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EXPLORING THE IMPACT OF AUTISM AWARENESS INTERVENTIONS FOR GENERAL EDUCATION STUDENTS: A META-ANALYSIS

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EXPLORING THE IMPACT OF AUTISM AWARENESS INTERVENTIONS FOR
GENERAL EDUCATION STUDENTS: A META-ANALYSIS

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DISSERTATION

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A dissertation submitted in partial fulfillment of the
requirements for the degree of Doctor of Philosophy in the
College of Education at the University of Kentucky

By
Olivia K. Lochner

Lexington, Kentucky

Director: Dr. Jonathan Campbell, Professor of School Psychology

Lexington, Kentucky

ABSTRACT OF DISSERTATION

EXPLORING THE IMPACT OF AUTISM AWARENESS INTERVENTIONS FOR
GENERAL EDUCATION STUDENTS: A META-ANALYSIS

Autism spectrum disorder (ASD) diagnoses are on the rise, increasing the likelihood of having a student with ASD in the general education classroom. Students with ASD may be included in the general education setting; however, inclusive educational experiences are negative for many students with ASD. ASD awareness interventions have been implemented to help general education students improve their attitudes, behavioral intentions, and understand their peers with ASD. In the current study, empirical articles evaluating the effectiveness of ASD awareness interventions were identified and quantified. Two research questions were addressed: (a) Are ASD awareness interventions effective for general education students? and (b) Do ASD awareness interventions increase general education students' attitudes, behavioral intentions, or knowledge of students with ASD? In addition, the following moderators: (a) age (b) gender (c) school level, and (d) message were evaluated. Results showed that ASD awareness interventions are effective for general education students, and that ASD awareness interventions improve attitudes, behavioral intentions, and knowledge of ASD. In addition, age, school level, and message moderate the effectiveness of ASD awareness intervention.

KEYWORDS: ASD, autism, ASD awareness intervention, peer attitudes, peer behavioral intentions

Olivia K. Lochner

June 25, 2019

EXPLORING THE IMPACT OF AUTISM AWARENESS INTERVENTIONS FOR
GENERAL EDUCATION STUDENTS: A META-ANALYSIS

By

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Chapter One: Introduction

Autism spectrum disorder (ASD) is a developmental disability in which deficits are present in the areas of social communication and restrictive and repetitive behaviors (American Psychiatric Association [APA], 2013). According to the *Diagnostic and Statistical Manual of Mental Disorders*, Fifth Edition, ASD occurs in 1% of the population (APA, 2013). More recently, the Centers for Disease Control reported that as many as 1 in 59 children age 8 are diagnosed with ASD in the United States (Baio et al., 2018). Because students with ASD have deficits in social communication, they face social challenges including engaging with and relating to their peers (Karoff, Tucker, Alvarez, & Kovacs, 2017). With the prevalence rates of ASD rising, more students with ASD are being placed in the general education classroom for at least part of their day (Adams, Taylor, Duncan, & Bishop, 2016). When students with ASD spend time in the general education classroom, the time spent can lead to increased social interactions with their peers (Adams et al., 2016). To help students with ASD improve socially acceptable behaviors, as well as decrease the amount of time spent in isolation from peers, educators should create and facilitate social opportunities for students with ASD (Karoff et al., 2017). Not only can the facilitation of social opportunities help students with ASD learn to better understand social nuances, it can help general education students better understand their peers with ASD (Karoff et al., 2017).

Inclusive education allows students with ASD to be included in the general education classroom, provided it is considered their least restrictive environment (National Research Council, 2001). Least restrictive environment for students with ASD will vary regarding the degree of peer interaction with typically developing peers due to

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the amount of time spent in general education. For example, least restrictive environment may involve full immersion in the general education classroom or involve students spending part of their day in general education classrooms (National Research Council, 2001). Regardless of the amount of time special education students are spending in the general education classroom, students with ASD should have the opportunity to interact socially with general education students to help facilitate appropriate social interactions (National Research Council, 2001). Having the opportunity to be included in the general education classroom provides the opportunity for students with ASD to develop friendships through peer interactions (Carter & Hughes, 2005). Inclusion allows the possibility for students with disabilities to develop and attain social and academic skills (Carter & Hughes, 2005). Ferraioli and Harris (2011) report that students with ASD are spending more time in the general education classroom than in previous years. Thus, students with ASD have more opportunities for interactions with general education students even without teacher prompting (Carter & Hughes, 2005). Although some students report positive social relationships with general education students (Cole, Waldron, & Majd, 2004), some students, especially those who have deficits in social communication and reciprocation (e.g., ASD), face more stigmatization and isolation than their peers (Carter, 2009).

Research shows that acceptance of people with disabilities by typically developing peers has decreased while intolerance and fear against people with disabilities have risen (People with Potential, 2011). Children with disabilities often face stigmatization and alienation (Storey & Miner, 2017) because general education students often report unfavorable attitudes towards their peers with disabilities. Lindsay and

McPherson (2012) found that students with disabilities are at a higher risk of bullying than typically developing peers, and many students with disabilities have fewer resources to cope with bullying (Christensen, Fraynt, Neece, & Baker, 2012). Negative portrayals of people with disabilities could account for some negative attitudes and low behavioral intentions towards people with disabilities (Clark, 2015). Disability awareness and training programs have been developed to reduce stigmatization towards people with disabilities (Culp, Rojas-Guyler, Vidourek, & King, 2017) and have been implemented in a variety of forms across a wide range of ages. For example, educational training programs have been implemented using a planned curriculum (Campbell et al., 2018) as well as picture books to facilitate peer awareness (Maich & Belcher, 2012), and can even involve activities that allow students to explore the five senses to help explain that students with ASD may use their senses differently than general education students (Gray, 2002). Some disability awareness interventions have been implemented to better understand general education students' attitudes, behavioral intentions, and knowledge of peers with ASD (e.g., Campbell et al., 2018; Staniland & Bryne, 2013; Swaim & Morgan, 2001; Tonnsen & Hahn, 2016). Disability awareness interventions have been implemented to help facilitate the social acceptance of students with ASD (Frederickson, 2010).

Children and adolescents with ASD often have difficulty with social interactions and frequently need targeted interventions or some form of social support to understand and engage in socially appropriate behaviors (Ferraioli & Harris, 2011). Failure to develop these skills for students with ASD, and students with disabilities in general, makes it more likely that these students will be socially excluded (Campbell, 2006).

Carter (2009) found that nearly two-thirds of students with ASD were victimized and/or shunned by their siblings and peers. Students reported to have been hit, attacked by a group of peers, picked on, chased, or had their hair pulled by their peers or siblings (Carter, 2009). This victimization has led to students with ASD reporting that they sometimes fear the people around them (Carter, 2009). Carter reports that students with ASD, especially those who are high functioning, are subjected to ridicule, peer harassment, and lack of tolerance from teachers and administrators. This is sometimes the case because high functioning students can engage in socially appropriate behaviors in some situations (Carter, 2009). Even as students grow older, they may continue to face adversity in the college setting as their peers and professor may not understand their social challenges (Gillespie-Lynch et al., 2015).

To reduce the amount of stigma students with ASD face, autism awareness interventions have been implemented in schools to increase general education students' attitudes, behavioral intentions, and knowledge of students with ASD (e.g., Campbell, 2006; Campbell et al., 2018; Clark, 2015; Gillespie-Lynch et al., 2015; Ranson & Byrne, 2014; Staniland & Byrne, 2013; Swaim & Morgan, 2001). General education students' attitudes toward, behavioral intentions to engage with, and knowledge of people who have disabilities has been assessed through disability awareness programs (Lindsay & Edwards, 2013); however, ASD specific programs have yet to be synthesized. Gaining a better understanding of general education students' attitudes towards, behavioral intentions to engage with, and knowledge of students with ASD, can help teachers, administrators, and researchers to reduce the amount of stigma students with ASD face.

Attitudes

     Definition of attitudes. Attitudes are multidimensional and composed of affective, behavioral, and cognitive components (Olson & Zanna, 1993; Vignes, Coley, Grandejean, Godeau, & Arnaud, 2008). The affect component addresses feelings and emotions, the behavioral component addresses behavioral intentions, and the cognitive component addresses beliefs and knowledge (Vignes et al., 2008). For example, "Being near Robby would scare me," is considered an affective attitude, "I would invite Robby to sleep over my house," is considered a behavioral attitude, and "Robby needs lots of help to do things," is considered a cognitive attitude (Campbell et al., 2018).

