquisition (Bandura, 1969a). As argued above, several researchers (Campbell, et al., 2011; Mahoney, 2008; Nevell & White, 2011; Petalas, et al., 2009) have cited positive, prior experience as a mediating factor for perceptions and treatment of individuals with ASD. Emotional arousal levels also play a role in attention. Bandura and Rosenthal (1966) showed that a moderated level of arousal increases the likelihood of attending to a model. Likewise, greater attention was paid to behaviors that are more discriminating as opposed to more nuanced (Bandura, 1969a).

The observer's ability to process sensory data undoubtedly influences attention. Bandura (1969a) suggested that, "rate, number, distribution, and complexity of modeling simulation" (p. 138) affect acquisition. Repeated exposure to a model can offset data's complexity or high rate of speed, thus increasing the likelihood of learning over a period of time. With *TBBT* rated as the most popular television show this year, one can assume that those viewing are doing so multiple times.

**Retention.** While the aforementioned attention-directing factors play a large role in observational learning, said learning cannot occur if the observer fails to retain and catalog the modeled behavior. In order to retain modeled behavior, the observer must

either place the behavior into his or her existing repertoire, or amend existing structures to allow for modified constructs. Since models rarely serve as constant external cues, rehearsal, or *cognitive repetition* is needed. Bandura (1969a) discussed the role of repetition in strengthening the retention of a learned response. He conceptualized how covert repetition is often utilized, as many learned behaviors, such as aggression, would neither warrant nor tolerate covert rehearsal. Repetition, much like attention, is positively correlated to the perceived power of the model or perceived value of the reward. Observers are more motivated to emulate behaviors that will result in desired social or material reward (Bandura, 1969a, 1969b). Time can be a mediating factor to observational learning as well; modeling that occurs repetitively in short durations is likely to elicit greater retention than lengthy, uninterrupted sequences. The use of a timely situation comedy, rather than a historic television or film piece, could influence how much information viewers retain and to what extent they emulate the observed behaviors.

**Reproduction.** The utilization of learned behavior is partially dependent on the observer's ability to piece together patterns or sequences of events in the absence of direct instruction. Replication of modeled behavior can be realized more easily if the observer's existing repertoire contains elements of the newly modeled behavior and needs only to be synthesized (Bandura, 1969a). In other words, the likelihood of performing an observed behavior is based on ability or experience. Often, the observer is absent one or many requisite skills for direct imitation, leading to partial reenactment of the behavior. This accounts for some of the variation measured in observers who exhibit a range of the modeled behavior after being exposed to the model (Bandura, 1969a).

Attention, retention, and reproduction are important elements in observational learning; however, without motivation the observer will fail to reenact the model's behavior. For example, a college student who enjoys watching football, understands the game's fundamentals, and possesses the requisite athletic skills to play competitively may still fail to succeed on his college team if he lacks the critical fourth component: Motivation.

**Motivation.** Motivation is the fourth component necessary for observational learning, according to Bandura. Without motivation, the observer is unlikely to imitate the model's behavior. Conversely, action is highly likely in the presence of appropriate incentives (Bandura, 1969a). Past reinforcement, the potential for future reinforcement, and vicarious reinforcement via models all contribute to whether the observer was motivated to display the modeled behavior.

**Social cognitive theory of mass communication.** Most recently, Bandura (2004b) began applying social learning theory to media. Bandura (2001) asserts "heavy exposure to this symbolic world (television) may eventually make the televised images appear to be the authentic state of human affairs" (p. 12). Bandura noted that misconceptions due to symbolic modeling of stereotypes (especially with regard to minorities, and social and sex roles) foster "collective illusions." Bandura believed that models, via television, can act as "social prompters," encouraging altruistic or prosocial behavior by example. As previously noted, media is historically linked to negative, antisocial, or risky behaviors. More recently, Bandura (2004a) presented social cognitive theory as a way of modeling prosocial and responsible behavior. According to Bandura, direct pathways involving media bring about change by informing, modeling, motivating, and guiding personal changes. Although specific to health behaviors, there is potential in

the use of the same media pathways for behavioral changes and attitudinal changes. One example of modeling responsible health behavior comes in the form of serial television dramas, based on social cognitive theory, that serve to educate people about solutions for everyday problems and address global problems, like soaring population growth and HIV/AIDS (Bandura, 2002). This is referred to as Entertainment education.

**Entertainment-education.** Entertainment education (EE) is grounded in social cognitive theory and is described by Signhal and Rogers (1999) as the decided insertion of prosocial messages into television programming. The idea behind EE is that as audiences become connected to the characters on television, thereby lowering their defenses and allowing the messages to be heard by the viewer. Entertainment television usually focuses on positive sex practices (e.g., HIV prevention, use of condoms, pregnancy prevention) through the use of social models and, although most empirically supported research has occurred outside of the United States, some initial work in prime-time television shows has shown promising results in similar topics (e.g., condom efficacy, HIV, and emergency contraception) (Moyer-Guse, 2008). In a 2011 study of 437 undergraduates, Moyer-Guse and colleagues found that when compared to education or entertainment only conditions, entertainment education (E-E) programs can promote safer sex behavior among young adults in the United States.

When placed within the context of *TBBT* and how viewing the behavior of Sheldon Cooper's co-stars might translate into actual attitudinal and behavioral changes, one can see that Bandura's (2004b) social cognitive theory and Campbell's (2006) work on changing children's attitudes toward autism, support the idea that characters on popular television, when properly attended to, can act as models of behavior learned

through observation, reinforcing specific attitudes and behaviors. Additionally, as society becomes more accepting of individuals with ASD qualities, and as the show becomes increasingly popular, the motivation to emulate the behavior is measurable—thus completing Bandura’s tenets of social learning.



## **CHAPTER III**

### **METHODOLOGY**

#### **Participants**

Approximately 200 full-time, traditional college students, between the ages of 18 and 24, were recruited for participation in this study. Participants were recruited for this study via Facebook, using snowball sampling (or chain referral sampling) method (Biernacki & Waldorf, 1981). The snowball sampling method occurred through a system of referrals: Existing study participants identify other individuals who meet study criteria as potential recruits for the study, and those individuals are asked to identify other potential participants, and so on (Biernacki & Waldorf, 1981). While snowball sampling is a type of convenience sampling and is prone to bias, it is often a very effective means of recruiting difficult-to-reach group members (Biernacki & Waldorf, 1981). In the absence of enough participants to conduct random sampling, convenience sampling via this method was the preferred recruitment method.

The investigator had access to 50 undergraduate college students through professional organizations (e.g., Milestones Organization, Aspiritech, Association of Higher Education and Disability) and through personal relationships in the following

states: Florida, Ohio, New York, Alabama and Arizona. The students were readily accessible via Facebook. A scripted Facebook message was sent to those students who meet study criteria; in this message, the researcher provided the link to the study survey.

The Facebook message read:

You are being invited to participate in a study looking at college students' perceptions of a character in popular television. During this study you will answer some basic questions about yourself, watch a short video, complete two surveys and answer some brief questions about a specific topic. The deadline for completion of this research is July 1, 2013. The module (video and survey) must be completed in ONE SITTING. The process will take between 30-45 minutes and all participants will have an opportunity to enter a raffle for an apple iPad mini. To take part in this research, go to [www.TBBTresearchproject.com](http://www.TBBTresearchproject.com). Thank you in advance for your assistance with this project.

The investigator requested that they share the study information on their individual Facebook pages and via Facebook private messaging. In addition, three professors in Ohio read the Facebook announcement in their fall courses (May through December of 2013), making students aware of the study and the website. All participants answered the study survey via the self-contained and secure research website at [TBBTresearchproject.com](http://TBBTresearchproject.com).

### **Research Design**

In this study, a quantitative survey research design was used, as data were gathered from the study participants via self-report measures, and statistical analyses were conducted on the data to capture the relationships among study phenomena

(Rosenthal & Rosnow, 2008). A quantitative survey research method was selected due to its preciseness in establishing statistical relationships among numerically coded variables, allowing for a more objective assessment of the proposed research questions (Rosenthal & Rosnow, 2008). As data in this study are not based on subjective responses of participants via interviews or focus groups, neither a qualitative nor mixed method research design was appropriate (Kaplan, 2004). A correlational (survey) research design was necessary, as the researcher could not manipulate the personal factors measured in this study; in other words, the variables under examination in this study precluded the use of an experimental research design (Kaplan, 2004).

### **Instruments**

**The Autism Quotient (AQ).** The AQ (Baron-Cohen, 2001), is a self-report survey of autistic traits in adults with normal intelligence that takes approximately 10 minutes to complete. The AQ consists of 50 questions, with 10 questions per the five factors or subscales of (a) Communication, (b) imagination, (c) attention to detail, and (d) attention switching. Individuals rate the extent to which they agree or disagree with the statements using a 4-point Likert-type scale wherein 4 = “definitely agree”; 3 = “slightly agree”; 2 = “slightly disagree” and 1 = “definitely disagree.” The summation of the score indicates placement on the autism spectrum. A score of 32 or above on the original scale is indicative of autism spectrum disorders. Baron-Cohen (2001) reported acceptable internal consistency of items for each AQ factor/subscale, with Cronbach’s alpha coefficient being  $\alpha = .65$  for the communication factor;  $\alpha = .77$  for the social factor;  $\alpha = .65$  for the imagination factor;  $\alpha = .63$  for the attention to detail factor; and  $\alpha = .67$  for the attention switching factor. Baron-Cohen and colleagues (2001) used a modified version

of the AQ as a method of measuring inner-rater reliability. In this modified version, the researchers reduced the number of questions from 50 to 40 and changed the first person format to third person to allow for third party interpretation of behaviors. In the current study, the original AQ scale was reduced to 20 questions and was referred to as the research AQ (R-AQ). The R-AQ questions were adapted to address the behaviors of Dr. Sheldon Cooper from *The Big Bang Theory* without losing the original meaning by replacing Sheldon's name for all instances of "I." For example: Statement number one on the original AQ reads, "I prefer to do things with others rather than on my own;" for our R-AQ the statement would read, "Sheldon Cooper prefers to do things with others rather than on his own". Equal loading on all five subscales was maintained, yielding four questions on each subscale (Social skill; Communication; Imagination; Attention to detail; and Attention switching). The R-AQ also retained the positive and negative scoring present on the original AQ. Given the reduction to 20 questions on the R-AQ, a score of 13 or higher on the R-AQ is suggestive of autism spectrum disorders.

**Shared Activities Questionnaire (SAQ).** The SAQ (Morgan et al., 1996) was adapted for this study. The SAQ is a self-report measure of an individual's behavioral intentions towards a peer, used to assess elementary school children's willingness to engage with peers with disabilities. Specifically, the measure was developed to measure elementary school children's behavior intentions towards a peer in a wheelchair (Morgan et al., 1996). It was also validated for use in measuring middle school students' behavioral intentions towards individuals with autism (Campbell, 2008). There are two versions of the SAQ: The SAQ version A and the SAQ version B. The SAQ-B is comprised of three factors/subscales that assess shared activities across three domains:

Social, academic, and recreational. Each subscale contains 24 questions with response coding of 3 = yes, 2 = maybe, and 1 = no. Total scores range from 24-72, with domain scores from 8-24. The higher the score, the more willing the participant is to engage in that activity with the subject. The SAQ-B was used in this study to determine participants' behavioral intentions towards (i.e., willingness to engage with) the character Dr. Sheldon Cooper. The SAQ-A was developed to assess individuals' willingness to engage with a peer in a wheelchair, and it is comprised of a social factor/subscale and academic factor/subscale; it does not include a recreational factor. The SAQ-A will not be used in this study.

