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REVIEW ARTICLE

Autism Awareness Interventions for Children and Adolescents: a Scoping Review

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Abstract

Research to date indicates that a significant contributing factor to the social experience in school and college for those with Autism Spectrum Disorder (ASD) relates to peers understanding of their condition and the associated social challenges. The current review sought to examine evidence for autism awareness programs designed to improve peers' conceptions and understandings of ASD. Eleven studies were examined in relation to reported changes in aspects of autism awareness in students without ASD who had participated in an educational program or interventions about ASD. Reported interventions varied in length and delivery style. There is some emerging evidence for the effectiveness of these interventions in changing knowledge, attitudes and intentional behaviors of students without ASD. The implications of these findings for research and practice are discussed along with directions for future research.

Keywords Peers · Autism awareness · Intervention · Autism Spectrum disorder · Knowledge · Attitude

International best practice and policy advises that students with Autism Spectrum Disorder (ASD) be educated in mainstream environments, with appropriate supports alongside their typically developing peers (Parsons et al. 2009;UNESCO 1994;Roberts and Simpson 2016). Since the Salamanca statement in 1994 on the inclusion of students with special educational needs in mainstream schools, the educational landscape for students with ASD has shifted towards a rights-based approach to inclusion (Roberts and Simpson 2016). An often stated benefit of inclusion is that it will give students the best opportunity to learn with and from their peers, with a specific belief that the students will benefit socially (Humphrey and Symes 2013; Koegel et al. 2013).

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However, evidence shows that for many individuals with ASD, an inclusive policy does not necessarily result in social inclusion. Research has shown that students with ASD at all ages have experienced difficulties in forming friendships, social networks and establishing themselves within the social contexts of schools or colleges (e.g., Chamberlain et al. 2007; Jones and Frederickson 2010; Kasari et al. 2011; Locke et al. 2010). Higher incidences of exclusion and bullying are reported for those with ASD than their peers without ASD (Hebron and Humphrey 2014; Hebron et al. 2015; Humphrey and Symes 2010). It is suggested that there may be a number of contributing factors to these social challenges including the characteristics of the student with ASD, the educational environment and the other students (i.e. peers) within the social environment (Hebron et al. 2015). Peers' contribution to an inclusive school experience for students with ASD is poorly understood. There are some reports of peers experiencing difficulty understanding the differences in how they and their fellow students with ASD were treated in school (Roberts and Simpson 2016). As Dillenburger et al. (2017) indicate, for inclusion to be a success positive peer attitudes are implied, but this is often not the case. There is a real concern that inclusive policies are not implemented in a fashion which promotes inclusion beyond the physical proximity of students, and that students without ASD may not always have positive attitudes towards their peers with ASD (Asmus et al. 2017; Carter et al. 2014).

The 'hidden' nature of ASD as a disability can contribute to a poor understanding of the condition by peers. Research applying attribution theory (Juvonen and Weiner 1993; Ling et al. 2010) reports that often the behaviors of students with ASD are misconstrued by their peers. Peers may reject or attribute negative emotions to students with ASD based on their observation of specific behaviors, with the assumption that these behaviors are within the control of the person. Sasson et al. (2017) demonstrated that observers' first impressions of children and adults with ASD engaging in social behavior were significantly less favorable than those of matched neurotypical controls. These less favorable impressions were also associated with reduced intentions to socially engage with the person with ASD.

Even though peers constitute the main aspect of the social world for students with ASD in school /college, few researchers have focused on peers' understanding of ASD as part of improving social inclusion. Whilst a large body of research exists on interventions to improve the social skills of school-aged students with ASD (Gates et al. 2017; Ke et al. 2017), how peers reciprocate with those with ASD, and if anything can be done to improve social connections is not well understood. Milton alludes to a "double empathy problem" between those with and without ASD, based on two differently disposed social actors having very different perceptions of a social interaction (Milton 2012). Humphrey and Symes (2011) demonstrated the impact of peer understanding of ASD through the Reciprocal Effects Peer Interaction Model (REPIM) which illustrates how the social challenges of students with ASD are further compounded by a lack of peer understanding and awareness of ASD characteristics. The REPIM highlighted that reduced opportunities for peers to learn about ASD was an important factor in the social challenges that students with ASD encounter (Humphrey and Symes 2011).