     Attitude research has been the focus of many empirical reports in the special education field, specifically around disabilities and inclusion (Findler et al., 2007; Lindsay & Edwards, 2013). More specifically, the focus has been to gain a greater understanding of typically developing peers' attitudes towards peers with ASD (Bronsan & Mills, 2016; Fleva, 2015).

     Attitudes of general education students and placement. General education students' attitudes towards peers with ASD are more negative when compared to their attitudes towards typically developing peers (Campbell, Ferguson, Herzinger, Jackson, & Marino 2004; Swaim & Morgan, 2001). Ferraioli and Harris (2011) reported that if students with ASD are included in the classroom, typically developing students may have difficulty adjusting to distracting behaviors that students with ASD sometimes engage in. These new distractions likely lead to negative attitudes towards their peers with ASD (Ferraioli & Harris, 2011). Though some parents, teachers, or administrators may believe that special education classrooms are the best option for students with ASD, separating

students can create stigma, exclusion, and alienation (Carter, 2009; Nowicki, Brown, & Stepien, 2014).

Impact of intervention on attitudes. General education students who are educated alongside children with ASD, or any disability, often report increased positive attitudes toward their peers with disabilities (Ferraioli & Harris, 2011). After completing ASD awareness programs, general education students often report increased positive attitudes towards their peers with ASD and are more likely to report that a student with ASD is their friend (Vitani & Reiter, 2007). Although general education students' attitudes of their peers with ASD are generally negative, research indicates that attitudes towards these students can improve if general education students are provided with an awareness intervention (Ranson & Byrne, 2014). Tonnsen and Hahn (2016) found that middle-school aged children reported more favorable attitudes towards with a student with ASD if the student was portrayed as being socially included with typically developing peers versus socially excluded. Tonnsen and Hahn concluded that to help facilitate positive prosocial interactions between general education students and students with ASD, educators should create an environment where students with ASD can engage in socially appropriate behaviors with success.

Behavioral Intentions

Definition of behavioral intentions. Behavioral intentions can be defined as a person's likelihood to engage in a future behavior (Ajzen, 1991). Behavioral intentions were first thought to be comprised of two influences: personal influences, or attitudes toward the behavior, and social desirability to engage in the behavior (Ajzen, 1985). However, as the Theory of Planned Behavior (TPB) has been further developed,

behavioral intentions are now thought to be influenced by attitudes towards a behavior, perceived behavioral control, and subjective norms towards a behavior (Ajzen, 1991). Although past behavior is the best predictor for future behavior, behavioral intentions help researchers to identify the likelihood that a person will engage in a behavior (Ajzen, 1991).

The TPB was developed by Ajzen (1991) to further explain his previous model of behavior, the Theory of Reasoned Action (TRA). TRA did not fully explain why a person engages in behaviors but did explain that a person does not necessarily have conscious control of their behaviors. A person is more likely to engage in a behavior if his or her intention to engage in that behavior is strong (Ajzen, 1991). Because it is important to identify the degree to which a person intends on engaging in a behavior to predict his or her future behavior, behavioral intentions are vital to understanding behavior (Ajzen, 1991). In addition to intention, one's attitudes of the behavior and his or her ability to consciously engage in the behavior influence one's ability to act on his or her behavioral intention. According to Werner and Grayzman (2011), demographic characteristics (e.g., age, gender), background knowledge, and previous experiences do not directly affect a person's intention to act. These influences, however, may impact antecedents of intentions and therefore are necessary to consider when trying to understand behavior (Werner & Grayzman, 2011). Okpareke and Salisbury (2018) report that students' behavioral intentions are not only influenced by how general education students perceive their school and home life, but also by how general education students perceive engaging with people who have disabilities. If students' attitudes towards peers with ASD are

unfavorable, it is also likely that their behavioral intentions towards a peer with ASD will also be low (Staniland & Byrne, 2013).

Behavioral intentions of general education students and placement. General education students often report lower behavioral intentions towards a child engaging in stereotypic behaviors of ASD when compared to a child not engaging in those behaviors (Staniland & Byrne, 2013). Swaim and Morgan (2001) found that older students had significantly lower behavioral intentions towards a peer displaying symptoms of ASD. This suggests that, as students age, their willingness to interact with peers who have ASD decreases. While behavioral intentions are generally low for general education students, they also often perceive their classmates as having low behavioral intentions (Swaim & Morgan, 2001). If general education students are perceiving their classmates to have low behavioral intentions towards students with ASD, this could influence their own behavioral intentions towards students with ASD.

Impact of intervention on behavioral intentions. Research has shown that without interventions helping students understand behaviors associated with disabilities, students' behavioral intentions towards peers with disabilities are lower than their behavioral intentions toward people who do not have disabilities (Werner & Grayzman, 2011). Even though some studies have evaluated the type of information provided to students (e.g., descriptive, explanatory, or combined) sometimes the type of information does not impact a student's behavioral intentions to engage in behaviors with a student with disabilities (Campbell, 2006). In some instances, providing information about disabilities can even decrease a student's behavioral intentions to interact with a student who has disabilities (Campbell, 2006). Okpareke and Salisbury (2018) further found that

although students had strong behavioral intentions to interact with students who have

disabilities after intervention, intentions did not correlate with observed behavior.

Because some researchers (Campbell, 2006) found that providing information can

decrease a student's behavioral intentions towards a student with ASD, it is not surprising

that children rate their peers as having unfavorable behavioral intentions towards students

with ASD.

Knowledge

Definition of knowledge. Knowledge of disabilities refers to a general

understanding of disabilities, including that people with disabilities look different,

experiences with people who have different disabilities will vary, and the skills needed to

interact with people who have disabilities will change based upon individual differences

of people with disabilities (Culp et al., 2017). Knowledge of a disability also indicates

that a person has some degree of understanding of the etiology of a disorder (Campbell &

Barger, 2011). General education students who have had peers with ASD included in

their classroom often report some degree of knowledge of their peer's disability status

and/or identify that they have heard of ASD (Campbell & Barger, 2011). However,

students' ability to elaborate on the definition of ASD often varies based upon prior

experiences with people who have disabilities, if students come from inclusive

classrooms, and whether they have had direct instruction on their peer's disability

(Schwab, 2017). Campbell (2006) found that students who understand less about ASD

often have incorrect beliefs, limited knowledge, and unfavorable attitudes of people with

disabilities.

Knowledge of general education students towards students with ASD.

Campbell, Morton, Roulston, and Barger (2011) report that of 450 middle school students, 71.3% could identify ASD as a disability, but a large portion of the sample were unable to elaborate upon their definition. In terms of students' ability to accurately identify core symptoms of ASD, 8.2% of the middle school sample accurately identified social deficits as a core symptom, 8.4% identified communication deficits as a core symptom of ASD, and 1.6% identified restrictive and repetitive behaviors as a core symptom of ASD (Campbell et al., 2011). This indicates that although middle school students tend to have a general understanding that ASD is a disability, general education students often do not understand the general characteristics of ASD, what makes up the disability, and/or characteristic behaviors associated with the disorder. Furthermore, Campbell et al. reported that 2.5% of the sample could identify two core symptoms of ASD, and only 0.6% of the sample could identify that students with ASD often face communication problems and engage in restrictive and repetitive behaviors. Although some students could identify core symptomology of ASD, students' understanding of ASD was found to be incomplete (Campbell et al., 2011). Even when students understood that ASD is a disability or have some aspects of the definition of ASD accurate, some students expressed a degree of uncertainty, indicating they were unsure of their responses (Campbell et al., 2011).

Age has been found to correlate with ASD knowledge (Dillenburger, Jordan, McKerr, Devine, & Keenan, 2013; Dillenburger, Jordan, McKerr, Lloyd, & Schubotz, 2017). Student age is positively correlated with knowledge of ASD, with older students reporting greater knowledge of ASD (Dillenburger et al., 2013; Dillenburger et al., 2017).

Dillenburger et al. (2017) found that 80% of 16-years-old students were aware of ASD and only 50% of 11-year-olds students had a general understanding of ASD. Campbell et al. (2018) reported that about 50% of elementary school students had heard of ASD prior to intervention. Due to the variability of knowledge between elementary, middle, high, and post-secondary students, awareness interventions can help to close the gap in knowledge.

Impact of intervention on knowledge. Through ASD awareness interventions, evidence suggests that knowledge increases after intervention (Campbell et al., 2018). If general education students have a better understanding of ASD, their beliefs about ASD could change, although Campbell (2007) did not find a relationship between knowledge and attitudes for middle school students. Multiple studies have found that knowledge of ASD increases with ASD awareness interventions (Campbell et al., 2018; Mavropoulou & Sideridis, 2014). Knowledge is also the most changed outcome for ASD awareness interventions, if it is evaluated. A rationale for this could be due to the fact that students have varying degrees of knowledge, and if students have low knowledge scores initially, they will have more room to grow when taught about ASD. Through teaching general education students about ASD, the goal is that general education students' attitudes and behavioral intentions will also increase.