The authors reported acceptable reliability for all three factors/subscales of the SAQ-B as reflected by coefficient alpha  $\alpha=.94$  total score;  $\alpha=.86$  General Social factor score;  $\alpha=.83$  academic factor score;  $\alpha=.86$  recreational score. The SAQ-B has been validated as a measure of children's intentions towards a peer with autism in both elementary (Swaim & Morgan, 2001) and middle school (Campbell, 2008) individuals. To better match the survey items to the developmental stage and social context of the sample of college students (as compared to the SAQ's original use with young children), some items on the survey were rephrased, although the intention behind the question remained the same. For example, question one was revised from "I would ask Suzy to come to my house to watch TV," to "I would ask Suzy to come to my dorm to watch TV." The adapted SAQ was referred to as the R-SAQ in this study.

**Knowledge about autism/Asperger syndrome questionnaire.** Participants answered questions that gauged their knowledge and familiarity with Asperger syndrome and autism. Questions inquired about the participants' (a) knowledge of Asperger

syndrome; (b) previous exposure to Asperger syndrome; (c) family history of autism spectrum disorders; and (d) participant diagnosis of an autism spectrum disorder. This questionnaire was designed by the researcher grounded in literature that suggests knowledge of AS (Campbell, 2008), previous exposure to AS (Gardiner and Iarocci, 2013), family history of ASD (Nevill & White, 2011), or diagnosis of ASD positively affects individuals' perceptions of people.

**Demographic questionnaire.** Participants were asked to complete a demographic questionnaire that inquires to their gender, age, ethnicity, and socioeconomic status. Participants also answered questions about their student ranking (i.e., freshman, sophomore, junior, senior) and their major or intended major. Exposure to *The Big Bang Theory* was gauged by a question that asks for frequency in viewing, using a response code in which 7 = more than once a week, 6 = once a week, 5 = two or more times a month, 4 = once a month, 3 = once every 2-3 months, 2 = once or twice a year, and 1 = never.

### **Procedure**

Students were directed by the investigator via a Facebook message to a self-contained and secure research website. The website is inclusive of all study components: It contains and ran the 12-minute video, and students accessed and answered the study survey on the website. Once the participants accessed the website, they read the research description explaining the process for completing the research module. The description read:

Thank you for your participation in this research. This information will help researchers better understand the college students' perceptions of a character in

popular television. During this study you will answer some basic questions about yourself, watch a short video, complete two surveys and answer some brief questions about a specific topic. The deadline for completion of this research is July 1, 2013. The module (video and survey) must be completed in ONE SITTING. The process will take between 30-45 minutes. Before beginning the module you were asked to indicate your consent by checking either an “I agree” box, indicating your agreement to participate in the study, or an “I do not agree” box which will allow you to exit the website. Participation in this study poses no measureable risk. If you have questions or concerns about your participation you can email the principal investigator at [TBBTresearchproject@gmail.com](mailto:TBBTresearchproject@gmail.com). If you have questions about your rights as a research participant you can contact the Cleveland State University Institutional Review Board at 216-687-3630, or view the Right of Participants via this link:

<http://www.csuohio.edu/offices/spr/irb/index.html>. This study is voluntary.

Again, thank you for your participation. Your answers are critical to potentially understanding the connections between media and perceptions.

Participants were informed via the website that they must complete the module, which consisted of an initial demographic survey, the viewing of a 12-minute video, the research AQ, the modified SAQ, and an additional questionnaire about the participants’ knowledge of autism spectrum disorders. The module took approximately 30-45 minutes to complete and participants were informed that they must complete the module in one sitting. Participants were given two options, one to agree to participate in the research by checking a box marked “I agree” and one to discontinue the research by checking a box

marked “I do not agree.” Participants who agreed to complete the module pressed “Begin” and the study started. Participants who elect not to complete the module and indicated this option by checking “I do not agree” and were routed to a statement thanking them for their time and a button to log out of the website. The website was designed to assure that all portions of the research occurred in the order intended. The participant did not have the option to complete one section without completing the prior section or viewing the video in its entirety.

Participants completed the initial demographic questions via a dropdown menu with categorical options in the following domains; Age, ethnicity, gender, student status, major in college, and socio-economic status. The options for age include all numerical values 18-24 (18, 19, 20.....24). Ethnicity choices included: White, American Indian and Alaska Native, Asian/Indian, Middle Eastern, Black or African American, Native Hawaiian and Other Pacific Islander, Hispanic or Latino. The options for gender included: Male; female; or transgender. Student status options included: Freshman, sophomore, junior, senior, and graduate student. Students selected from the following major/intended major options: Humanities; Engineering-Computer Science; Science and Math; Social Science; Visual or Performing Arts; Business; or Undecided. For socio-economic status, participants chose from the following family income levels: Below 25K, 25-50K, 50-75K, 75-100, over 100. Once the participants completed the initial demographics selections, they were prompted to begin the video (played via Flash plugin).

Participants viewed a 12-minute video of clips from *The Big Bang Theory* that included Sheldon Cooper, both solo and in discourse with support characters. Two



minutes of footage, from each of the first six seasons, was selected via random selection and edited to create the 12-minute montage that was vetted and reviewed by two autism experts—the director of the Milestones Autism Organization and a professor of psychology who specializes in autism spectrum disorders; the experts agreed that the video was an accurate representation of an individual with Asperger syndrome.

Immediately after the video, the first survey began. Participants completed the research AQ (R-AQ) by clicking on the appropriate choice, via a drop-down menu under each question. Once the R-AQ was completed, the research version of the Shared Activities Questionnaire (R-SAQ) began. Participants selected “yes,” “no,” or “maybe” from a drop-down menu under each question. Immediately following the R-SAQ, participants’ knowledge of autism and Asperger’s were assessed through a series of questions, including: (a) Do you know what Asperger syndrome is?; (b) Have you been diagnosed with autism or Asperger syndrome?; (c) Do you have an immediate family member (brother, sister, mother, father) who has been diagnosed with Asperger syndrome? (not autism); (d) Do you have a friend or extended family member (uncle, aunt, cousin, etc.) who has been diagnosed with Asperger’s? Response questions include “yes” or “no,” and were coded as 1=Yes, 0=No. Questions regarding participants’ knowledge of autism spectrum disorders and Asperger syndrome were completed at the end of the session to avoid prompting their ratings of Sheldon on the other two measures, the R-AQ and the R-SAQ.

Participants who wished to be entered in the raffle for the iPad Mini were given the option of sharing their email addresses for the raffle. Email addresses were placed into a pool and randomized before extracting the winning address. Email addresses were

strictly confidential and cannot be linked with survey responses. After 200 modules were completed, a number generator selected a number (1-200) and the corresponding email was selected as the winner. The student was notified via email that he or she was selected to receive the prize.

## **Data Analysis**

**Preliminary data analysis.** Prior to conducting statistical analyses for hypothesis testing, data were checked for entry errors and missing responses, with adjustments for missing data made in accordance with Allison (2001). Participant descriptive data was computed. Descriptive statistics for sample data included frequencies and percentages for categorically coded variables such as gender, socioeconomic status, and college major. The mean, median, standard deviation, and range of scores were computed for sample variables that are continuously coded; some of these variables included student age and how often the participants watch *The Big Bang Theory*. Given the reliability of the AQ, and the equal loading on factors on the R-AQ, the researcher believed the modified research version of the AQ was a reliable indicator for measuring participants' impressions of Dr. Sheldon Cooper as an individual with Asperger syndrome. The inter-item consistency of the R-SAQ-B and R-AQ were determined by computing a Cronbach's alpha ( $\alpha$ ). The R-AQ and the SAQ-B scales were computed by summing the scale items. The R-AQ was used to address whether participants view the character Dr. Sheldon Cooper, as having Asperger syndrome. The score provided a comparison for willingness to engage the character as a function of the R-AQ score. In other words: Are participants' SAQ-B scores correlated with R-AQ scores, and, if so, what, is the relationship for those who viewed Sheldon's behaviors as

more strongly aligned with Asperger syndrome? A mean score of 13 or above on the R-AQ is indicative of a participant's judgment that Dr. Sheldon Cooper has Asperger syndrome. To answer research question 3 and 4, college majors were recoded into two groups, (1) Math/Science/Engineering majors and (2) Non-Math/Science/Engineering majors. Group 1 consisted of the following majors: Engineering/computer science; science; and math. Group 2 consisted of the following majors: Humanities; social science; visual or performing arts; business; or undecided.

**Testing for violations of assumptions.** Assumptions are inherent to all statistical analyses. Study variables were tested for violations of the assumption of normality, which was determined by a skewness value greater than .90 and a kurtosis value greater than 3.00, as well as evidence of univariate and multivariate outliers (Rosenthal & Rosnow, 2008). Another assumption is homoscedasticity; that is, when the criterion variables show similar variance of scores across the range of scores for the predictor variables (Howell, 2012). Linear relationships between the predictor variables and between predictor and criterion variables to test for homoscedasticity were plotted via scatterplots (Howell, 2012). The data proved to be linear and show homoscedasticity as scores were evenly distributed above and below the horizontal line of the scatterplot (Howell, 2012).

Specific to research question two, which was tested via multiple linear regression, multi-collinearity between predictor variables was determined. Specific to research question three, the researcher ran a multivariate analysis of variance (MANOVA), testing for the assumption of homogeneity of variance-covariance matrices. A Box's M statistic was computed to test this assumption. Statisticians recommend that the Box's M

significance should be determined by significance level of  $p < .001$  (Kaplan, 2004; Rosenthal & Rosnow, 2008).

### **Study Hypotheses**

In this research study, four research questions have been posed:

1. What is the total frequency and percentage of students who indicated that the character of Dr. Sheldon Cooper has Asperger syndrome, as evidenced by a R-AQ score of 13 or higher?
2. To what extent, if any, do the participant variables of gender, race, socioeconomic status, frequency of watching *The Big Bang Theory*, major, and pre-existing knowledge of Asperger syndrome predict R-AQ scores?

H<sub>02</sub>: The participant variables of gender, race, socioeconomic status, frequency of watching *The Big Bang Theory*, major, and pre-existing knowledge of Asperger syndrome will not significantly predict R-AQ scores.

H<sub>a2</sub>: The participant variables of gender, race, socioeconomic status, frequency of watching *The Big Bang Theory*, major, and pre-existing knowledge of Asperger syndrome will significantly predict R-AQ scores.

3. To what extent, if any, do students who are science, mathematics, or engineering majors differ from students who are non-science, mathematics, or engineering majors on their willingness to engage with the character Dr. Sheldon Cooper in the social, academic, and recreational domains, as measured the factors/subscales of the SAQ-B?

H<sub>03</sub>: Students who are science, mathematics, or engineering majors will not significantly differ from students who are non-science, mathematics, or engineering

majors on their willingness to engage with the character Dr. Sheldon Cooper in the social, academic, and recreational domains, as measured the factors/subscales of the SAQ-B.

H<sub>a3</sub>: Students who are science, mathematics, or engineering majors will significantly differ from students who are non-science, mathematics, or engineering majors in regard to their willingness to engage with the character Dr. Sheldon Cooper in the social, academic, and recreational domains, as measured the factors/subscales of the SAQ-B.

4. To what extent, if any, do students who are science, mathematics, or engineering majors differ from students who are non-science, mathematics, or engineering majors in classifying the character of Dr. Sheldon Cooper as an individual with Asperger syndrome, as evidenced by a R-AQ score of 13 or higher?

H<sub>o4</sub>: Students who are science, mathematics, or engineering majors *will not* significantly differ from students who are non-science, mathematics, or engineering majors in classifying the character of Dr. Sheldon Cooper as an individual with Asperger syndrome, as evidenced by a R-AQ score of 13 or higher.