When peers are provided with an opportunity to learn about ASD, there is evidence that the provision of explanatory and descriptive information and an understanding of

how the diagnosis impacts on a student's skills and behaviors, altered the perception of peers in describing the condition (Campbell et al. 2004). Descriptive information highlights similarities between the person with ASD and those without ASD. Explanatory information includes information about the cause, challenges and presentation of ASD (Campbell et al. 2004). Carter et al. (2014) highlighted approaches focused on peers as a key factor in improving social competence and promoting peer relationships for students with ASD. Their research described how peer focused interventions should incorporate informational efforts, peer training and interactional opportunities. Whilst evidence exists for incorporating explanatory and descriptive information about ASD into any intervention that targets improved understanding of the condition, less is known about the effectiveness of teaching direct strategies or direct training of communication skills with neurotypical peers (Campbell and Barger 2014; Campbell et al. 2004). Campbell and Barger suggest that directive strategies, such as teaching students communication strategies instill more confidence in peers to interact with their contemporaries with ASD. Interventions which develop social awareness in the classroom around a specific child with ASD are also reported such as 'circle of friends' (e.g., Frederickson et al. 2005; Gus 2000), but these types of interventions describe little with regard to educating peers about the nature of ASD or in changing perceptions about ASD more generally (Ezzamel and Bond 2016). There is also a large body of evidence for peer-mediated interventions (PMI), which are considered an evidence-based practice (Chang and Locke 2016). PMI involve training neurotypical peers to engage with students with ASD with a specific goal or objective of the intervention, usually a social skill. However, the focus of many studies employing PMI is skill acquisition for the student with ASD, and peers' understanding or learning related to ASD is rarely addressed as an outcome (Ezzamel and Bond 2016).

More generally, there are mixed reports of interventions relating to overall disability awareness in schools which have measured attitude change and/or acceptance of people with disabilities. A systematic review of these interventions (Lindsay and Edwards 2013) demonstrated that 34 out of 42 reviewed studies showed statistically significant gains in attitude or acceptance and eight of these studies also demonstrated improved knowledge (Lindsay and Edwards 2013). Studies varied considerably in relation to the interventions offered, including variations in the intervention components, length, focus and intensity (Lindsay and Edwards 2013). However, only two of these 42 studies targeted awareness of ASD specifically. It appears despite a recognition that opportunities to understand peers with ASD better can improve social connections, programs or interventions which specifically target reducing stigma or improving the knowledge, attitudes and intentional behaviors of peers' without ASD have gained little recognition in the literature. The concepts of knowledge, attitude and intentional behavior as they pertain to stigma and awareness of autism have been explored through the development of measures (Campbell and Barger 2014; Campbell et al. 2004; Swaim and Morgan 2001). Knowledge focuses on peers' knowledge of autism including problematic or inaccurate knowledge or not knowing about autism at all. Attitude relates to prejudices or preconceptions that peers may hold in relation to their peers with ASD. Intentional behaviors relate to discriminatory behavior that peers may display in their everyday lives towards their peers with ASD. These three elements are suggested to embody stigma (Campbell and Barger 2014; Campbell et al. 2004).

The review aimed to examine published research on intervention studies which were designed to improve aspects of autism awareness for children and adolescents without ASD. It followed the methodological framework of a scoping review (Arksey and O'Malley 2005) and aimed to address the following questions: Are educational programs relating to autism awareness effective in changing students' knowledge, understanding, attitudes or intentional behaviors (including stigma)? What is the nature of these intervention programs? What recommendations for further development in this area can be deduced?

A scoping review was chosen as the preferred method for review of this area, as an overview of the literature and a mapping of the nature of the intervention programs and the evidence (if any) for intervention programs which focused on autism awareness in peers was warranted before more specific questions could be accurately answered. As it was a relatively diverse area of research with unknown size and nature of the evidence base, a scoping review presented as the most appropriate methodology (Munn et al. 2018).

Methods

Search Procedures

Studies were identified for inclusion by conducting comprehensive searches of six electronic databases: Scopus; PsycInfo; Web of Science; ScienceDirect; ERIC, and Psychology & Behavioral Sciences Collection. The database search was carried out in February 2018. Searches were carried out by inputting the following key terms: autis*or ASD or Asperger* and pervasive developmental disorder or developmental disability and school* or education and college or third level or university and stigma or attitude or knowledge or 'intentional behav*' or understanding or acceptance or awareness and peer or student and intervention or program*. The NOT Boolean operator for students with ASD was also applied in order to limit the return of studies with students with ASD as the sample. Limiters used in the search were peer reviewed articles, published between 1997 and 2018, (to reflect the era of inclusive education studies and literature since the Salamanca statement over two decades) and published in English. In addition to these electronic searches, a subsequent review of the reference lists of all included studies was conducted by hand in order to identify any other suitable studies for inclusion.