Purpose of the Meta-Analysis

The purpose of this meta-analysis was to review, synthesize, and quantify the literature investigating the effectiveness of ASD awareness interventions designed to increase attitudes, behavioral intentions, and knowledge of general education students. The primary objective of this paper was to review ASD awareness interventions and

determine if they are effective for general education students. A second objective was to summarize outcomes of ASD awareness interventions including attitudes, behavioral intentions, and knowledge of general education students after an educational awareness intervention was provided and highlight the type of intervention, the targeted audience, who implemented the intervention, and the setting of the intervention. A final objective of this paper was to outline implications for future practice and research.

The following research questions were evaluated:

(a) Are ASD awareness intervention effective for general education students?

(b) Are ASD awareness interventions effective for increasing general education students' attitudes towards a peer with ASD?

    a. Does the effectiveness of the ASD awareness interventions vary by study characteristics, interventions, and other coded variables (e.g., age, school level gender and/or message)?

(c) Are ASD awareness interventions effective for increasing general education students' behavioral intentions towards a peer with ASD?

    a. Does the effectiveness of the ASD awareness interventions vary by study characteristics, interventions, and other coded variables (e.g., age, school level gender and/or message)?

(d) Are ASD awareness interventions effective for increasing general education students' knowledge of a student with ASD?

    a. Does the effectiveness of the ASD awareness interventions vary by study characteristics, interventions, and other coded variables (e.g., age, school level gender and/or message)?

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Chapter Two: Method

Meta-analysis methodology was guided by the Preferred Reporting Items for

Systematic Reviews and Meta-Analysis (PRISMA) guidelines (Moher, Liberati, Tetzlaff,

& Altman, 2009). In the following section, study searching, inclusion and exclusion

criteria, data extraction procedures, and effect size calculations are described.

Inclusion and Exclusion Criteria

   Distinguishing features. The first step in identifying potential articles for this

meta-analysis was to identify the distinguishing features of the interventions assessed

(Lipsey & Wilson, 2001; Moher et al., 2009). To be included in the current review, the

article must have implemented an educational intervention on ASD to general education

students.

   Research respondents. General education students from preschool to post-

secondary school were the target population for the current review. This population was

identified due to the range of students identified with ASD who are in special education.

   Key variables. An article was selected for inclusion if the educational

intervention targeted attitudes, behavioral intentions, or knowledge. To be included in the

current review, the article must also have provided enough statistical information to

either calculate or transform an effect size (Lipsey & Wilson, 2001).

   Research methods. To be included in the current review, studies used an

experimental or quasi-experimental method. All other research methods were excluded

from the current review.

   Cultural and linguistic range. Empirical studies needed to be reported in

English to be included as a potential article. If an article was published in any other

language than English, it was excluded from the review. Research articles that were conducted in other countries, but were published in English, were considered eligible for inclusion.

Timeframe. Date of publication was not considered for the current review. All relevant articles were considered eligible for the current review regardless of date of publication because it was crucial to the review to uncover as many potential eligible articles as possible.

Publication type. Only published peer-reviewed journal articles were considered for the current review. The rationale for not including grey literature (e.g., unpublished manuscripts, conference presentations) is due to the rigor of review that published articles undergo before publication. When researchers include grey literature, it can inflate or deflate effect sizes due to the lack of rigor within a study (Cooper, 2017; Lipsey & Wilson, 2001). Research has been mixed on whether to include grey literature within systematic reviews and meta-analyses because of this (Cook & Guyatt, 1993; Schmucker et al., 2017; Tetzlaff, Moher, Pham & Altman, 2006). To account for the potential effects of including grey literature in the current review, the fail-safe N was calculated to identify how many unpublished articles without significant findings would have to be published to reduce the overall effects to non-significance (Lipsey & Wilson, 2001).

Article Search and Inclusion Procedures

An article report system was created using an Excel spreadsheet to track searches and article data because a current reporting system did not exist. Within each search, the reporting system captured search terms used, how many articles were found, title of possible eligible articles, and the author(s) of possible articles. To organize searches,

researchers also identified whether the search was complete or pending to improve upon searching articles in a systematic way (Cooper, 2017).

Review articles. To begin the literature search, researchers searched the literature to identify if there were any previous systematic reviews or meta-analyses that were relevant. Researchers then used the reference list of the meta-analyses and systematic reviews to find potential articles for the current review.

Electronic literature search. Searches were conducted using the following databases: (a) Academic Search Complete, (b) PsycINFO, (c) MEDLINE, and (d) Psychology and Behavioral Sciences Collection. Boolean Operators such as "AND," were used to identify potential articles that met eligibility criteria. The use of these phrases helped to further identify and exclude possible articles that met eligibility criteria.

The search operators and keywords used in this study were: (Autis* AND peer awareness), (Autis* AND peer perception), (Autis* AND peer awareness AND intervention), (Autis* AND knowledge AND peer education), (Autis* AND peer education), (Autis* AND peer awareness AND inclusion), (Autis* AND awareness AND inclusion AND intervention), (Autis* AND peer awareness AND intervention), (Autis* AND behavioral intention AND intervention), (Autis* AND peer perception AND inclusion), (Autis* AND peer perception), (Autis* peer attitude, and intervention), (Autis* AND peer attitude AND peer knowledge), (Autis* AND peer attitude AND inclusion), (Autis* AND peer education AND inclusion), and (Autis* AND peer awareness).

Selected journal search. In addition, a hand search of 12 ASD-related journals were conducted. The following journals were included in the hand search: *American*

Journal of Intellectual and Developmental Disabilities, Autism, Autism Research,

Education and Training in Autism and Developmental Disabilities, Education and

Treatment of Children, Exceptional Children, Focus on Autism and Other Developmental

Disorders, Journal of Autism and Developmental Disorders, Journal of Developmental

and Physical Disabilities, Journal of Intellectual Disabilities, Research in Autism

Spectrum Disorder, and *Research in Developmental Disabilities.*

Ancestral search. After articles went through the first round of screening, all

articles that appeared to meet basic screening criteria underwent an ancestral or reference

list search to further uncover possible eligible articles.

Identification. Screening criteria were applied to journal articles identified

though the study searching procedures. As criteria were applied to studies identified

though the study searching procedures, studies were eliminated because they did not meet

screening criteria. The screening criteria were as follows: the aim of the study was to

evaluate an educational intervention on ASD to general education peers; students were in

grades preschool to post-secondary; and the outcome of the study measured at least one

of following: (a) attitudes, (b) behavioral intentions, or (c) knowledge. Once screening

criteria were applied to potential articles, any article that met screening criteria was then

considered a tentative eligible article for this meta-analysis.

Initial screening. After articles were initially searched, the primary investigator

uploaded the collection of possible eligible articles to Rayyan (Ouzzani, Hammady,

Fedorowicz, & Elmagarmid, 2016). Data uploaded to Rayyan included the following: (a)

the abstract, (b) title, and (c) citation of each possible article. Then, the primary

investigator on this project identified screening criteria for research assistants. The

primary investigator and research assistant then independently identified articles as "included," "excluded," or "unsure." Articles with abstracts that did not provide enough information to either include or exclude were downloaded and the full article was examined. All articles that appeared to meet basic screening criteria were then downloaded and examined.

Second screening. In the second phase of screening, articles were downloaded and reviewed across the following inclusion criteria:

(a) *The study evaluated an educational ASD awareness intervention*. In cases where the abstract did not clearly indicate that the purpose of the study was to assess the effectiveness of an ASD awareness intervention, the primary investigator and research assistants read the study in detail to confirm this criterion.

(b) *The study targeted general education peers*. In cases where the abstract did not clearly identify that the target audience included general education students, the full text article was downloaded to confirm this criterion.

(c) *The age of the participants fell between preschool and post-secondary school*. If the abstract did not provide sufficient information detailing the age of participants, researchers then read each article in detail to confirm this criterion was met.

(d) *The dependent variable measured was an attitude, behavioral intention, and/or knowledge*. In cases where the abstract did not clearly identify one, two, or three of the study outcomes, the primary investigator and research assistants' then read the article in detail to confirm this criterion.

(e) *Sufficient statistical information was reported to calculate an effect size*. It is unlikely that research articles would publish the amount of statistical information needed

to calculate an effect size within the abstract of an article. However, this information is critical to the current review. Therefore, every article was reviewed to ensure enough statistical information was provided to either calculate or transform an effect size.