H<sub>a4</sub>: Students who are science, mathematics, or engineering majors *will* significantly differ from students who are non-science, mathematics, or engineering majors in classifying the character of Dr. Sheldon Cooper as an individual with Asperger syndrome, as evidenced by a R-AQ score of 13 or higher.

## Hypothesis Testing

For research question two, “To what extent, if any, do the participant variables of gender, race, socioeconomic status, frequency of watching *The Big Bang Theory*, college major, and pre-existing knowledge of Asperger syndrome predict R-AQ scores?,” a multiple linear regression was conducted, with all of the predictor variables entered on the first step of the regression model using SPSS 20.0. The regression provided information about how subsets of students view Sheldon as an individual with Asperger’s or without. This regression also provided some predictive information about the impact of pre-exposure to the show and interpretation of the main character as an individual with an autism spectrum disorder.

For research question three, “To what extent, if any, do students who are science, mathematics, or engineering majors differ from students who are non-science, mathematics, or engineering majors on their willingness to engage with the character Dr. Sheldon Cooper in the social, academic, and recreation domains, as measured the factors/subscales of the SAQ-B?,” a one-way MANOVA was conducted. Given the independent/dependent variables, this was the optimal statistic to test significance of two or more criterion variables that share conceptual overlap and statistical variance (Rosenthal & Rosnow, 2008). The significance of the MANOVA model was determined by the F-value, the Wilk’s lambda ( $\Lambda$ ) value, and the corresponding significance (p) value. Significant univariate results were determined by the F-value and corresponding significance (p) value.

For research question four, “To what extent, if any, do students who are science, mathematics, or engineering majors differ from students who are non-science,

mathematics, or engineering majors in classifying the character of Dr. Sheldon Cooper as an individual with Asperger syndrome, as evidenced by a R-AQ score of 13 or higher?,” a chi-square ( $\chi^2$ ) test of independence was conducted. The significance of the  $\chi^2$  test of independence were determined by the  $\chi^2$  test statistic and corresponding significance (p) value.

## CHAPTER IV

### RESULTS

The purpose of this proposed quantitative study, utilizing a survey research design, was to examine college students' perceptions and attitudes about Dr. Sheldon Cooper, the main character in *The Big Bang Theory* who demonstrates traits salient in individuals' with Asperger's syndrome. These perceptions and attitudes were measured via four distinct research questions. The goal of the first question was to assess whether or not participants perceived the character of Sheldon as having Asperger's syndrome. The goal of the second question was to determine if demographic questions (i.e., age, gender, race, class standing, income level) and questions regarding knowledge of Asperger's syndrome and relationships with individuals with Autism Spectrum Disorders significantly predicted participants' perceptions of Sheldon Cooper as an individual with Asperger's syndrome. The goal of the third question was to determine if participants who were and were not engineering/sciences/mathematics majors differed in their willingness to engage socially, academically, and recreationally with Sheldon's character. The goal of the fourth and final research question was to assess if participants who were and were not engineering/sciences/mathematics majors differed in their responses on the R-AQ indicating that the character of Sheldon had Asperger's syndrome.



The purpose of this chapter is to present the statistical results of the study. The study opens with a discussion of the sample participants and includes descriptive statistics as well as preliminary inferential statistics with regard to participants' demographics and knowledge of Asperger's syndrome. The descriptive statistics of the study variables are discussed in the next section, followed by the finding of each research question. In these sections, assumptions for specific statistics are presented and explained. The results from the statistical analyses conducted for each research question are explained. A summary of the analysis completes the chapter.

### **Sample**

**Data screening.** The initial sample of participants included 232 participants ( $N = 232$ ). The sample was screened for missing items. One hundred and thirty participants failed to respond to all items queried after the video, and were identified and recoded as missing data. The minimum amount of data for power was satisfied, with a final sample size of 102. The researcher used listwise deletion to exclude data with missing values in accordance with Allison (2001). No patterns were predicted in those participants who chose not to persist in the study.

**Sample descriptive information.** Table 1 presents the descriptive statistics for the sample demographic variables. The sample of participants was  $N = 102$ , with 62 (60.8%) females and 40 (39.2%) males. The sample was comprised of 30 (29.4%) 18-year-old participants and 15 (14.7%) 19-year-old participants. Of the remaining participants, 45 (44.1%) were between the ages of 20 and 29 years and 12 (11.8%) were between the ages of 30 to 40 years. The majority ( $n = 79$ , 77.5%) of participants were White/Caucasian, while 7 (6.9% of) participants were Asian/Indian Asian, 7 (6.9% of)

participants were Black/African American, 5 (4.8%) were Hispanic/Latino(a), 3 (2.9%) Middle Eastern, and 1 (1.0%) was Native American. The majority ( $n = 70$ , 68.6%) of participants had a household income less than \$75,000, while 32 (31.4%) of participants had a household income of \$75,000 or higher.

Table 1

*Descriptive Statistics: Participant Demographics*

<i>Variable</i>	<i>Categories</i>	<i>Frequency</i>	<i>Percentage</i>
Gender	Female	62	60.8
	Male	40	39.2
Age Group Categorical	18 years of age	30	29.4
	19 years of age	15	14.7
	20 to 29 years of age	45	44.1
	30 to 40 years of age	12	11.8
Age Group Dichotomized	18 to 19 years of age	45	44.1
	20 to 40 years of age	57	55.9
Ethnicity Categorical	White/Caucasian	79	77.5
	Asian/Asian Indian	7	6.9
	Black/African American	7	6.9
	Hispanic/Latino(a)	5	4.8
	Middle Eastern	3	2.9
	Native American/Alaskan Native	1	1.0
Ethnicity Dichotomized	White/Caucasian	79	77.5
	Other Ethnicity	23	22.5
Income Level	\$24,000 or less	23	22.5
	\$24,001-\$49,999	7	6.9
	\$50,000-\$74,999	40	39.2
	\$75,000-\$99,999	9	8.8
	\$100,000 or higher	23	22.5

( $N = 102$ )

The participants provided information on their college class status and their major (see Table 2). The largest college class category represented in the study were freshmen,  $n = 43$  (42.2%), followed by graduate students,  $n = 20$  (19.6%). Of the remaining college class categories, 11 (10.8% of) participants were in the sophomore category, 14 (13.7%) were in the junior category, and 14 (13.7%) were in the senior category. With regard to college major, 14 (13.8% of) participants<sup>2</sup> had yet to decide upon a major. The largest major group represented was engineering/computer sciences ( $n = 25$ , 24.5%), followed by social sciences ( $n = 24$ , 23.5%), science/mathematics ( $n = 22$ , 21.6%), humanities ( $n = 13$ , 12.7%), and business ( $n = 4$ , 3.9%).

Table 2

*Descriptive Statistics: Participant College Demographics*

<i>Variable</i>	<i>Categories</i>	<i>Frequency</i>	<i>Percentage</i>
College Class Status	Freshman	43	42.2
	Sophomore	11	10.8
	Junior	14	13.7
	Senior	14	13.7
	Graduate Student	20	19.6
	Major	Humanities	13
Engineering/Computer Science		25	24.5
Science/Mathematics		22	21.6
Social Sciences		24	23.5
Business		4	3.9
Undecided		14	13.8
Major Dichotomized		Engineering/Sciences/Mathematics	47
	Other Major	55	53.9

( $N = 102$ )

<sup>2</sup> Of the 14 undecided majors, 3 were freshmen, 3 were sophomores, 1 was a junior, 2 were seniors, and 5 were graduate students.

Participants reported on how often they watched *The Big Bang Theory* (see Table 3). The largest group ( $n = 45$ , 44.1%) were those participants who watched the show once a week; in contrast, 14 (13.7% of) participants had never watched *The Big Bang Theory*. With regard to the remaining groups, 14 (13.7% of) participants watched *The Big Bang Theory* once every couple of months, 12 (11.8%) watched the show once or twice a year, 10 (9.8%) watched the show two or more times a month, and 7 (6.9%) watched the show once a month.

Table 3

*Descriptive Statistics: How Often Watch The Big Bang Theory*

<i>Variable</i>	<i>Categories</i>	<i>Frequency</i>	<i>Percentage</i>
How often watch <i>The Big Bang Theory</i> ?	Never	14	13.7
	Once or twice a year	12	11.8
	Once every couple of months	14	13.7
	Once a month	7	6.9
	Two or more times a month	10	9.8
	Once a week	45	44.1

( $N = 102$ )

Participants provided information on their knowledge of Asperger's syndrome: 90 (88.2% of) participants did have knowledge of Asperger's syndrome. Participants responded to a question inquiring if they had been diagnosed with Asperger's syndrome, and 101 (99.0%) of participants reported that they had not. One participant did report having been diagnosed with Asperger's syndrome; that person was a White male of 21 years of age who was a science/mathematics major.

Participants provided additional information on whether they had immediate and/or extended family and friends diagnosed with Asperger's syndrome. Three

participants reported that they had a family member with Asperger’s syndrome (the one individual with Asperger’s syndrome was not one of these three participants). A higher number of participants – 31 – had extended family members and/or friends who had a diagnosis of Asperger’s syndrome. Table 4 provides the descriptive statistics for these questions.

Table 4

*Descriptive Statistics: Asperger’s Syndrome Questions*

<i>Variable</i>	<i>Categories</i>	<i>Frequency</i>	<i>Percentage</i>
Knowledge of Asperger’s Syndrome	Yes	90	88.2
	No	12	11.8
Have Diagnosis of Asperger’s Syndrome	No	101	99.0
	Yes	1	1.0
Have Immediate Family Member with Asperger’s Syndrome	No	99	97.1
	Yes	3	2.9
Have Extended Family or Friends with Asperger’s Syndrome	No	71	69.6
	Yes	31	30.4

(*N* = 102)

**Preliminary Analyses**

A series of chi-square ( $\chi^2$ ) tests of independence were calculated to determine if any demographic factors were significantly related to knowledge of Asperger’s syndrome. The chi-square ( $\chi^2$ ) test of independence examining gender group differences on knowledge of Asperger’s syndrome was significant,  $\chi^2(1) = 11.11, p = .001$ .

Significantly more females ( $n = 60, 96.8\%$ ) than males ( $n = 30, 75\%$ ) had knowledge of Asperger’s syndrome.

Results of the chi-square ( $\chi^2$ ) tests of independence examining ethnic group differences showed that significant ethnic groups differed with regard to knowing the meaning of Asperger’s Syndrome,  $\chi^2(1) = 15.16, p < .001$  (see Table 5 for results).

There were significantly higher numbers of White participants ( $n = 75, 94.9\%$ ) who knew the meaning of Asperger’s syndrome than there were persons of other ethnicities, ( $n = 15, 65.2\%$ ). There were no significant differences with regard to knowing the meaning of Asperger’s Syndrome between age groups,  $\chi^2(3) = 4.54, p = .209$ , or between income level,  $\chi^2(4) = 4.57, p = .335, \chi^2(4) = 4.57, p = .335$ .