Inclusion and Exclusion Criteria

The current review included studies that reported on knowledge, attitude, intentional behavior and levels of stigma of students without ASD who had participated in an educational program or intervention about ASD. In order to ascertain objective measurement of change, studies with experimental designs including randomized controlled trials, non-randomized controlled trials, quasi-experimental, pre- and post-intervention studies and case control studies were considered for inclusion. Studies were excluded if the outcomes did not describe change in these variables in peers without ASD or if they did not have either a pre-post design or a control group.

Data Extraction

A coding guide was developed to extract data. One author (KC) coded the data and two others (SQ and MS) confirmed this coding. Studies were summarized and coded according to the following characteristics: participants; sample characteristics; study design, measures (outcome variables); theory base; objectives; intervention procedures and type; key findings, and limitations. These characteristics are similar to those used by Lindsay and Edwards (2013) in their review of disability awareness interventions. The studies were then evaluated regarding the intervention and measures utilized. The components of the intervention and measures summarized were: (a) type of information delivered to participants (descriptive, explanatory or directive); (b) method of intervention administration (direct contact or otherwise); (c) length of the intervention; (d) interventionists; and (e) types of measures employed (standardized, non-standardized or qualitative). Outcomes and findings were examined in relation to: (a) outcome variables; (b) reported findings (related to knowledge, attitude (stigma) and intentional behavior); (c) additional findings and (d) reports of social validity. In relation to knowledge, attitude, behavioral intention which were considered the main outcome variables and the focus of the review, these outcomes were extracted according to Campbells definitions and applied across the studies despite some variance in terminology utilized.

Quality Evaluation

For evaluation of the quality of each study, the American Academy of Neurology's (AAN) classification system of evidence for therapeutic intervention (Edlund et al. 2004) was employed. Class 1 includes a randomized control trial meeting five quality criteria; Class 2 includes a randomized control trial meeting all but one of the five quality criteria from Class 1 or a prospective matched cohort study that meet the four applicable criteria in Class 1; Class 3 includes all other controlled trials where outcome is independently assessed, or independently derived by an objective outcome measure, and Class 4 are all other studies not meeting Class 1 to 3 criteria. Quality evaluation was carried out independently by two academic reviewers. Inter-rater agreement for quality evaluation was calculated by dividing the number of agreements recorded by the total number of opportunities for agreement and multiplying this figure by 100. This was found to be 90.9%.

Results

Through the search process 402 records were identified. Initial screening of these articles identified a high number which related to an intervention or program for students with ASD and not their peers. Refinement of the search terms by using the NOT Boolean operator for students with ASD and removal of duplicates reduced the records to be screened to 158 articles. The 158 article titles and abstracts were reviewed based on the inclusion and exclusion criteria. Following this process, 40 articles were included for further analysis. These articles were independently read and screened for inclusion by three academic reviewers, all with experience of reading and reviewing

academic research and conducting reviews (KC, SQ and MS). Based on mutual agreement, 11 were identified as meeting the inclusion criteria for the current review. There was some discussion in relation to the mixed methods study (Ezzamel and Bond 2017), as its classification of measures and outcomes were slightly different to the other studies, but it was deemed to meet the inclusion criteria and no other conflicts were detected. Figure 1 outlines the process during which these articles were systematically extracted. Table 1 summarizes the study characteristics and quality evaluation scores for all included studies. Of note all the reviewed articles were published between 2001 and 2017.

Participant Characteristics

A total of 3180 participants (48.97% female) were reported across the 11 included studies. Some 903 of these represented control group participants who received no intervention. Seven studies reported mean ages, the overall mean age of participants was 13.44 years, with a range from 10.39 years to 19.9 years.