Coding Key Outcomes and Variables of Interest

 Constructs. To answer the research question(s) at least one of the following constructs were coded: (a) attitudes, (b) behavioral intentions, or (c) knowledge. No other constructs were coded for this review. For articles that included more than one outcome, all outcomes that were reported were coded.

 Measures. There are many attitude, behavioral intention, and knowledge measures used to assess general education students' feelings towards students with ASD (Nowicki, 2006). The primary investigator and research assistants extracted the measures used to evaluate general education students' attitudes, behavioral intentions, and knowledge toward students with ASD. When researchers encountered studies that used one measure to code two or more dependent variables, researchers coded each measure for each dependent variable, as it is the most inclusive method of data extraction (Cooper, 2017; Lipsey & Wilson, 2001). Due to the multidimensional definition of attitudes utilized in the meta-analysis, if an article assessed multiple components of attitudes, the components were coded independently. If a study did not identify which dimension was being measured or if the measure was assessing multiple dimensions, the attitude was coded as "general attitudes."

 Sample. The following data were abstracted from each sample population: (a) total number of participants, (b) total number of included participants, (c) age range of participants, (d) mean age of participants, (e) standard deviation of age (calculated if not

provided and given enough information), (f) school level, (g) school setting where the intervention was implemented, (h) gender of participants, and (i) race and ethnicity of participants. School levels were defined as follows: (a) elementary, K – 5th grade; (b) middle, 6 – 8th grade; (c) high, 9 – 12th grade; and, (d) post-secondary, post-12th-grade.

Study descriptors. Three categories of study descriptors were coded: substantive, methods and procedures, and source descriptors (Lipsey & Wilson, 2001). The following substantive information was coded for each article: (a) age of participants; (b) gender of participants, coded as % male; (c) the type of treatment; and (d) organizational context in which the study took place. The following method and procedure information was coded: (a) what kind of intervention was implemented (i.e., treatment/control conditions), (b) whom the intervention was delivered by, (c) materials used in the intervention, (d) type of message, (e) measure used to assess participants' attitudes, behavioral intentions, and/or knowledge, (f) reliability of measures, (g) analyses conducted, and (h) outcome variables.

Moderators coded for the current review. To better understand the impact of intervention on general education students' attitudes, behavioral intentions, and knowledge of ASD, the primary investigator and research assistants coded the following additional variables: (a) age, (b) school level, (c) message and (d) gender. Justification for coding age, school level, message, and gender are described below.

Age. The research is mixed on whether age acts as a moderator for attitudes towards students with disabilities. Early literature suggests that there is no difference between middle and high school students' attitudes towards students with disabilities (Barrett & Kitchenham, 1992; Hazzard, 1983). At age three, general education students often do not have a preference for the peers they play with regardless of the presence of a

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disability (Diamond, Le Furgy, & Blass, 1993). However, by age four, students tend to prefer to play with peers who are of the same gender and prefer to play with peers without disabilities (Diamond et al., 1993). As children without disabilities grow older, they are significantly more likely to choose playmates who are of the same gender and who do not have disabilities (Diamond et al., 1993). Moreover, de Boer, Pijl, Post and Minnaert (2013) found that as students age, their attitudes towards peers with ASD become more unfavorable. It has also been noted that maturity level as well as tolerance of personal differences could be a rationale for why older students might report increased attitudes towards students with disabilities, but up to this point, no empirical evidence shows support for this claim (Cowardin, 1986). To gain a better understanding the role age has in predicting attitudes towards ASD or responsiveness to intervention (or both), age was coded and analyzed in the current review.

   School level. To further understand the impact of educational interventions on general education students' attitudes, behavioral intentions, and knowledge, it is also important that researchers code for school level (e.g., elementary, middle, high, or post-secondary) because age is not always reported. Swaim and Morgan (2001) found that students from younger grades had more positive attitudes towards students portrayed as having ASD than did their peers from older school levels. Campbell et al. (2004) also found that third and fourth grade students had more positive attitudes of a student with ASD than fifth grade students after providing a brief educational intervention. However, de Boer, Timmerman, Pijl, and Minnaert (2012) found that students from older grades had more positive attitudes towards students with disabilities than did students from young grades. Because the literature suggests differences in attitudes, behavioral

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intentions, and knowledge between grades, this variable was coded and analyzed to better understand the role it plays in regard to ASD awareness interventions.

 Message. When instructing children about disabilities, there are three kinds of messages that can be used to help general education students better understand disabilities (Nabors & Larson, 2002). The three types of information are descriptive, explanatory, and a combination of the two types (Nabors & Larson, 2002). Descriptive information includes discussing the similarities between general education students and a student with the disability; explanatory information includes giving an explanation for behaviors; and combined includes both explaining and discussing the similarities of the audience and student with ASD (Campbell, 2007). Because there are different levels of instruction that students can receive when learning about ASD, it is important that this information is coded to better understand the level of instruction needed to influence outcomes.

 Gender. Generally, researchers have found that females tend to be more accepting of their peers with disabilities than males (Barrett & Kitchenham, 1992; Campbell et al., 2018; Cowardin, 1986; Karnilowicz, Sparrow, & Shinkfield, 1994; Nowicki & Sandieson, 2002). However, this does not necessarily indicate that males do not accept their peers with disabilities, but that females often report more favorable attitudes towards peers with disabilities (Cowardin, 1986). A rationale for more favorable attitude scores by females toward students with disabilities could be due to the likelihood that females are more prone to socially desirable behaviors (Hazzard, 1983). Although studies have consistently documented females reporting more favorable attitudes towards people with disabilities, these findings should be interpreted with caution as the data are often

inadequate to make this conclusive statement (Lindsay & Edwards, 2013). To better understand the role that gender plays for general education students towards their peers with ASD, gender was coded and analyzed.

Reliability. To ensure reliability throughout the current review, reliability was checked during the searching and coding processes. Cooper (2017) notes that when errors are made in the data extraction process, that it is often in favor of the hypothesis. To counter this, the primary investigator and research assistants double coded all demographic, intervention, and design information from every article and double coded the effect size data extraction information for six of the eighteen articles.

Interobserver Agreement on Coding

Interobserver agreement (IOA) data were collected by the principal investigator and three graduate level research assistants. Research assistants were trained by teaching screening, eligibility, and coding criteria followed by practice examples at each stage of IOA. IOA was evaluated at three time points: (a) screening, (b) eligibility, and (c) data extraction. Three types of IOA were calculated. For categorical variables, Cohen's κ and percent agreement were calculated. Percent agreement was calculated using the following formula: total number of agreements / total number of possible agreements x 100. Pearson's *r* was calculated for continuous variables. For any disagreements between coders, an expert in the field reviewed each article and made the final decision. At the screening level, Cohen's κ was calculated to determine the agreement between the primary investigator and a graduate level research assistant on basic screening criteria.

There was strong agreement between the primary investigator and one graduate level research assistant, with κ = .87 and 95% agreement.

IOA was then calculated at the eligibility phase of this review to ensure that reliability was being assessed and all three coders were identifying the same articles as either eligible or ineligible. There was strong agreement between the primary investigator and two graduate level research assistants at this phase with Cohen's κ = .92 and 96.67% agreement.

Finally, IOA data were also collected at the data extraction phase. For all categorical variables (e.g., outcome, materials used, school level, message, and source) coded % agreement was calculated, and for both continuous variables Pearson's r was calculated (e.g., mean age and sample size). For all categorical variables mean percent agreement was 91%. For the continuous variables, there was perfect correlation between coders ($r = 1.00$, $p < 0.01$).

Effect Size Calculations

Effect sizes were computed and coded for all study outcomes of interest. Two types of effect sizes were calculated using Wilson's (2010) Practical Meta-Analysis Effect Size Calculator. Eighty-three percent of the time ($k = 15$), Cohen's d was calculated from raw data reported in the included articles, such as means, standard deviations, standard errors, and sample sizes. For the three studies that did not provide enough raw data to calculate d, Pearson's r was calculated and then transformed to Cohen's d using the Comprehensive Meta-Analysis-2 software program (CMA-2; Borenstein, Hedges, Higgins, & Rothstein, 2005).

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Handling multiple outcomes**.** When the author came across multiple outcomes

from the same study, effect size calculations were calculated for every outcome reported.

For instance, when a study reported data on attitudes and behavioral intentions, effect

sizes were calculated for both outcomes. Although effect sizes were calculated for

multiple outcomes for 88% ($k = 16$) of articles, one overall effect size that encompassed

all outcomes was calculated to understand the overall effectiveness of the intervention

(i.e., Research Question 1).