Table 5

*Chi-Square ( $\chi^2$ ) Test of Independence: Ethnic Group by Knowledge of Asperger’s Syndrome*

Ethnic Group	Knowledge of Asperger’s Syndrome	
	No	Yes
White/Caucasian	4 (5.1%)	75 (94.9%)
Other Ethnicity	8 (34.8%)	15 (65.2%)

( $N=102$ ) Note:  $\chi^2(1) = 15.16, p < .001$

Two chi-square ( $\chi^2$ ) tests of independence were calculated to determine if knowledge of Asperger’s syndrome significantly differed across college class status and college major groups. The chi-square ( $\chi^2$ ) tests of independence examining college class

group differences on knowledge of Asperger’s syndrome was not significant,  $\chi^2(4) = 4.23, p = .376$ . Across college class groups, 35 (81.4%) of freshman, 10 (90.9%) of sophomores, 12 (92.9%) of juniors, 14 (100.0%) of seniors, and 18 (90.0%) of graduate students had knowledge of Asperger’s syndrome. There were also no significant Asperger’s syndrome knowledge differences across major groups,  $\chi^2(5) = 5.88, p = .318$ . Across majors, 24 (100%) of social sciences majors, 20 (90.9%) of science/mathematics majors, 11 (84.6%) of humanities majors, 21 (84.0%) of engineering/computer sciences majors, 11 (78.6%) of undecided majors, and 3 (75.0%) of business majors knew the meaning of Asperger’s syndrome.

A chi-square ( $\chi^2$ ) test of independence was conducted to determine if knowledge of Asperger’s syndrome significantly differed by how often participants watched *The Big Bang Theory*. Results of the chi-square ( $\chi^2$ ) test of independence showed that no significant differences on knowledge of Asperger’s syndrome emerged between groups classified by how often they watched *The Big Bang Theory*,  $\chi^2(5) = 6.68, p = .246$ . Table 6 presents the responses across these categories.

Table 6

*Chi-Square ( $\chi^2$ ) Test of Independence: How Often Watch The Big Bang Theory by Knowledge of Asperger’s Syndrome*

How Often Watch <i>The Big Bang Theory</i>	Know the Meaning of Asperger’s Syndrome	
	No	Yes
Never	1 (7.1%)	13 (92.9%)
Once or Twice a Year	2 (16.7%)	10 (83.3%)
Once Every Couple of Months	0 (0.0%)	14 (100.0%)
Once a Month	0 (0.0%)	7 (100.0%)
Two or More Times a Month	3 (30.0%)	7 (100.0%)
Once a Week	6 (13.3%)	39 (86.7%)

( $N=42$ ) Note:  $\chi^2(5) = 6.68, p = .246$

## Descriptive Statistics: Study Variables

Table 7 presents the descriptive statistics of the study variables. The SAQ Social subscale had a mean of 15.94 ( $SD = 4.56$ ); scores ranged from 8.00 to 24.00 points. The SAQ Academic subscale had a mean of 17.76 ( $SD = 4.76$ ), with scores ranging from 8.00 to 24.00 points. The SAQ Recreational subscale had a mean of 11.97 ( $SD = 3.83$ ), with scores also ranging from 8.00 to 24.00 points. The SAQ subscales displayed good inter-item reliability, with Cronbach's alphas being .70 for the SAQ Social subscale, .73 for the SAQ Academic subscale, and .71 for the SAQ recreational subscale. The R-AQ displayed a mean of 13.58 ( $SD = 2.70$ ), with scores ranging from 4.00 to 19.00. The R-AQ showed good inter-item reliability, with a Cronbach's alpha of .73.

Table 7

### *Descriptive Statistics: Study Variables*

	<i>M</i>	<i>SD</i>	<i>Min</i>	<i>Max</i>	<i>Sk</i>	<i>K</i>	$\alpha$
SAQ Social	15.94	4.56	8.00	24.00	-.33	-.90	.70
SAQ Academic	17.76	4.76	8.00	24.00	-.76	-.35	.73
SAQ Recreational	11.97	3.83	8.00	23.00	.96	.33	.71
R-AQ	13.58	2.70	4.00	19.00	-.85	.81	.73

( $N = 102$ ) *Note.* The possible range of scores for the SAQ subscales are 8.00 to 24.00 points. In this sample, the participants SAQ subscale score ranges were equal to the possible range of scores. The possible range of scores for the R-AQ is 0 to 20 points. In this sample, the range of scores was somewhat truncated.

## Results

**Research question 1.** The first research question was, “What is the total frequency and percentage of students who indicated that the character of Dr. Sheldon Cooper has Asperger’s syndrome, as evidenced by a R-AQ score of 13 or higher?”



Results showed that 71 (69.6%) of participants indicated that the character of Dr. Sheldon Cooper has Asperger's syndrome whereas 31 (30.4%) did not. In other words, a significant majority of 71 – almost 70% of – participants indicated that Sheldon did indeed have Asperger's syndrome.

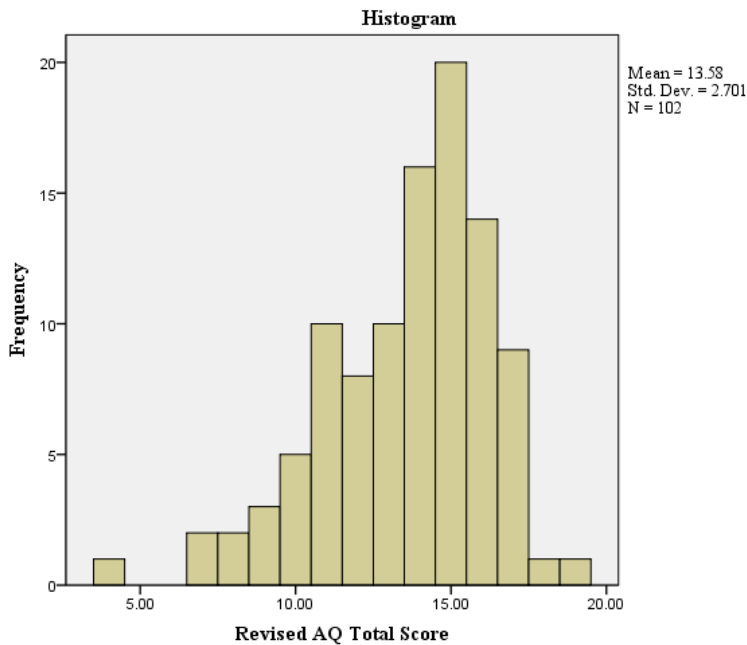
**Research question 2.** The second research question was, “To what extent, if any, do the participant variables of gender, ethnicity, socioeconomic status, frequency of watching *The Big Bang Theory*, major, and pre-existing knowledge of Asperger's syndrome predict R-AQ scores?” To answer the second research question a multiple linear regression was conducted. Adequate power needs to be achieved and certain assumptions must first be met for multiple linear regression. Therefore, prior to conducting the multiple linear regression, a power analysis was conducted and statistical tests were performed to test for any violations of assumptions for multiple linear regression.

**Power analysis for multiple linear regression.** The power achieved for a multiple linear regression was calculated from the sample size of  $N = 102$ , with a medium effect size,  $f^2 = 0.15$  and significance at  $p < .05$ . Based on these parameters, the power achieved in this study was 0.85, with  $F_{crit}(5, 96) = 2.31$ . The power of 0.85 was higher than the commonly accepted power of 0.80 (Tabachnik & Fidell, 2013).

**Testing assumptions for multiple linear regression.** There are four primary assumptions that must be met for multiple linear regression. The first assumption is that scale variables -- which, for this question was the R-AQ -- must show normality (Tabachnik & Fidell, 2013). This can be determined by (a) a histogram that shows the distribution of scores as a normal curve; and (b) having a skewness value less than 1.00

and a kurtosis value less than 2.00 (Tabachnik & Fidell, 2013). As seen in Figure 1, the R-AQ scale scores showed a relatively normal distribution on the normal curve.

Moreover, the skewness value for the R-AQ was  $-.85$  and the kurtosis value for the R-AQ was  $.81$ , both of which were lower than the critical values for skewness and kurtosis (Tabachnik & Fidell, 2013).



**Figure 1.** Distribution of R-AQ scale scores

The second assumption of multiple linear regression is that there is no evidence of multicollinearity among the independent variables (Tabachnik & Fidell, 2013).

Multicollinearity is not evident if (a) Pearson bivariate correlations among the independent variables are less than  $r \geq .90$ ,  $p < .001$ ; and (b) variance inflation factors are 1.00 (Tabachnik & Fidell, 2013). A series of Pearson bivariate correlations were conducted among the independent variables (see Table 8). Results from the Pearson bivariate correlations showed that only two significant associations emerged. Gender was significantly associated with knowledge of Asperger's syndrome,  $r(102) = .33$ ,  $p = .001$ .

Based on the coding of the gender variable, female participants had significantly higher knowledge of Asperger’s syndrome than did male participants. Ethnicity was also significantly associated with knowledge of Asperger’s syndrome,  $r(102) = .39, p < .001$ . Based on the coding of the dichotomous ethnicity variable, White/Caucasian participants had significantly higher knowledge of Asperger’s syndrome than did participants from another ethnic group. These two correlations did not reach the level of multicollinearity. The assumption of lack of multicollinearity was met.

Table 8

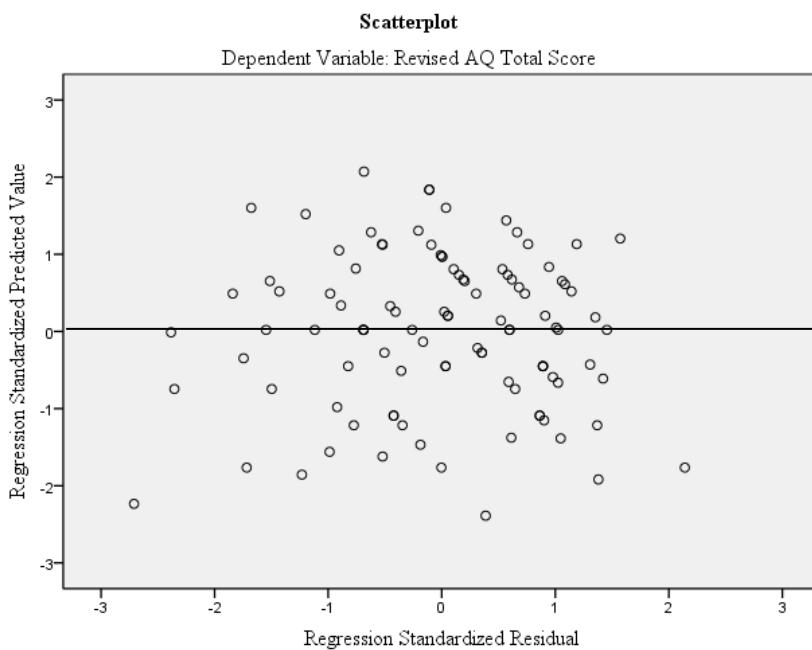
*Pearson Bivariate Correlations: Independent Variables*

	1	2	3	4	5
1. Gender	1.00				
2. Ethnicity <sup>b</sup>	.10	1.00			
3. Socioeconomic Status	-.15	.03	1.00		
4. How often watch <i>The Big Bang Theory</i>	-.05	-.13	.08	1.00	
5. Knowledge of Asperger’s	.33**	.39***	-.13	-.09	1.00

( $N = 102$ ) Note. \*\* $p < .01$ , \*\*\* $p < .001$ . <sup>a</sup> The dichotomous ethnicity variable was used, where 0 = Other ethnicity than White/Caucasian and 1 = White/Caucasian

The third assumption for multiple linear regression is that the errors of predictors are independent of one another (i.e., there is a lack of autocorrelation) which can be determined by the Durbin-Watson statistic (Tabachnik & Fidell, 2013). If the Durbin-Watson value is between 1.00 and 3.00, the assumption of independence of errors has been met (Tabachnik & Fidell, 2013). The Durbin-Watson value was 2.52. Thus, the assumption of independence of errors was met.