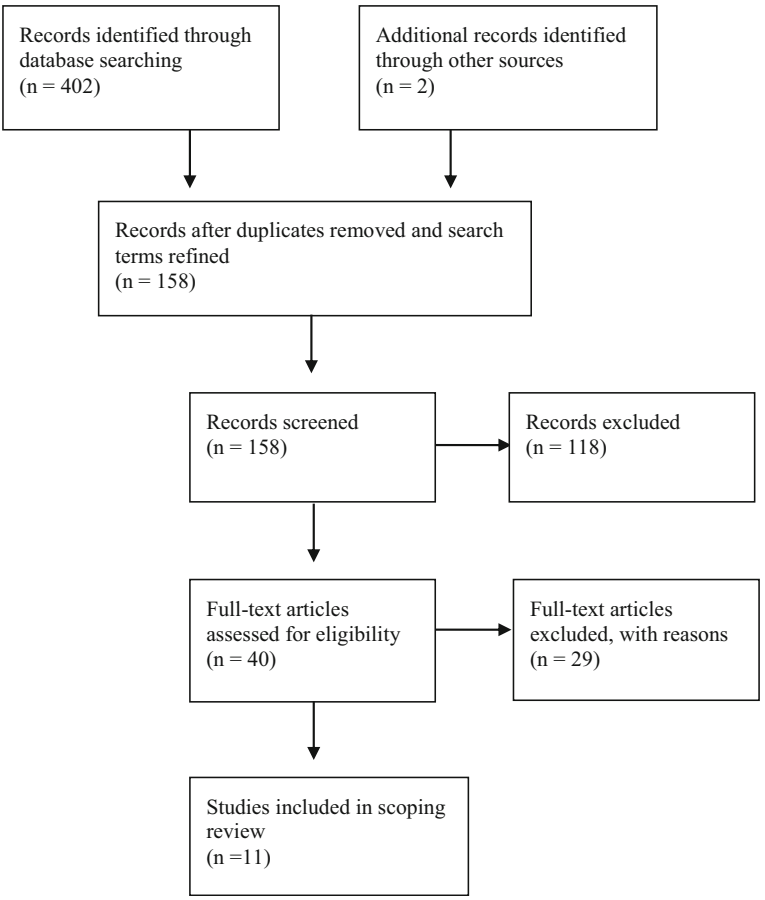

Fig. 1 Flow diagram depicting identification of studies for review

Table 1 Study Characteristics of the 11 reviewed studies including American Academy of Neurology (AAN) classification of evidence

Authors and Country	Participants (%female)	Sample Characteristics	Study design	Outcome variable or Measure	Theory base	Objective
Campbell et al. 2004 USA	*N* = 576 (48.96%)	Mean age 10.06 years 3rd, 4th and 5th grade 7.1% had heard of ASD	Analog study Experimental design	Adjective checklist (Cognitive attitude) Shared activity questionnaire (Behavioral intentions) – short format Similarity Rating Form	Attribution theory	To examine the effects of a brief video intervention using descriptive and explanatory information about ASD on attitudes and behavioral intentions.
Ezzamel and Bond 2017 UK	*N* = 7 (35%)	Mainstream primary school in Northwest England Year 3	Mixed methods	Playground observations – adaptation of Playground Observation of Pupil-Peer Engagement (POPE) Interviews Focus group	N/A	To determine the impact and how pupils with ASD and peers perceive participating in a peer network intervention
Gillespie-Lynch et al. 2015 North America	*N* = 365 (54.2%)	Mean age 19.9 years University Students 56.6% knew someone with autism	Pre-post design (online)	Social distance scale (stigma) The autism survey (knowledge) Qualitative autism awareness scale (knowledge)	N/A	To determine if participation in online training about ASD was associated with increased knowledge and decreased stigma
Mavropoulou and Sideridis 2014 North Greece	*N* = 475 (46.1%)	Mean age 10.97 years Primary school students Contact group *n* = 224 No contact group *n* = 251	Experimental control group design	Knowledge of Autism The Adjective Checklist (Cognitive attitudes) The Shared Activity Questionnaire (Behavioral Intentions) Basic Empathy scale (Empathy)	N/A	To measure the effects of contact with integrated students with ASD on the knowledge, attitudes and empathy of children from grades 4–6
Obeid et al. 2015 Lebanon and USA	*N* = 675 (62.7%)	USA: *N* = 346, mean age = 18.4 years Lebanon: *N* = 329, mean age = 18.4 years, Undergraduates	quasi-experimental design	Social distance scale (stigma) The autism survey (knowledge) Qualitative autism awareness scale (knowledge)	N/A	To determine if participation in online training about autism was associated with increased knowledge and decreased stigma amongst college students in the USA and Lebanon to evaluate the cross-cultural effectivenessof an online training about ASD

Table 1 (continued)