Data Analysis

For all analyses conducted, the CMA-2 (Borenstein et al., 2005) software package

was used to calculate overall effects, test for heterogeneity, test for moderators, and

conduct meta-regression analyses.

Overall effect of interventions. First, interventions were compared regardless of

the outcome (e.g. attitudes, behavioral intentions, or knowledge) and were used to

summarize the overall effectiveness of the intervention. All effect sizes were weighted

based on the inverse of the variance so that effect sizes produced from larger sample sizes

were given greater weight in calculating the overall effect (Lipsey & Wilson, 2001).

When studies provided more than one effect size for a sample, one of the groups was

dropped from the overall analysis to ensure that studies were not counted twice. For

example, some studies reported sufficient data to calculate an effect size for male versus

female and grade comparisons. In such cases, the male versus female calculations were

dropped. Tests of heterogeneity were conducted using Q and I^2. A significant Q statistic

indicates that the variability of effect sizes is more than what is likely to be expected from

sampling error alone (Cooper, 2017). An I^2 statistic above 75% indicates that a

significant proportion of the total variance in effect sizes is due to variance between studies (Cooper, 2017). Results from Q and I^2 were used to determine if moderator analyses were warranted.

Moderator analyses. In the presence of significant heterogeneity, moderator analyses were conducted to understand how variables changed the effectiveness of the intervention. Moderator analyses included the following: (a) outcome (attitude, behavioral intention, knowledge); (b) school level (elementary, middle, high, or post-secondary); and, (c) message. Two meta-regressions were conducted to evaluate if age and gender related to the effectiveness of educational awareness interventions.

Publication bias. For assessment of reporting biases, the fail-safe N was used to assess publication bias. The fail-safe N is a calculation of how many studies would need to be published with no statistically significant findings to reduce the cumulative findings to insignificance (Lipsey & Wilson, 2001). Next, a funnel plot was produced and visually analyzed. A funnel plot is used to represent the relationship between effect size and standard error. Funnel plot analysis is used to determine if there is systematic bias in effect size for studies of either high or low precision (Lipsey & Wilson, 2001). To further assess the correlation between effect size and study sample, a Kendall's tau (τ) correlation was calculated.

Fixed and random effect modeling. There are two models that can be used to synthesize effects and conduct moderator analyses: a fixed effect model and a random effects model. Within the current set of articles, there is sufficient variability within study procedures which supports the use of a random effect model. However, due to the small number of articles ($k = 18$), the study level variance may be too conservative, meaning

that confidence interval bands will be too wide making it more difficult to reach a significant statistic (Cooper, 2017). Give that the current review falls between the two rationales, both fixed and random effect model statistics were reported.

Chapter Three: Results

Study Exclusion and Inclusion

The electronic search identified 2,671 studies, the journal search yielded an additional 91 studies, and the ancestral search yielded 32 studies. Of the 2,794 studies identified through the search, 2,776 were excluded. At identification, 2,223 articles were removed due to not meeting screening criteria. At the screening phase, 61 articles met eligibility criteria and 140 articles were excluded after title and abstract review indicated that they would not meet study criteria. At the eligibility phase, 18 articles met eligibility criteria by meeting inclusion criteria. Forty-three articles did not meet eligibility for the following reasons: (a) 37 studies were excluded because the aim of the study was not to evaluate an educational intervention on ASD, (b) three studies were excluded because the design was not either experimental or quasi-experimental, (c) two studies were excluded because the intervention was not targeting general education students, and (d) one study was excluded because the sample's school level (e.g., elementary, middle, high, or postsecondary school) did not meet eligibility (see Figure 1 for PRISMA flowchart).

Descriptive Information for Included Studies

Outcomes. Four articles assessed affective attitudes, four articles assessed attitudes in general, and 10 articles assessed cognitive attitudes. Every article assessed at least one component of attitudes. A total of 16 articles assessed behavioral intentions, and four articles assessed knowledge (see Table 1 for full descriptive information).

Intervention materials. Various materials were used to educate general education students on ASD. Three studies used written vignette, five studies used a video, one study used a PowerPoint presentation, three studies used a weekly curriculum, and

six studies used a video plus additional material. Additional materials included the following: (a) a PowerPoint presentation, (b) personalized interaction/discussion, or (c) video activity.

      Participants. A total of 5,036 participants aged 8-55 years contributed to the meta-analysis. Five studies assessed elementary aged children, six assessed middle school aged children, two assessed high school students, and four assessed post-secondary students. One study assessed half middle school and half high school students. Of the included studies, there were a total of 2,049 male participants and 1,803 female participants with five studies not reporting gender by participant data.

Table 1: Descriptive Information

Author, Year	Outcome	N (% male)	Mean Age	Grade Level	Message	Type of Intervention	Intervention Source
Bronsan & Mills, 2016	AA	120 (45.8%)	21.72	College	Explanatory	Vignette	Researcher
Campbell et al., 2004	BI, CA	576 (51%)	10.06	Elementary	Combined	Video	Researcher
Campbell et al., 2005	BI, CA	576 (41.3%)	12.95	Middle	Combined	Video	Researcher
Campbell, 2007	BI, CA, K	233 (39.9%)	13.01	Middle	Explanatory or Combined	Video + Paper Materials	Researcher
Dachez & Ndobo, 2018	AA, BI, CA	104 (69.2%)	21.8	Post-Secondary	Combined	Video	Researcher or person with ASD
Fiedler & Simpson, 1987	A	90 (48%)	-	High	Descriptive or Combined	Class Discussion or 10-week curriculum and paper materials	Teacher
Fleva, 2014	BI, CA	179 (51.2%)	13.7	Middle or High	Combined	Vignette + PowerPoint	Friend or Teacher
Fleva, 2015	A, BI	416	15.2	High	Combined	Vignette + PowerPoint	Researcher
Freitag & Dunsmuir, 2015	CA, BI	318 (49.7%)	-	Elementary	Combined	Vignette	Researcher
Gillespie-Lynch et al., 2015	A, BI	365 (45.8%)	19.9	Post-Secondary	Explanatory	PowerPoint	Researcher
Matthews et al., 2015	AA, CA, BI	224 (52%)	20	Post-Secondary	Explanatory	Vignette	Researcher

Table 1, continued

Author, Year	Outcome	N (% male)	Mean Age	Grade	Message	Type of Intervention	Intervention Source
Mavropoulou & Sideridis, 2014	CA, BI, K	475 (53.9%)	10.97	Middle	Combined	Video + Reading Activity + Experimental Activity + Sixth Sense	Teacher
Morton & Campbell, 2008	CA, BI	296 (52.4%)	10.21	Elementary	Combined	Video + In Person Discussion	Doctor or Father or Mother or Teacher
Ranson & Byrne, 2014	A, BI, K	273 (0.0%)	-	Middle	Combined	6-week Program	Researcher
Silton & Fogel, 2012	CA, BI	158 (51.9%)	10.39	Elementary	Combined	Video	Researcher
Staniland & Byrne, 2013	AA, BI, K	395 (100%)	-	Middle	Combined	6-week Program	Researcher
Swaim & Morgan, 2001	CA, BI	233 (49.8%)	10.57	Elementary	Combined	Video	Researcher
Tonnsen & Hahn, 2016	AA, BI	83 (52.6%)	12.38	Middle	Combined	Blog + Video	Person with ASD