The fourth assumption for linear regression is that homoscedasticity is evident (Tabachnik & Fidell, 2013). Homoscedasticity is the assumption that the dependent variable of the R-AQ scores show similar variances across the range of scores for the independent variables (i.e., gender, ethnicity, socioeconomic status, how often watch *The Big Bang Theory*, and knowledge of Asperger's Syndrome) (Tabachnik & Fidell, 2013). Data will show homoscedasticity if scores are evenly distributed above and below the horizontal line of the scatterplot (Tabachnik & Fidell, 2013). As seen in Figure 2, R-AQ scores were evenly distributed above and below the horizontal line of the scatterplots. Thus, the assumption of homoscedasticity was met.



**Figure 2.** Scatterplot of R-AQ predicted and residual scores

***Results from the multiple linear regression.*** For the multiple linear regression, the independent variables of gender, ethnicity, socioeconomic status, frequency of watching *The Big Bang Theory*, and knowledge of Asperger's Syndrome were entered collectively in one step or regression model. Due to the small sample sizes of

participants from ethnic groups other than White/Caucasian, ethnicity was collapsed into two categories where 1 = White/Caucasian and 0 = Other Ethnicity. Results from the multiple linear regression are presented in Table 9. Results from the multiple linear regression showed that the overall model of gender, ethnicity, socioeconomic status, how often participants watch *The Big Bang Theory*, and knowledge of Asperger’s syndrome predicting R-AQ scores was significant,  $F(5,96) = 7.89, p < .001$ . Based on the  $R^2$  of .291, the independent variables collectively explained 29.1% of the variance in R-AQ scores.

Table 9

*Multiple Linear Regression: Gender, Ethnicity, Socioeconomic Status, How Often Watch The Big Bang Theory, and Knowledge of Asperger’s Syndrome Predicting R-AQ Scores*

			<i>R</i>	<i>SEE</i> <sup>+</sup>	<i>R</i> <sup>2</sup>	<i>F</i>	<i>Df</i>	<i>P</i>
Model 1			.540	2.33	.291	7.89	5,96	<.001
Univariate Effects	<i>β</i>	<i>t</i>						<i>P</i>
Gender <sup>a</sup>	.203	2.21						.029
Ethnicity <sup>b</sup>	.252	2.68						.009
Socioeconomic Status <sup>c</sup>	.178	2.04						.045
How Often Watch TBBT <sup>d</sup>	-.33	-3.77						<.001
Knowledge of Asperger’s Syndrome <sup>e</sup>	.07	0.67						.506

(*N* = 102) Note. <sup>a</sup> Gender was coded where 1 = female and 0 = male <sup>b</sup> Due to the small sample sizes of participants of ethnicities other than White/Caucasian, ethnicity was coded where 1 = White/Caucasian and 0 = Other Ethnicity. <sup>c</sup> Socioeconomic status was treated as a continuous variable, from 1 = \$24,000 or less a year to 7 = \$100,000 or more a year. <sup>d</sup> Frequency of watching was treated as a continuous variable, from 1 = never to 6 = once a week. <sup>e</sup> Knowledge of Asperger’s syndrome was coded where 1 = Yes, know what Asperger’s syndrome is and 0 = No, don’t know what Asperger’s syndrome is. <sup>+</sup> SEE = standard error of the estimate.

When examining univariate results, four of the five independent variables were significant. The non-significant independent variable was knowledge of Asperger’s syndrome,  $\beta(102) = .066, r_p^2 = .003, p = .506$ . Having knowledge of Asperger’s syndrome did not significantly predict R-AQ scores or the indication that the character of Sheldon on *The Big Bang Theory* had Asperger’s syndrome.

Gender significantly predicted R-AQ scores,  $\beta(102) = .203, r_p^2 = .036, p = .029$ , with females more so than males predicting that the character of Sheldon in *The Big Bang Theory* had Asperger's syndrome. Based on the  $r_p^2$  of .036, the female gender explained 3.6% of the variance in R-AQ scores, after having removed any contributing variance from the other independent variables. The ethnicity of White/Caucasian significantly predicted R-AQ scores,  $\beta(102) = .252, r_p^2 = .052, p = .009$ , with persons who were White/Caucasian more so than persons of other ethnic groups predicting that the character of Sheldon had Asperger's syndrome. Based on the  $r_p^2$  of .052, White/Caucasian ethnicity explained 5.2% of the variance in R-AQ scores, after having removed any contributing variance from the other independent variables. Income level significantly predicted R-AQ scores,  $\beta(102) = .178, r_p^2 = .030, p = .045$ : as income levels increased, so did R-AQ scores, or the higher indication that the character of Sheldon had Asperger's syndrome. Based on the  $r_p^2$  of .030, income level explained 3% of the variance in R-AQ scores, after having removed any contributing variance from the other independent variables. Finally, how often the participants watched *The Big Bang Theory* significantly predicted R-AQ score,  $\beta(102) = -.328, r_p^2 = .057, p < .001^3$ . The results showed that as the frequency of watching *The Big Bang Theory* decreased, the likelihood of indicating that the character of Sheldon had Asperger's syndrome *increased*. Based on the  $r_p^2$  of .057, frequency of watching *The Big Bang Theory*

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<sup>3</sup> An additional multiple linear regression was conducted with a dichotomously-coded how often watch *The Big Bang Theory* variable, where 0 = less than once a week and 1 = once a week. The inclusion of the dichotomous variable resulted in an increase the overall model,  $F(5,96) = 9.34, R^2 = .327, p < .001$ . The univariate effect of frequency of watching *The Big Bang Theory* also increased in significance,  $\beta(102) = -.380, r_p^2 = .141, p < .001$ . Based on the coding, participants who watched *The Big Bang Theory* less than once a week were more likely than participants who watched the show once a week to indicate the character of Sheldon had Asperger's syndrome.

explained 5.7% of the variance in R-AQ scores, after having removed any contributing variance from the other independent variables.

The null hypothesis for the second research question was, “H<sub>02</sub>: The participant variables of gender, race, socioeconomic status, frequency of watching *The Big Bang Theory*, major, and pre-existing knowledge of Asperger's syndrome *will not* significantly predict R-AQ scores.” Based on the significant results of the multiple linear regression, the researcher rejected the null hypothesis.

**Research question 3.** The third research question was, “To what extent, if any, do students who are science, mathematics, or engineering majors differ from students who are non-science, mathematics, or engineering majors on their willingness to engage with the character Dr. Sheldon Cooper in the social, academic, and recreational domains, as measured the factors/subscales of the SAQ-B?” To answer this question, a one-way MANOVA was conducted, with the independent variable being 1 = engineering/sciences/mathematics major and 0 = other major, and the dependent variables being the SAQ social, academic, and recreational subscales. Prior to running the one-way MANOVA, a power analysis was conducted two major assumptions were statistically tested.

**Power analysis for one-way MANOVA.** The power achieved for a one-way MANOVA in the study was calculated from the sample size of  $N = 102$ , with a medium effect size,  $f^2 = 0.15$  and significance at  $p < .05$ . Based on these parameters, the power achieved in this study was 0.91, with  $F_{crit}(3, 98) = 2.70$ . The power of 0.91 was higher than the commonly accepted power of 0.80 (Tabachnik & Fidell, 2013).

**Testing assumptions for MANOVA.** There are two primary assumptions that need to be met for a one-way MANOVA. One assumption is that the variance in the dependent variable (i.e., each of the SAQ subscales) must be equivalent across the two independent variable categories (i.e., the two major categories) (Tabachnik & Fidell, 2013). Equality of variances is tested via the computation of Levene's tests for equality of variances: if the Levene's test is non-significant, the assumption has been met (Tabachnik & Fidell, 2013). The variance of the SAQ social subscale score was equivalent across the two major categories,  $F(1,100) = 0.71, p = .401$ . The variance of the SAQ academic subscale score was equivalent across the two major categories,  $F(1,100) = 0.87, p = .353$ . Finally, The variance of the SAQ recreational subscale score was equivalent across the two major categories,  $F(1,100) = 0.29, p = .591$ . The second assumption is the equality of covariance matrices, that is, that the covariance matrices of the SAQ subscales are equivalent across major categories (Tabachnik & Fidell, 2013). The assumption of equality of covariance matrices is tested via Box's M: if the Box's M is non-significant, the assumption has been met. The Box's M was 0.82,  $p = .992$ . The assumption of equality of covariance matrices was met.

**Results from the one-way MANOVA.** A one-way MANOVA was conducted, with the independent variable being major (i.e., engineering/sciences/mathematics major versus other major) and the dependent variables being the SAQ social, academic, and recreational subscales. Results from the one-way MANOVA are presented in Table 10. Results showed that the overall corrected model was not significant, Wilk's  $\lambda = .997$ ,  $F(3,98) = 0.10, p = .960$ , partial  $\eta^2 = .003$ . There were no significant univariate effects. There were no significant differences between participants who were ( $m = 15.74, SD =$



4.47) and were not ( $m = 16.11, SD = 4.66$ ) engineering/sciences/mathematics majors and SAQ social subscale scores,  $F(1,100) = 0.16, p = .689$ . Results showed that there were no significant differences between participants who were ( $m = 17.68, SD = 4.48$ ) and were not ( $m = 17.83, SD = 5.02$ ) engineering/sciences/mathematics majors and SAQ academic subscale scores,  $F(1,100) = 0.03, p = .870$ . Finally, Results showed that there were no significant differences between participants who were ( $m = 11.96, SD = 3.83$ ) and were not ( $m = 11.98, SD = 3.86$ ) engineering/sciences/mathematics majors and SAQ recreational subscale scores,  $F(1,100) = 0.00, p = .975$ .

Table 10

*One-Way MANOVA: Engineering/Sciences/Mathematics and Other Majors and SAQ Subscales*

<i>Model Subscales</i>	<i>SAQ</i>	<i>Type III Sum of Squares</i>	<i>Df</i>	<i>F</i>	<i>P</i>	<i>Partial eta<sup>2</sup></i>
<b>Corrected Model</b>						
	SAQ Social	3.37	1,100	0.16	.689 <sup>+</sup>	.002
	<i>Major Category</i>	<i>n</i>	<i>M</i>	<i>SD</i>		
	Engineering/Sciences/Mathematics	47	15.74	4.47		
	Other	55	16.11	4.66		
	SAQ Academic	0.61	1,100	0.03	.870 <sup>+</sup>	.000
	<i>Major Category</i>	<i>n</i>	<i>M</i>	<i>SD</i>		
	Engineering/Sciences/Mathematics	47	17.68	4.48		
	Other	55	17.83	5.02		
	SAQ Recreational	0.02	1,100	0.00	.975 <sup>+</sup>	.000
	<i>Major Category</i>	<i>n</i>	<i>M</i>	<i>SD</i>		
	Engineering/Sciences/Mathematics	47	11.96	3.83		
	Other	55	11.98	3.86		

( $N = 102$ ) Note. <sup>+</sup> not significant.

The null hypothesis for the third research question was, “H<sub>03</sub>: Students who are science, mathematics, or engineering majors *will not* significantly differ from students

who are non-science, mathematics, or engineering majors on their willingness to engage with the character Dr. Sheldon Cooper in the social, academic, and recreational domains, as measured the factors/subscales of the SAQ-B.” The results from the one-way MANOVA were non-significant. As such, the researcher failed to reject the null hypothesis.

**Research question 4.** The fourth research question was, “To what extent, if any, do students who are science, mathematics, or engineering majors differ from students who are non-science, mathematics, or engineering majors in classifying the character of Dr. Sheldon Cooper as an individual with Asperger’s syndrome, as evidenced by a R-AQ score of 13 or higher?” To answer this research question, a chi-square ( $\chi^2$ ) test of independence was conducted with the dichotomously coded major variable (i.e., 0 = not engineering/sciences/mathematics major, 1 = engineering/sciences/mathematics major) and the dichotomously coded R-AQ variable (i.e., 0 = score less than 13, 1 = score 13 or higher).