Note. AA = Affective Attitudes; A = Attitudes in general; BI = Behavioral Intentions; CA = Cognitive Attitudes; K = Knowledge.
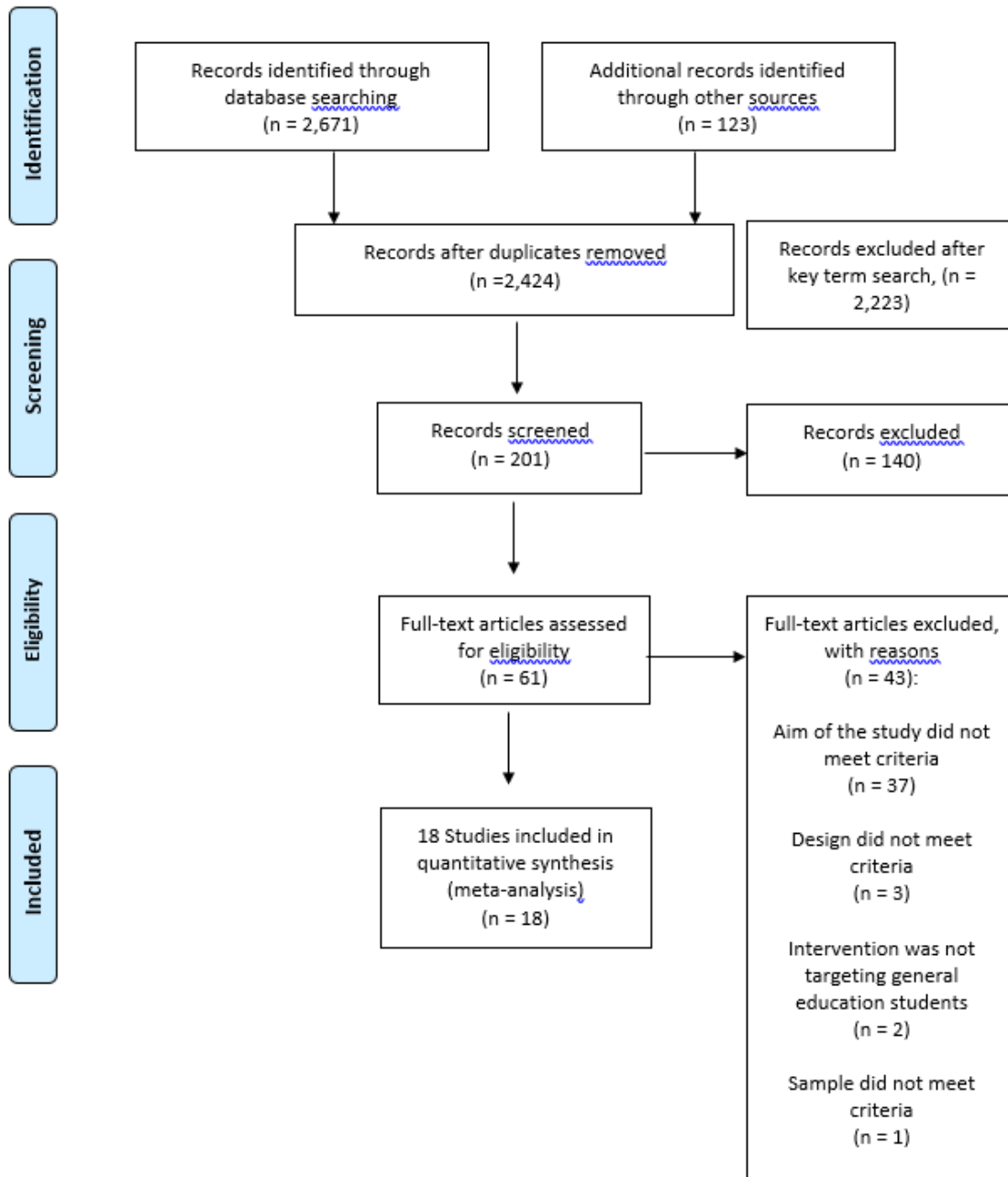
Figure 1. PRISMA Flow Diagram

Overall Effect Size and Homogeneity Analysis

     Fixed effect model. Across the 18 studies, there was a small overall effect size of d = 0.17, 95% CIs [.13, .21], which is considered a small effect size according to Cohen (1988; see Figure 2). The overall effectiveness of ASD educational awareness interventions on general education students was statistically significant ($Z = 8.50$, $p <$ .001). Heterogeneity among all dependent variables was significant Q (17) = 194.46, $p <$ .001 and $I^2 = 91.26\%$.

     Random effect model. Across the 18 studies, there was a small effect size of $d =$ 0.15, 95% CIs [.01, .30], which is considered a small effect size according to Cohen (1988; see Figure 3). The overall effectiveness of ASD educational awareness interventions on general education students was considered statistically significant ($Z = 2.13$, $p = .03$).

Moderator Analysis

     Fixed effect model for outcomes. A moderator analysis (see Table 2) was conducted to evaluate the effect sizes of the three dependent variables: attitudes, behavioral intentions, and knowledge. Educational interventions evaluating knowledge (k = 4) $d = 0.33$, 95% CIs [0.20, 0.46], $p < .01$ produced the largest effect size, followed by cognitive attitudes ($k = 11$) $d = 0.24$, 95% CIs [0.18, 0.30] , $p < .01$; general attitudes ($k = 4$) $d = 0.13$, 95% CIs [0.00, 0.25], $p = .05$; behavioral intentions ($k = 15$) $d = 0.10$, 95% CIs [0.04, 0.16], $p < .01$; and finally affective attitudes ($k = 5$) $d = 0.10$, 95% CIs [-0.03, 0.23], $p = .14$. However, effect sizes, especially allocated to attitudes in general, should be interpreted with caution as the statistical backing behind some of the measures used to assess attitudes lack validation when compared to attitude measures that incorporate affective, behavioral, or cognitive components.

Table 2: Results from Moderator Analysis

Moderator	k	Fixed Effect d	Fixed Effect CI	Fixed Effect p	Random Effect d	Random Effect CI	Random Effect p
				Attitudes			
Affective	$k = 5$	0.10	-0.03, 0.23	0.14	0.09	-0.08, 0.27	0.29
Cognitive	$k = 11$	0.24	0.18, 0.30	0.01	0.12	-0.02, 0.26	0.10
General	$k = 4$	0.13	0.00, 0.25	0.05	0.24	-0.92, 0.78	0.37
				Behavioral Intentions			
	$k = 15$	0.10	0.04, 0.16	0.01	0.05	-0.10, 0.19	0.51
				Knowledge			
	$k = 4$	0.33	0.20, 0.46	< 0.01	0.36	-0.19, 0.91	0.19
				School Level			
Elementary	$k = 5$	0.18	0.11, 0.24	0.01	0.15	-0.09, 0.40	0.22
Middle	$k = 6$	0.31	0.24, 0.37	0.01	0.21	-0.02, 0.45	0.08
High	$k = 3$	-0.04	-0.15, 0.07	0.44	0.21	-0.29, 0.71	0.42
Post-secondary	$k = 4$	-0.00	-0.09, 0.09	0.98	0.01	-0.12, 0.14	0.87
				Message			
Descriptive	$k = 1$	0.88	0.35, 1.41	0.01	0.88	0.35, 1.41	0.01
Explanatory	$k = 4$	-0.02	-0.11, 0.08	0.70	-0.01	-0.36, 0.33	0.94
Combined	$k = 15$	0.20	0.16, 0.24	0.01	0.12	0.02, 0.22	0.02

Note. k = Number of Articles; d = Cohen's d; CI = Confidence Interval.

| Study name | Outcome | Statistics for each study | | | | | | | Std diff in means and 95% CI |
		Std diff in means	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value	
Bronsan & Mills, 2016	Affective Attitudes	0.150	0.104	0.011	-0.053	0.353	1.448	0.148	
Campbell et al., 2004	Combined	0.293	0.059	0.004	0.176	0.409	4.923	0.000	
Campbell et al., 2005	Combined	0.426	0.060	0.004	0.309	0.543	7.152	0.000	
Campbell, 2007	Combined	-0.029	0.078	0.006	-0.181	0.123	-0.377	0.706	
Dachez & Ndobo, 2018	Combined	-0.000	0.097	0.009	-0.191	0.190	-0.004	0.997	
Fiedler & Simpson, 1987	Attitudes-General	0.968	0.193	0.037	0.589	1.346	5.013	0.000	
Fleva, 2014	Combined	-0.085	0.108	0.012	-0.298	0.127	-0.787	0.431	
Fleva, 2015	Combined	-0.160	0.070	0.005	-0.298	-0.023	-2.285	0.022	
Freitag & Dunsmuir, 2015	Combined	0.590	0.083	0.007	0.427	0.753	7.099	0.000	
Gillespie-Lynch et al., 2015	Combined	-0.147	0.080	0.006	-0.303	0.009	-1.849	0.065	
Matthews et al., 2015	Combined	0.079	0.095	0.009	-0.106	0.265	0.838	0.402	
Mavropoulou & Sideridis, 2014	Combined	0.604	0.060	0.004	0.486	0.721	10.070	0.000	
Morton & Campbell, 2008	Combined	-0.047	0.065	0.004	-0.174	0.081	-0.717	0.473	
Ranson & Byrne, 2014	Combined	0.039	0.095	0.009	-0.147	0.224	0.409	0.683	
Silton & Fogel, 2012	Combined	-0.005	0.095	0.009	-0.191	0.181	-0.054	0.957	
Staniland & Byrne, 2013	Combined	0.083	0.092	0.008	-0.097	0.263	0.903	0.367	
Swaim & Morgan, 2001	Combined	-0.088	0.114	0.013	-0.311	0.135	-0.771	0.441	
Tonnsen & Hahn, 2016	Combined	0.081	0.198	0.039	-0.308	0.470	0.410	0.682	
		0.166	0.020	0.000	0.128	0.205	8.504	0.000	

-1.00   -0.50   0.00   0.50   1.00

Favours A   Favours B

Meta Analysis

Figure 2. Fixed Effect Forest Plot

Figure 3. Random Effect Forest Plot

Random effect model for outcomes. A moderator analysis was conducted to evaluate the effect sizes of the three dependent variables: attitudes, behavioral intentions, and knowledge. For the random effect model, no outcome was statistically significant: knowledge ($k = 4$) $d = 0.36$, 95% CIs [-0.19, 0.91] , $p = .19$; cognitive attitudes ($k = 11$) $d = 0.12$, 95% CIs [-0.02, 0.26] , $p = .10$; attitudes in general ($k = 4$) $d = 0.24$, 95% CIs [-0.92, 0.78] , $p = .37$; behavioral intentions ($k = 15$) $d = 0.05$, 95% CIs [-0.10, 0.19], $p = .51$; and affective attitudes ($k = 5$) $d = 0.09$, 95% CIs [-0.08, 0.27] , $p = .29$.