Results from the chi-square ( $\chi^2$ ) test of independence are presented in Table 11. Results from the chi-square ( $\chi^2$ ) test of independence were not significant,  $\chi^2(1) = 0.55, p = .459$ . There were equivalent numbers of participants who were engineering/sciences/mathematics majors ( $n = 31, 66.0\%$ ) to participants who were other majors ( $n = 40, 72.7\%$ ) who were placed in the R-AQ score of 13 and higher category. In other words, similar percentages (66.0% versus 72.7%) of participants who were and were not engineering/sciences/mathematics majors indicated that the character of Sheldon had Asperger’s Syndrome.

Table 11

*Chi-Square ( $\chi^2$ ) Test of Independence: Major by RA-Q Score Dichotomized*

Major	RA-Q Score	
	Less than 13	13 and higher
Engineering/Sciences/Mathematics Major	16 (34.0%)	31 (66.0%)
Other Major	15 (27.3%)	40 (72.7%)

( $N=102$ ) Note.  $\chi^2(1) = 0.55, p = .459$

The null hypothesis for this research question was, “ $H_{04}$ : Students who are science, mathematics, or engineering majors *will not* significantly differ from students who are non-science, mathematics, or engineering majors in classifying the character of Dr. Sheldon Cooper as an individual with Asperger’s syndrome, as evidenced by a R-AQ score of 13 or higher.” Based on the non-significance of the chi-square ( $\chi^2$ ) test of independence, the researcher failed to reject the null hypothesis.

### Summary

The purpose of this proposed quantitative study, utilizing a survey research design, was to examine college students’ perceptions and attitudes about Dr. Sheldon Cooper, the main character in *The Big Bang Theory* who demonstrates common traits seen in persons with Asperger’s syndrome. The study sample was comprised of 102 college students, 62 (60.8%) females and 40 (39.2%) males. The majority ( $n = 79$ , 77.5%) of students were White/Caucasian. A substantial number of students ( $n = 45$ ) were ages 18 or 19, and  $n = 43$  (42.2%) were freshmen. The largest major group represented was engineering/computer sciences ( $n = 25$ , 24.5%). Ninety (88.2%) of participants knew the meaning of Asperger’s syndrome.

College students' perceptions and attitudes about Dr. Sheldon Cooper, the main character in *The Big Bang Theory*, with regard to Asperger's syndrome were gauged via four distinct questions. The goal of the first question was to assess if study participants perceived the character of Sheldon as having Asperger's syndrome. Results for the first question showed that a significant majority of participants,  $n = 71$  (69.6%), indicated that the character of Dr. Sheldon Cooper has Asperger's syndrome whereas 31 (30.4%) did not.

The goal of the second question was to determine if specific demographic questions and questions on Asperger's syndrome significantly predicted participants' likelihood to indicate that the character of Sheldon had Asperger's syndrome. The second question was addressed via a multiple linear regression. Results from the multiple linear regression showed that the overall model of gender, ethnicity, socioeconomic status, how often watch *The Big Bang Theory*, and knowledge of Asperger's syndrome predicting R-AQ scores was significant,  $F(5,96) = 7.89, p < .001$ . Four independent variables significantly predicted R-AQ scores. Gender significantly predicted R-AQ scores,  $\beta(102) = .203, r_p^2 = .036, p = .029$ , with females more so than males predicting that the character of Sheldon in *The Big Bang Theory* had Asperger's syndrome. The ethnicity of White/Caucasian significantly predicted R-AQ scores,  $\beta(102) = .252, r_p^2 = .052, p = .009$ , with persons who were White/Caucasian more so than persons of other ethnic groups predicting that the character of Sheldon had Asperger's syndrome. Income level significantly predicted R-AQ scores,  $\beta(102) = .178, r_p^2 = .030, p = .045$ : as income levels increased, so did R-AQ scores, or the higher indication that the character of Sheldon had Asperger's syndrome. Finally, how often

the participants watched *The Big Bang Theory* significantly predicted R-AQ score,  $\beta(102) = -.328, r_p^2 = .057, p < .001$ . The results showed that as the frequency of watching *The Big Bang Theory* decreased, the likelihood of indicating that the character of Sheldon had Asperger's syndrome *increased*. Based on the significant results of the multiple linear regression, the researcher rejected the null hypothesis.

The goal of the third question was to determine if participants who were and were not engineering/ sciences/mathematics majors differed with regard to socially, academically, and recreationally engaging with the character of Sheldon. Results showed that the overall corrected model was not significant, Wilk's  $\lambda = .997, F(3,98) = 0.10, p = .960, \text{partial } \eta^2 = .003$ . There were no significant univariate effects. Based on the non-significance of the one-way MANOVA, the researcher failed to reject the null hypothesis.

The goal of the fourth and final research question was to assess if participants who were and were not engineering/sciences/mathematics majors differed with regard to indicating that the character of Sheldon had a diagnosis of Asperger's syndrome. Results from the chi-square ( $\chi^2$ ) test of independence were not significant,  $\chi^2(1) = 0.55, p = .459$ . Similar percentages (66.0% versus 72.7%) of participants who were and were not engineering/sciences/mathematics majors indicated that the character of Sheldon had Asperger's Syndrome. Based on the non-significance of the chi-square ( $\chi^2$ ) test of independence, the researcher failed to reject the null hypothesis.

## CHAPTER V

### INTERPRETATIONS, CONCLUSIONS, AND RECOMMENDATIONS

The purpose of this quantitative study, utilizing a survey research design, is to examine college students' perceptions and attitudes about Dr. Sheldon Cooper, the main character in *The Big Bang Theory*, who demonstrates common traits seen in persons with Asperger syndrome. This study will also examine the frequency with which college students identify Dr. Sheldon Cooper as having Asperger syndrome-related traits, as well as how college student demographic factors and chosen majors influence their knowledge of Asperger syndrome and their willingness to engage with someone (i.e., Dr. Sheldon Cooper) who shares traits with individuals on the spectrum.

This chapter will present results from statistical analyses conducted to answer the study's research questions. It includes a summary of the study, including a review of (1) study methodology, (2) participant demographics, and (3) research questions. This is followed by study conclusions, including (1) considerations (2) cautions. A review of the limitations of the research follows and the chapter concludes with recommendations for future research.

#### **Summary**

**Study methodology.** This study utilized a quantitative survey design. A quantitative survey research method was selected due to its precision in establishing

statistical relationships among numerically coded variables, allowing for a more objective assessment of the proposed research questions (Rosenthal & Rosnow, 2008). Two instruments were modified for use in this study: The Autism Spectrum Quotient (AQ; Baron-Cohen, 2001), and the Shared Activities Questionnaire (SAQ; Morgan et al., 2000). Both instruments showed good internal validity, with Cronbach's alpha's of .73 on the R-AQ and .70 (social), .73 (academic) and .71 (recreational) on the SAQ. In addition, a researcher-designed questionnaire was used to measure participants' knowledge about and experience with autism spectrum disorders and Asperger syndrome.

Descriptive statistics were used to answer the first research question about whether students viewed Sheldon Cooper as an individual with AS, while a series of chi-square tests of independence were used to analyze whether there were statistical differences among the demographic groups with regard to knowledge of AS. Three models were used to analyze the remaining research in this study. A multiple linear regression was conducted to answer the research question two, looking at whether any demographic factors were significantly predictive of students' R-AQ scores. A one-way MANOVA was used to address research question three, about whether math/science and engineering majors were more willing to engage Sheldon Cooper on the SAQ. Finally, to address research question four, whether math/science/engineering majors differed in their responses on the SAQ, a chi-square test of independence were conducted.

Overall, the findings from this study indicate that 90% of students report an awareness of Asperger syndrome and 69.6 % of students responded in a manner that suggests Sheldon Cooper is an individual on the spectrum. Gender, ethnicity, income level, and exposure to *The Big Bang Theory* were predictive of students' responses on the R-AQ (indicating that Sheldon Cooper has Asperger syndrome). White females from

higher family incomes were more likely to rate Sheldon as having AS, while students who watch *The Big Bang Theory* less often were also more likely to rate Sheldon as having AS. The female, white/Caucasian demographic and those students with higher family income levels were also significantly more likely to report having a knowledge of AS.

### **Participant Demographics**

This study included 102 participants, with 62 (60.8%) females and 40 (39.2%) males. The sample was comprised of 30 (29.4%) 18-year-old participants and 15 (14.7%) 19-year-old participants. Of the remaining participants, 45 (44.1%) were between the ages of 20 and 29 years and 12 (11.8%) were between the ages of 30 to 40 years. The majority ( $n = 79$ , 77.5%) of participants were White/Caucasian, while seven (6.9% of) participants were Asian/Indian Asian, seven (6.9% of) participants were black/African American, five (4.8%) were Hispanic/Latino(a), three (2.9%) were Middle Eastern, and one (1.0%) was Native American. The majority ( $n = 70$ , 68.6%) of participants had a household income of less than \$75,000, while 32 (31.4% of) participants had a household income of \$75,000 or higher. The largest college class category represented in the study were freshmen,  $n = 43$  (42.2%), followed by graduate students,  $n = 20$  (19.6%). Of the remaining college class categories, 11 (10.8% of) participants were in the sophomore category, 14 (13.7%) were in the junior category, and 14 (13.7%) were in the senior category. With regard to college major, 14 (13.8% of) participants<sup>4</sup> had yet to decide upon a major. The largest major group represented was engineering/computer sciences ( $n = 25$ , 24.5%), followed by social sciences ( $n = 24$ ,

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<sup>4</sup> Of the 14 undecided majors, 3 were freshmen, 3 were sophomores, 1 was a junior, 2 were seniors, and 5 were graduate students.



23.5%), science/mathematics ( $n = 22$ , 21.6%), humanities ( $n = 13$ , 12.7%), and business ( $n = 4$ , 3.9%). In this sample, 30.4 % of respondents endorsed having an extended family member or friend with AS, while only 2.9 % endorsed having an immediate family member with AS.

### **Research Question 1**

*What is the total frequency and percentage of students who indicated that the character of Dr. Sheldon Cooper has Asperger syndrome, as evidenced by a Revised Asperger Quotient (R-AQ) score of 13 or higher?*

Results showed that 71 (69.6% of) participants indicated that the character of Dr. Sheldon Cooper has Asperger syndrome, whereas 31 (30.4%) did not. In other words, a significant majority of 71 (almost 70% of) participants indicated that Sheldon did indeed have Asperger syndrome. This finding supports the previous content analysis (Meeks, 2013) suggesting that Sheldon Cooper is an appropriate representation of an individual on the spectrum for use in research and application.

### **Research Question 2**

*To what extent, if any, do the participant variables of gender, race, socioeconomic status, frequency of watching *The Big Bang Theory*, academic major, and pre-existing knowledge of Asperger syndrome predict R-AQ scores?*

The majority of participants endorsed Sheldon as having AS 69.6%, based on their responses to the R-AQ. Significant predictors emerged between demographic and behavioral variables and whether participants rated Sheldon as having AS. Females, more so than males, predicted that Sheldon's character had Asperger syndrome, which may be explained by the findings that females, when compared to males in the sample, reported having greater knowledge of AS. Descriptive results suggest that all participants

had some level of knowledge regarding Asperger syndrome, with 90% of respondents positively responding to a general question querying their knowledge of AS.

Additionally, white respondents were significantly more likely to report knowledge of AS when compared with non-white respondents. No differences emerged between major, class standing, or viewing frequency of *The Big Bang Theory* and participants' knowledge of AS. Further, endorsing knowledge of AS did not significantly predict participants' R-AQ scores or the indication that the character of Sheldon on *The Big Bang Theory* has AS.

Another significant predictor for scores on the R-AQ was ethnicity. When ethnicity was dichotomized to white/non-white categories, white/Caucasian participants were more likely to categorize Sheldon as having AS. Differences in ethnicity were potentially linked to greater health care and diagnosis within the white/Caucasian populations. In a 2009 *Pediatrics* article, researchers found that non-Hispanic black and non-Hispanic multiracial children had 57% and 42% lower odds, respectively, of being diagnosed with ASD than non-Hispanic white children (Kogan et al., 2009). The researchers in this study assert that this black-white disparity is explained by the parental reporting of current ASD, rather than by the lack a diagnosis. These statistical differences were mirrored in a report from the Centers for Disease Control (Baio & Centers for Disease Control and Prevention, 2012), which reported that prevalence among non-Hispanic white children (12.0 per 1,000) was significantly greater than that among non-Hispanic black children (10.2 per 1,000) and Hispanic children (7.9 per 1,000). Researchers found similar disparities when looking specifically at race differences and age at first diagnosis (Mandell, Listerud, Levy, & Pinto-Martin, 2002). Mandell and colleagues discovered that, on average, white children first received

their autism diagnosis at 6.3 years of age, compared with 7.9 years for African-American children and 8.8 years for Latino children. Additionally, white children entered the mental health system at an earlier age than African-American or Latino children, giving them early access to intervention and treatment. Taken together, these findings suggest that large and important racial differences exist in the detection and diagnosis of children with autistic disorder. This may speak to cultural differences in acceptance of disability, as well as to quality of and exposure to appropriate healthcare, which leads to early identification and diagnosis of ASD.

The idea that access to quality healthcare predicts diagnosis of ASD and, by association, education or understanding of ASD, may also explain the finding that income levels were positively associated with participants' ratings on the R-AQ. As income levels increased, so did R-AQ scores, or, the higher indication that the character of Sheldon had Asperger syndrome. In one *American Medical Association* article on trajectories of children diagnosed with ASD as a function of economic disparities, the researcher found that white children with well-educated mothers were more likely to be high-functioning than minority children with mothers who had a lower level of education, presuming that early identification and intervention plays a significant role in the level of functioning (Kuehn, 2012). Similarly, a review of the role of socioeconomic factors in the disparity of children diagnosed in Wisconsin found that autism spectrum disorder prevalence is positively associated with socioeconomic status (Maenner, Arneson, & Durkin, 2009). These findings underscore the relationship between income level and diagnosis for individuals with ASD. Furthermore, if individuals lack a diagnosis and the associated education on the topic, ASD traits, characteristics, and behaviors may not be a standard part of their discourse or awareness. This reasoning may also explain the

findings that income level of participants was a significant predictor of the R-AQ. An increase in income was directly related to an increase in scores on the R-AQ, indicating that Sheldon is an individual with AS.

Finally, viewership was negatively related to participants' ratings on the R-AQ. The results showed that as the frequency of watching *The Big Bang Theory* decreased, the likelihood of indicating that the character of Sheldon had Asperger syndrome increased. Interestingly, it appears that the more exposure participants had to Sheldon Cooper, the less likely they were to rate him as an individual with AS. One potential explanation is that multiple exposures to the show serve to normalize Sheldon's behavior.

### **Research Question 3**

*To what extent, if any, do students who are science, mathematics, or engineering majors differ from students who are non-science, mathematics, or engineering majors on their willingness to engage with the character Dr. Sheldon Cooper in the social, academic, and recreational domains, as measured the factors/subscales of the Student Activities Questionnaire Form B (SAQ-B)?*

Another goal of the research was to determine if students' majors, or clusters of majors, significantly affected their willingness to engage with Sheldon socially, academically, or recreationally, as measured by the SAQ-B. The predicted differences of participants who were engineering/sciences/mathematics majors (vs. those who were not) being more willing to engage with the character were not supported by the findings. These findings mirror recent research by Nevill and White (2011), who found that engineering and physical science majors did not demonstrate more overall openness to students who display symptoms of ASD.

These hypotheses were grounded in three separate theories/findings: First, findings by Baron-Cohen (2001), during development of the original Autism Quotient (AQ), suggested that a higher number of individuals in math-science and technology fields exhibited autistic traits. In this study, Baron-Cohen found that within the control group, men scored significantly higher than women on autistic traits, as did scientists, mathematicians, physical scientists, computer scientists, and engineers when compared with human-or-life-centered sciences of medicine (including veterinary science) and biology. This work mirrored that of Baron-Cohen's earlier findings investigating links between ASD and occupation, which found a significant association between individuals whose cognitive strengths lie in mathematics, engineering, and physics and those who have a biological relative with autism (Baron-Cohen et al., 1998). Finally, in 2007, Baron-Cohen and colleagues found a higher prevalence of autism among mathematics majors when compared to students in medicine, law, or social sciences. Wei, Yu, Shattuck, McCracken, & Blackorby, (2013) recently confirmed Baron-Cohen's findings in a study that specifically looked at the prevalence of ASD among college students. Their findings, that college students with ASD are more likely to major in science, technology, engineering, and math (STEM) fields

In the current study, the researcher hypothesized that individuals who possess traits similar to those displayed by Sheldon Cooper would more likely to be majoring in the hard sciences. Moreover, given the findings that perceived similarity to a student with autism is associated with more positive attitudes (Campbell, 2007), the researcher felt that those students with math/science and engineering majors would find Sheldon more appealing (and similar), which would lead to a willingness to engage with him in social, academic, and recreational domains. Also, as drawn from the social cognitive

theory framework (Bandura, 2001) and entertainment education (Cohen, 2011), greater perceived similarity between the participants and Sheldon Cooper is associated with greater identification, which has been shown to increase the likelihood of observational learning, thus increasing viewers' (participants') willingness to engage with Sheldon. Possible explanations for the alternative findings include the limited sample size. It may be that a larger sample size would yield greater attitudinal and behavioral intention differences in participants who are and are not math/science and engineering students. It may also be that simply having shared traits with the character is not enough to translate into the desire to share experiences with that individual. Similarly, it may be that those students who identify with Sheldon (i.e. share more traits with the character) lack a desire to engage in any domain, not specific to Sheldon but generalized to all individuals.

#### **Research Question 4**

*To what extent, if any, do students who are science, mathematics, or engineering majors differ from students who are non-science, mathematics, or engineering majors in classifying the character of Dr. Sheldon Cooper as an individual with Asperger syndrome, as evidenced by a R-AQ score of 13 or higher?*

Another goal of the research was to determine if math, science, and engineering majors differed from non-math, science, engineering students in how they classified the character of Dr. Sheldon Cooper as evidenced by their ratings on the R-AQ. The researcher predicted that students in math, science, and engineering would be more likely to identify with the character. Identification may normalize the behavior of Sheldon, resulting in a lower score on the R-AQ. Participants who were and were not engineering/sciences/mathematics majors indicated that the character of Sheldon had Asperger syndrome, with no statically significant difference between groups. It seems

that the character of Sheldon Cooper expresses behaviors that are salient to the AS population, confirming previously unpublished research by the author (Meeks, 2013) showing that Sheldon Cooper meets the DSM-IV criteria for an individual with Asperger syndrome. Despite research that shows math/science/engineering majors are more likely to display traits and characteristics similar to those on the spectrum (Baron-Cohen, 2001; Wei et al., 2013) and are more likely to score higher on the AQ in research studies (Wheelwright et al., 2006), it does not appear to translate into reduced perceptions of Sheldon Cooper as an individual with AS within the math/science and engineering student base.

### **Considerations**

Given the overwhelming rating of Dr. Sheldon Cooper as an individual on the spectrum (as evidenced by participants ratings on the R-AQ), coupled with the show's popularity, the use of *The Big Bang Theory* may prove to be an effective platform for discussing the traits/characteristics of individuals on the autism spectrum within the college population. As discussed earlier, social cognitive theory asserts that individuals are capable of learning prosocial behaviors vicariously via media (i.e. movies & television) (Bandura, 2004b, Moyer-Guse 2008 & Cohen, 2011). As such, a character with ASD, whose differences are accepted, and even embraced, within the context of a situation comedy, may promote awareness and understanding of the disorder while modeling appropriate support behaviors. Pro-social and health messages, delivered via mainstream television or entertainment-education programming, have proven to be a positive influence on awareness, knowledge, attitudes, and/or behaviors (Bandura, 2004; Moyer-Guse, 2008; Cohen 2011). Cohen (2011) asserts that simple identification (the emotional and cognitive process whereby a viewer takes on the role of a character in a

narrative) with a character can cause the viewer to adopt the goals, feelings, or thoughts of the character, extending the viewer's social perspectives. Results of this study suggest that with increased viewership, college students were statistically less likely to rate Sheldon Cooper as an individual with AS. This normalizing of Sheldon's behavior is supported by Moyer-Guse (2008), who suggests that the perceived norms (behavior that is normative in the context of a television series) of characters with whom the viewer identifies may serve to increase prosocial and healthy behavior. It may be that students who watch *The Big Bang Theory* come to accept Sheldon's idiosyncratic behaviors via modeling the behavior of the supporting characters. Therefore, exposure to a likeable and appealing media character—despite ASD traits and behaviors—is likely to increase one's acceptance of that character and normalize his/her behavior. As shown in Bandura's work with social learning and media (2004), prosocial modeling can occur vicariously through viewing television shows with a prosocial or health platform. Although *TBBT* is not directly identified as a show with a prosocial message, the understanding and support shown toward Sheldon's idiosyncratic behaviors align with television programs with prosocial slants, absent the ancillary educational message.

**Cautions.** While *The Big Bang Theory* may prove to be a helpful tool for educational purposes, researchers and educators should be cautious. It is impossible to generalize the behavior and traits of Sheldon Cooper to everyone with ASD. In addition, it may be presumptuous and insensitive to assume that most individuals with ASD enjoy being compared to Sheldon. In fact, individuals on the spectrum may find the highlighted idiosyncrasies insulting or perpetuating of an already stereotyped "aspie" ideal. In her work on renegotiating a stigmatized identity, Sarah Parsloe (2013) discusses how media can work against the individual on the spectrum. She claims that the popularity of



Asperger syndrome and the stereotyped manner in which it is portrayed reduce the legitimacy of the individual's ability to form (and take ownership of) his/her ASD identity. As part of her work, Parsloe interviewed individuals on the spectrum who reported that Sheldon's success, as a college professor with a number of accepting and likeminded friends, places unrealistic expectations on individuals with ASD to possess exceptional intellect or talent. Indeed, the more Sheldon becomes a popular media icon, the more encroached the stereotype becomes. This can lead viewers to wrongly assume that individuals with ASD experience gainful employment and successful personal relationships with little to no difficulty. As viewers come to understand that Asperger's is synonymous with "smart nerd," an opportunity to understand the entire scope of ASD is lost.

### **Study Limitations**

As with all research, these findings come with limitations. While careful attention was paid to reducing limitation during the design phase of this research, a few limitations were unavoidable or detected during data collection. One limitation of the study was the use of a website with an embedded video. Many students lacked the requisite software and plug-ins (Adobe Flash) to run the video, which kept them from persisting to the two main surveys and knowledge of autism questionnaire. Additionally, the website was not configured for IOS devices such as iPad or iPhone. Two professors (from Kent State University and Florida Institute of Technology, respectively) emailed the researcher to note students' inability to access the survey on these devices, however, it was too late to inform the development of the website and changes could not be made without seriously disrupting the study. It is likely that students attempted to complete the survey on an iOS device or computer without plug-ins and after discovering the error were forced to log on

a second time and complete the study on an appropriate device. This would account for a good portion of the non-persistent participants in the study.