Fixed effect model for school level. A moderator analysis was conducted to evaluate if effect sizes differed according to school level (elementary, middle, high, or post-secondary). Educational awareness interventions were most effective for middle school students ($k = 6$) $d = 0.31$, 95% CIs [0.24, 0.37], $p < 0.01$; followed by elementary students ($k = 5$) $d = 0.18$, 95% CIs [0.11, 0.24], $p < 0.01$; high school students ($k = 3$) $d = -0.04$, 95% CIs [-0.15 to 0.07], $p = 0.44$; and post-secondary students ($k = 4$) $d = -0.00$, 95% CIs [-0.09, 0.09], $p = 0.98$.

Random effect model for school level. A moderator analysis was conducted to evaluate the effect size of school level. Educational awareness interventions did not differ in significance based upon school level: middle ($k = 6$) $d = 0.21$, 95% CIs [-0.02, 0.45], $p = 0.08$; elementary ($k = 5$) $d = 0.15$, 95% CIs [-0.09, 0.40], $p = 0.22$; high school ($k = 3$) $d = 0.21$, 95% CIs [-0.29, 0.71], $p = 0.42$; and post-secondary ($k = 4$) $d = 0.01$, 95% CIs [-0.12, 0.14], $p = 0.87$.

Fixed effect model for message. A moderator analysis was conducted to understand the differences between descriptive, explanatory, and combined information. Interventions that used only descriptive information ($k = 1$) produced an effect of $d =$

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0.88, 95% CIs [0.35, 1.41], $p = 0.01$, interventions that used only explanatory information ($k = 4$) produced an effect of $d = -0.02$, 95% CIs [-0.11, 0.08], $p = 0.70$, and interventions that provided combined information ($k = 15$) produced an effect of $d = 0.20$, 95% CIs [0.16, 0.24], $p < 0.01$.

Random effect model for message. A moderator analysis was conducted to understand the differences between descriptive, explanatory, and combined information. Interventions that used only descriptive information did not differ in effect size from the fixed effect model, interventions that only used explanatory information ($k = 4$) produced an effect of $d = -0.02$, 95% CIs [-0.36, 0.33], $p = 0.94$, and interventions that provided combined information ($k = 15$) had an effect of $d = 0.12$, 95% CIs [0.02, 0.22], $p = 0.02$.

Gender. A meta-regression was conducted to evaluate the relationship between gender and effectiveness of educational intervention. The percentage of male participants in the study sample was used as a measure of gender. No significant relationship emerged between percentage of male participants and effect size, $b = -0.00$; $z (16) = -0.02$, p = 0.98.

Age. A meta-regression was conducted to determine educational awareness intervention effectiveness related to age. A significant result was found, $b = -0.01$, $z (14) = 2.92$, $p < .01$, indicating that as students age, the overall effectiveness of ASD awareness interventions decreases.

Reporting Biases

The fail-safe N was calculated to identify the number of unpublished studies reporting a null effect needed to reduce the overall effect size to non-significance. The

fail-safe *N* statistic indicated that a total of 240 unpublished articles with non-significant results would be needed to reduce the cumulative effect across studies.

A funnel plot was visually analyzed to evaluate the presence of biased reporting of effect size as related to small sample size bias (see Figure 4). Although more than half of the studies ($k = 10$) fell outside of the funnel, the outliers laid rather symmetrically, indicating that there were a similar number of articles published with large and small effect sizes with large standard errors. A Kendall's tau correlation (τ) was conducted to better understand the relationship between the sample size and effect size of the ASD awareness interventions. There was no correlation between the sample size and effect size ($\tau = -0.00$, $p = 0.97$).
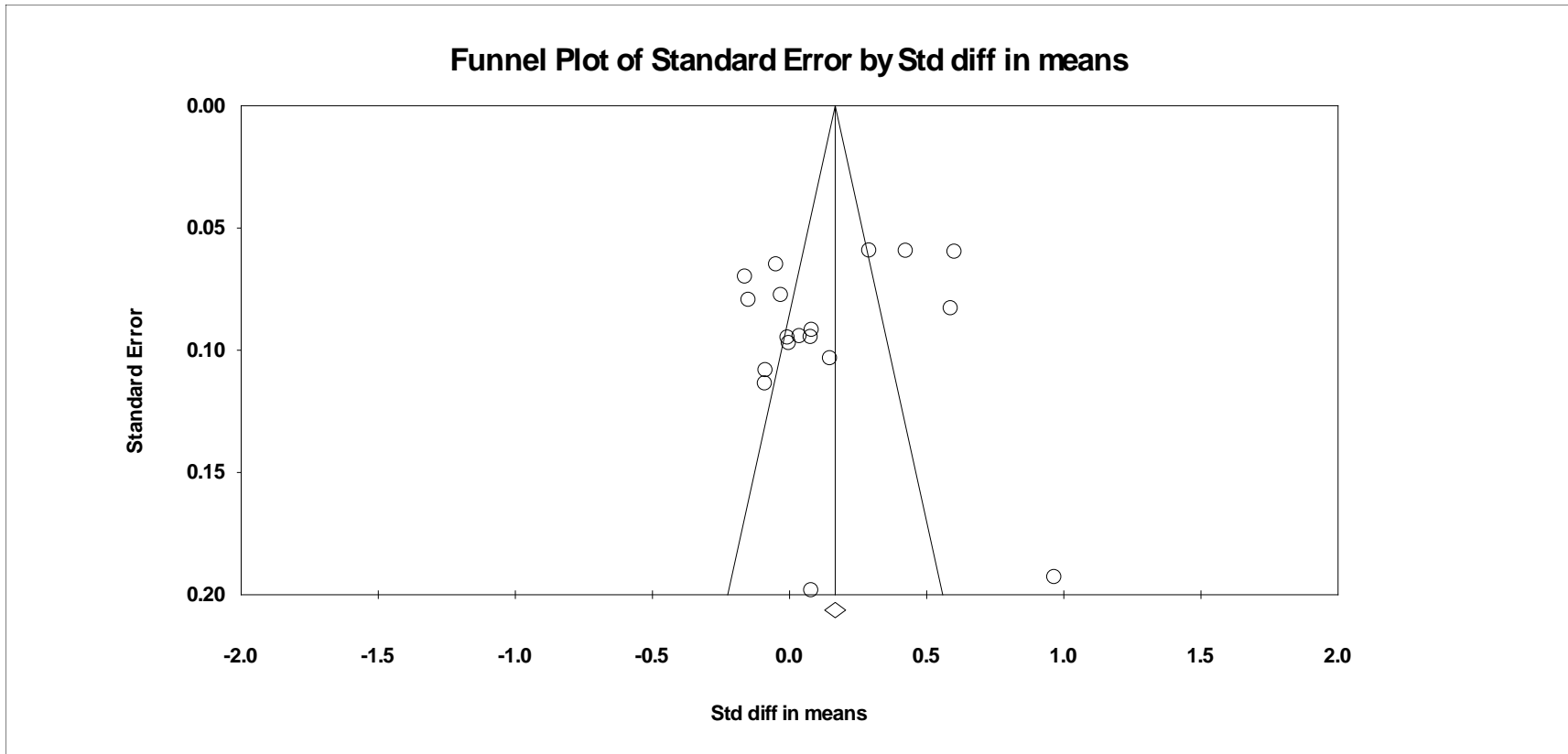
Figure 4. Funnel Plot

Chapter Four: Discussion

This study summarized the effectiveness of ASD awareness interventions by evaluating the effects of intervention on general education students' attitudes, behavioral intentions, and knowledge of ASD through an awareness intervention through meta-analysis. Eighteen studies met eligibility criteria and were coded in the meta-analysis. ASD awareness interventions were hypothesized to be effective with significant differences predicted between general education peers who did not receive an ASD awareness program and students who did. There were differences in the effectiveness of ASD awareness interventions on general education students' knowledge, attitudes, and behavioral intentions. Results confirmed the hypothesis that general education students who have participated in an ASD awareness program have more favorable attitudes, behavioral intentions, and knowledge of ASD after an intervention is provided. Furthermore, moderator analyses indicated that educational awareness interventions have a small effect for general attitudes towards individuals with ASD, knowledge of ASD, behavioral intentions towards students with ASD, and cognitive attitudes of ASD. Affective attitudes did not improve after an ASD awareness intervention was provided. Finally, interventions are most effective for changing students' knowledge when compared to attitudes and/or behavioral intentions. Because the goal of ASD awareness interventions is to increase knowledge and acceptance of students with ASD, the constructs (e.g., attitudes, behavioral intentions, and/or knowledge) evaluated are important because they can be thought about as a Tier 1 intervention for general education students (Hume & Campbell, 2019).