Another limitation of the study was the selection of clips from *The Big Bang Theory*. Although the selections were drawn using random selection (thus reducing researcher or selection bias), alternative clips may have increased or decreased Sheldon's presentation as an individual on the spectrum. Also, participants may be influenced by the show's popularity and use of humor. Repeated viewing of the show may serve to normalize Sheldon's behavior, thus causing participants who watch more frequently to reduce their rating of Sheldon on the AQ. With the use of any questionnaire, one cannot assume that questions are answered honestly and that responses from participants predict actual behavior. In addition, the intended demographic of 18-24, while collected, was mixed within other age group responses, diluting the applicability to only traditionally aged college students. Furthermore, given the data collection method one can assume that student self-selection yielded individuals who (a) are interested in being participants in research, or (b) are interested in winning an iPod Mini. The questions regarding knowledge of autism are also limiting: Although the questions provide a gestalt view of the individuals' knowledge of autism spectrum disorders, the researcher is unable to verify that those students who report knowledge of Asperger syndrome actually understand the disorder rather than working on uninformed presuppositions. Time was another limitation to the study: The researcher attempted to pack the most measures into the study without overwhelming the participants and jeopardizing attention and focus. Finally, while the research module is self-contained and mandates that students complete the research in one setting, it is accessed via personal computer at the comfort and convenience of the participant. As such, the researcher could not account for the

amount of time taken to complete the module and the potential of interfering variables between sections of the module (e.g., interruptions, web surfing, taking unplanned breaks, phone calls) to skew participants' responses.

None of the aforementioned limitation of the study are presumed to undermine these findings or weaken the research design. This study was conducted using sound questionnaires, grounded in the literature, with strong internal validity. Furthermore, the demographic breakdown of participants provided an excellent cross sample of students by gender, major, age, income level, and viewership of *The Big Bang Theory*.

### **Recommendations for Future Research**

Using the existing data set, the researcher plans to conduct further analysis on gender, major, and secondary relationships with an individual with ASD (the sample size for those who reported a primary relationship was too small to analyze), looking for any significant differences in response pattern to the SAQ-B as a whole and within the separate domains. This work will build on the existing work of Campbell and will provide a basis for using the SAQ-B with the college/university population. These analyses may also provide additional information on specific domain engagement; for example: Females may be more willing to engage Sheldon in a social setting when compared with their male peers, while students majoring in math/science and engineering may be more willing to engage Sheldon in the academic domain when compared with the non-math/science/engineering peers. Additionally, the researcher will look at college majors in relation to answers on the R-AQ, and will administer an analysis by question, rather than as a whole, to see if any statistical differences are present between questions—perhaps exploring methods of making the integrity of the R-AQ stronger for use in future research with other characters on the spectrum.

Future research should consider administering the entire module during the course of a class to reduce the likelihood of distraction and in order to allow for a more robust rating of participants' knowledge of ASD. Future research should also explore more carefully the differences in socioeconomic and ethnic differences. Researchers may wish to run the same study with an ASD population to investigate how individuals on the spectrum view Sheldon to better understand *TBBT* as an educational tool for both individuals with ASD and their peers.

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## **APPENDICES**

## APPENDIX A

### SHARED ACTIVITIES QUESTIONNAIRE

**Sheldon Cooper moves to your University/College and is in your class, here is a list of things that you might do with him. Respond by indicating Yes, No or Maybe that shows how you feel about doing each of these things with Sheldon Cooper. (For the purposes of this study assume you are doing these activities, the question is whether or not you would do them with Sheldon).**

- |   |    |       |     |
|---|----|-------|-----|
| 1. Ask Sheldon to come to my house to watch TV.       | NO | MAYBE | YES |
| 2. Sit next to Sheldon in class.                      | NO | MAYBE | YES |
| 3. Work in the university library with Sheldon.       | NO | MAYBE | YES |
| 4. Share my games or books with Sheldon.              | NO | MAYBE | YES |
| 5. Work on a science project at school with Sheldon.  | NO | MAYBE | YES |
| 6. Be in the same study group with Sheldon.           | NO | MAYBE | YES |
| 7. Study with Sheldon at school.                      | NO | MAYBE | YES |
| 8. Invite Sheldon to my birthday party.               | NO | MAYBE | YES |
| 9. Ask Sheldon to hike in the woods with me.          | NO | MAYBE | YES |
| 10. Ask Sheldon to hike in the woods with me.         | NO | MAYBE | YES |
| 11. Eat lunch next to Sheldon in the dining hall.     | NO | MAYBE | YES |
| 12. Walk to class with Sheldon across the quad.       | NO | MAYBE | YES |
| 13. Do an exercise with Sheldon in class.             | NO | MAYBE | YES |
| 14. Pick Sheldon to be on my intermural sports team.  | NO | MAYBE | YES |
| 15. Work calculus problems in class with Sheldon.     | NO | MAYBE | YES |
| 16. Write a lab report for school with Sheldon.       | NO | MAYBE | YES |
| 17. Ask Sheldon to join my club.                      | NO | MAYBE | YES |
| 18. Do homework with Sheldon at the dorm after class. | NO | MAYBE | YES |
| 19. Go to the movies with Sheldon.                    | NO | MAYBE | YES |

- |  |    |       |     |
|--|----|-------|-----|
| 20. Play Frisbee or toss a ball with Sheldon on the quad.  | NO | MAYBE | YES |
| 21. Pick Sheldon as my partner in a game with other peers. | NO | MAYBE | YES |
| 22. Be good friends with Sheldon.                          | NO | MAYBE | YES |
| 23. Go to a ball game with Sheldon.                        | NO | MAYBE | YES |
| 24. Ride bikes with Sheldon.                               | NO | MAYBE | YES |

## APPENDIX B

### MODIFIED AUTISM SPECTRUM QUOTIENT

1. Sheldon Cooper prefers to do things with others rather than on his own (Q1-S)  
definitely agree      slightly agree      slightly disagree      definitely disagree
  
2. Sheldon Cooper prefers to things the same way over and over again (Q2-A).  
definitely agree      slightly agree      slightly disagree      definitely disagree
  
3. Other people frequently tell Sheldon Cooper that what he has said is impolite,  
even though he thinks it is polite. (Q7-C).  
definitely agree      slightly agree      slightly disagree      definitely disagree
  
4. Sheldon Cooper finds making up stories easy. (Q14-I)  
definitely agree      slightly agree      slightly disagree      definitely disagree
  
5. Sheldon Cooper finds social situations easy. (Q11-S)  
definitely agree      slightly agree      slightly disagree      definitely disagree
  
6. Sheldon Cooper has very strong interests, which he gets upset about if he can't  
pursue. (Q 16-A)  
definitely agree      slightly agree      slightly disagree      definitely disagree

7. Sheldon Cooper enjoys social chit-chat. (Q17-C)  
definitely agree    slightly agree    slightly disagree    definitely disagree
8. Sheldon Cooper would rather go to the theatre than a museum. (Q24-I)  
definitely agree    slightly agree    slightly disagree    definitely disagree
9. Sheldon Cooper finds it hard to make new friends. (Q22-S)  
definitely agree    slightly agree    slightly disagree    definitely disagree
10. It does not upset Sheldon Cooper if his daily routine is disturbed. (Q25-A)  
definitely agree    slightly agree    slightly disagree    definitely disagree
11. Sheldon Cooper is often the last to understand the point of a joke. (Q35-C)  
definitely agree    slightly agree    slightly disagree    definitely disagree
12. Sheldon Cooper likes to collect information about categories of things (e.g., types of car, types of bird, types of train, types of plant, etc.). (Q41-I)  
definitely agree    slightly agree    slightly disagree    definitely disagree
13. Sheldon Cooper doesn't usually notice small changes in a situation, or a person's appearance. (Q30-D)  
definitely agree    slightly agree    slightly disagree    definitely disagree

14. Sheldon Cooper seems to concentrate more on the whole picture, rather than the small details. (Q28-D)
- definitely agree      slightly agree      slightly disagree      definitely disagree
15. Sheldon Cooper is fascinated by dates. (Q9-D)
- definitely agree      slightly agree      slightly disagree      definitely disagree
16. Sheldon Cooper enjoys social occasions (Q-44-S) \*\*\*\* Change from original
- definitely agree      slightly agree      slightly disagree      definitely disagree
17. Sheldon Cooper enjoys doing things spontaneously (Q34-A)
- definitely agree      slightly agree      slightly disagree      definitely disagree
18. Sheldon Cooper frequently finds that he doesn't know how to keep a conversation going (Q26-C)
- definitely agree      slightly agree      slightly disagree      definitely disagree
19. Sheldon Cooper would find it easy to play games with children that involved pretending? (Q50-I)
- definitely agree      slightly agree      slightly disagree      definitely disagree
20. Sheldon Cooper is fascinated by numbers (Q19-D)
- definitely agree      slightly agree      slightly disagree      definitely disagree

APPENDIX C

IRB APPROVAL



**Memorandum**

Institutional Review Board

**To:** Jeremy Genovese  
Curriculum & Foundations

**From:** Craig M. Zullig *C.M. Zullig*  
Director  
Office of Sponsored Programs & Research

**Date:** September 12, 2013

**Re:** Results of IRB Review of your project number: #29892-GEN-HS  
Co-Investigator: Lisa Meeks, Student  
**Title: Popular Television as a Potential Mediator for College Students Perceptions of a Peer with Asperger's Syndrome**

The IRB has reviewed and approved your application for the above named project, under the category noted below. Approval for use of human subjects in this research is for a one-year period as noted below. If your study extends beyond this approval period, *you must contact this office to initiate an annual review of this research.*

By accepting this decision, you agree to notify the IRB of: (1) any additions to or changes in procedures for your study that modify the subjects' risk in any way; and (2) any events that affect that safety or well-being of subjects. Notify the IRB of any revisions to the protocol, including the addition of researchers, prior to implementation.

Thank you for your efforts to maintain compliance with the federal regulations for the protection of human subjects.

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<b>Approval Category:</b>	<b>Approval Date:</b>	<b>September 12, 2013</b>
<u>X</u> <b>Expedited (9)</b>	<b>Expiration Date:</b>	<b>September 11, 2014</b>

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cc: Project file

**APPENDIX D**

**DEMOGRAPHICS, EXPOSURE TO *THE BIG BANG THEORY* AND**

**KNOWLEDGE OF ASPERGER'S QUESTIONNAIRE**

**Demographics:**

How would you identify your gender: \_\_\_\_\_  
(female, male or transgender)

Please identify your intended area of study: \_\_\_\_\_  
(Humanities, Engineering-Computer Science, Science and Math,  
Social Science, Visual or Performing Art, Business, Unknown).

What is your academic classification? \_\_\_\_\_  
(e.g., freshman, sophomore, junior, senior, graduate)

What is your age? \_\_\_\_\_

Which best describes your ethnicity? \_\_\_\_\_  
(White, American Indian and Alaska Native, Asian/Indian, Middle Eastern, Black or  
African American, Native Hawaiian and Other Pacific Islander, Hispanic or Latino).

Which of the following best describes your family's income level: \_\_\_\_\_  
25K below, 25-50K, 50-75K, 75-100, over 100.

**Exposure to TBBT:**

How often do you watch THE BIG BANG THEORY? \_\_\_\_\_  
(weekly, bi-weekly, monthly, not at all)

**Knowledge of Asperger's Questionnaire:**

Do you know what Asperger's Syndrome is? Yes/No

Have you been diagnosed with Autism or Asperger's Syndrome?

Do you have an immediate family member (brother, sister, mom, dad) who has been  
diagnosed with Asperger Syndrome? (Not Autism)

Do you have a friend, family member (distant for example Uncle, Aunt, Cousin, etc.) or  
college who has been diagnosed with Asperger Syndrome?