Effects differed depending on message type with descriptive information producing a large effect, combined information producing a small effect, and explanatory information producing a non-significant effect. Although the current review found descriptive information to have a large effect size, and explanatory information to have a negative effect, these results should be interpreted with caution as only one study provided descriptive information. Often, explanatory or descriptive information alone is not enough to change peers' attitudes and behavioral intention towards peers with disabilities (Campbell et al., 2004; Nabors & Larson, 2002). In addition, explanatory information alone could be harmful to students with ASD because it only provides an explanation for the behaviors (Nabors & Larson, 2002) and does not provide any further information. Without any additional information, general education students may form negative attitudes or behavioral intentions towards their peer with ASD. Combined information includes highlighting similarities between the child with ASD and the general education student, and the etiology of ASD (Nabors & Larson, 2002). This could be an explanation for why combined information is more effective than descriptive or explanatory information alone. As such, educational interventions should use a combination of explanatory and descriptive information to teach general education students about ASD.

Moderator analyses found that middle school students were most affected by the ASD awareness interventions, followed by elementary students, then high school students, and finally post-secondary students. Researchers hypothesize that middle school students had the largest effect size because there were more studies including middle school children than any other school level. Generally, general education students' attitudes become more negative as they grow older (Campbell et al., 2004; Ryan, 1981). Therefore,

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it is not surprising to find that ASD awareness interventions were only minimally effective at changing attitudes and behavioral intentions of high school and post-secondary students.

Finally, two meta-regressions were conducted to better understand the relationship between age and gender. Results showed that there is no difference in overall effectiveness by gender. Although females have more favorable attitudes towards students with disabilities in general (Barrett & Kitchenham, 1992; Campbell et al., 2004; Campbell et al., 2018; Nowicki & Sandieson, 2002), males and females appear to be equally responsive to educational interventions. The meta-regression analysis found that there is a difference in overall effectiveness by age. As students age, the overall effectiveness for ASD awareness interventions tended to decrease because attitudes and behavioral intentions are more difficult to change. One explanation for differential effectiveness of ASD awareness interventions could be that, as students age, they acquire greater knowledge and experiences with individuals with ASD. If students already have knowledge of ASD and have already formed attitudes and behavioral intentions towards their peers with ASD, their attitudes and behavioral intentions will be more difficult to change.

Limitations

The results of the current meta-analysis should be viewed with caution due to limitations of this study. First, the sample size is limited with only 18 studies meeting eligibility criteria for inclusion. When studies have small sample sizes, like some of the studies included in this review, the small sample sizes can inflate the effect size. This inflation can lead to over-generalizations, which can lead to misunderstandings and interpretations of the results. Having a small sample size can also impact the model of analysis that was chosen (Cooper, 2017). Although rationale for reporting both models was

discussed above, it is important to note that, according to Cooper (2017) and Lipsey and Wilson (2001), only one model should be reported. However, with the competing rationales, the author found it most appropriate to report effect sizes from both models.

Implications for Research

The results of the current review suggest that ASD awareness interventions are effective at changing at least one of the following: attitudes, knowledge, and/or behavioral intentions. However, there are a limited number of studies evaluating the effectiveness of ASD awareness interventions. The studies that have implemented and evaluated ASD awareness interventions vary greatly in terms of the information provided (e.g., descriptive, explanatory, or both), the materials used in the intervention, and the overall effectiveness of the intervention. While the current review indicates that ASD awareness interventions have shown to be effective, studies with larger sample sizes should be conducted to further support this finding so that a definitive generalization can be made.

Results also showed that not all studies included important demographic information, such as age, race and ethnicity, and gender of participants. These moderating variables can help researchers to identify if characteristics of people (e.g., gender, age, or race) can impact how effective an ASD awareness intervention is in terms of attitudes of, behavioral intentions towards, and knowledge of people with ASD. Future research should not only include these data in data collection, but also analyze these data to ensure the highest degree of effectiveness of ASD awareness interventions.

Finally, teaching general education students about ASD should serve to facilitate social interaction with students who have ASD. It has been found that behavioral intentions for interacting with students who have ASD are generally low, and if a child's

intention to interact with a student with ASD is low, their likelihood to engage in an

interaction is also likely going to be low. While the studies evaluated the effectiveness of

ASD interactions, the focus now should not only be on attitudes, behavioral intentions, and

knowledge, but should also include an analysis of social interactions general education

students have with their peers with ASD before and after intervention. This addition to

ASD awareness interventions will allow researchers to better understand the behavior of

general education students towards their peers with ASD. This greater understanding could

help to inform ASD awareness interventions, as the goal of ASD awareness interventions

is to allow for a better understanding of ASD for general education students, thus reducing

stigma of students with ASD.

Implications for Practice

Educators can be the witnesses to bullying and stigma for students with ASD, but

not know how they can change the attitudes and behavior of their typically developing

students. Through an ASD awareness program, educators may not only help to reduce the

amount of misinformation about ASD, but also to increase the understanding and

knowledge of ASD for general education students. Because we know that attitudes,

behavioral intentions toward, and knowledge of students with ASD are generally low

without intervention, if educators are willing to implement ASD awareness programs

within the general education classroom, it might help to reduce the stigma that students

with ASD face. Because current research is focused on changing the attitudes, behavioral

intentions, and knowledge of general education students towards their peers with ASD

(Brosnan & Mills, 2016; Campbell et al., 2018; Dachez & Ndobo, 2018; Freitag &

Dunsmuir, 2015; Gillespie-Lynch et al., 2015; Matthews et al., 2015; Tonnsen & Hahn,

2016), there are freely available programs for educators to use to help general education students understand more about ASD. For example, the Organization for Autism Research has two freely available programs: "What's Up With Nick," which uses paper materials to teach children about ASD and "Autism Tuned In," which is an online program designed for students to use in the program.

Overall, findings from the meta-analysis support the use of educational awareness interventions for typically developing peers. To appropriately implement an ASD awareness intervention, researchers, teachers, and administrators should consider the following recommendations. First, consent from the family and student with ASD should be secured to ensure that the family is comfortable with disclosing their child's diagnosis as questions may come up regarding their child. Second, researchers should facilitate coordination with school professionals to identify the appropriate time of year to implement the intervention. Because school districts differ in their curriculum, researchers and school professionals should work together to identify the most appropriate time to implement an ASD awareness interventions. In addition, researchers and practitioners should begin to focus on the changes in behavior of general education students after ASD awareness interventions have been implemented to better understand the overall effectiveness of the intervention.

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PUBLICATIONS

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CONFERENCE PRESENTATIONS

Lochner, O., & Campbell (March 2018) Kit for Kids evaluation project: Evaluating an online autism awareness intervention with third grade students. Presented at the annual meeting of the Southeastern Psychological Association, Charleston, SC.

Campbell, J. M., Caldwell, E. A., Scheil, K. A., **Lochner, O**., & Kerwin, S. (May 2017). *Evaluation of a peer education program about ASD for elementary school students.* Poster presented at the International Meeting for Autism Research, San Francisco, CA.

Scheil, K. A., Bowers-Campbell, J., Campbell J. M., **Lochner, O**. (February 2017). *Teaching students about autism: Students' impression of a peer education curriculum.* National Association of School Psychologists Conference, San Antonio, TX.

Lochner, O., Baley, J., & Malesky, L. (April 2015) *Cheating Difficulty by Assignment in an Online Class*. National Conference for Undergraduate Research, Cheney, WA.

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