Authors and Country	Participants (%female)	Sample Characteristics	Study design	Outcome variable or Measure	Theory base	Objective
Ranson and Byrne 2014 Australia	$N = 273$ (100%)	$N = 48$ intervention group, median age 13 years $N = 56$ no intervention peer group, median age 13 years $N = 169$ no intervention no peer group, median age 12 years Catholic girls school	Experimental design Pre-post control group	The Autism Knowledge questionnaire The Adjective Checklist (Cognitive attitudes) The Shared Activities Questionnaire (Behavioral Intentions) Similarity Rating Form Perceived responsibility Questionnaire Student Interaction Questionnaire	N/A	To determine if the knowledge, attitudes and behavioral intentions of students who participated in an educational program will improve towards female peers with High Functioning Autism (HFA) To determine any spillover effect of the intervention to no intervention peer group.
Reiter and Vitani 2007 Israel	$N = 23$ (47.82%)	1 class in Kibbutz school northern Israel Age range 9 to 10 years	Pilot study Pre-post design	Burnout questionnaire Quality of Mediation Questionnaire CATCH scale (attitude)	Mediated Learning (Feuerstein et al. 1991)	To determine the extent of which negative attitudes held by regular pupils towards their peers with autism correlated with greater burnout To determine whether an intervention program based on mediated learning improved the quality of mediation by the regular pupils and had a positive effect on their attitudes towards their peers with autism.
Silton and Fogel 2012 USA	$N = 158$ (47.5%)	students from 4th, 5th and 6th grade. Mean age = 10.39 years 76.6% had previous exposure to ASD	Experimental design	Shared activities questionnaire (behavioral intention) Adjective checklist (cognitive attitude)	Cognitive Consistency Theory (Heider 1958) Social Attribution Theory (Heider 1958, Kelley 1967) Social Learning Theory (Bandura 1977) Affect / Effect Theory (Rosenthal, 1989)	To determine which types of information: descriptive, explanatory, peer strategy or strengths information best promote positive behavioral intentions and cognitive attitudes of typical children towards children with autism.

Table 1 (continued)

Authors and Country	Participants (%female)	Sample Characteristics	Study design	Outcome variable or Measure	Theory base	Objective
Staniland and Byrne 2013 Australia	*N* = 395 (0%)	*N* = 46 intervention condition, 8th grade *N* = 66 no intervention peer group, 8th grade *N* = 283 no intervention, no peer group, 7th and 9th grade	Experimental design Pre-post control group	The Autism Knowledge questionnaire The Adjective Checklist (Cognitive attitudes) The Shared Activities Questionnaire (Behavioral Intentions) Similarity Rating Form Perceived responsibility Questionnaire Student Interaction Questionnaire	N/A	To determine if the knowledge, attitudes and behavioral intentions of students who participated in an educational program will improve towards male peers with High Functioning Autism (HFA) To determine any spillover effect of the intervention to no intervention peer group
Swaim and Morgan 2001 USA	*N* = 233 (50%)	3rd grade, mean age = 9.12 years and 6th grade, mean age 12.02 years 3 conditions: No ASD (n = 78), ASD (*n* = 77), ASD and information (*n* = 78)	Analog study Experimental design	Adjective checklist (Cognitive attitude) Shared activity questionnaire (Behavioral intentions) Similarity Rating Form	Social desirability and Attribution theory	To examine the attitudes and intentional behaviors of children towards their peers with and without ASD
Tonnsen and Hahn 2016 USA	N = 78 (46.43)	Mean age 12.38 years Grades 5 to 7	Analog study Experimental design	CATCH – self and other Adjective checklist (cognitive attitude) Demographic checklist	N/A	To examine how middle school students' attitudes to a fictional pee with ASD varied according to physical inclusion and social acceptance.

Authors and Country	Intervention procedure and type	Outcomes/ key findings	Limitation	Classification of evidence (AAN)
Campbell et al. 2004 USA	Video vignette with explanatory and descriptive information about ASD	Less positive attitude towards peer with ASD Combination of descriptive and explanatory information resulted in improved cognitive attitudes for 3rd and 4th grade but not 5th grade. Descriptive and explanatory information improved overall intention to engage in shared behaviors.	No pre-post measures Video intervention with child actors who may not have displayed ASD accurately. Homogenous participant group. No manipulation check	Class 3
Ezzamel and Bond 2017 UK	Two whole class awareness sessions (*n* = 18) Six group peer network sessions –	Enjoyed the group Learnt new skills	No quantitative measure of attitude change	Class 4

Table 1 (continued)

Authors and Country	Intervention procedure and type	Outcomes/ key findings	Limitation	Classification of evidence (AAN)
	core play skills from pivotal response training framework	Gained understanding and acceptance of needs of child with ASD Number of occasions peers responded appropriately to child with ASD initiations increased.	No follow up No inter-rater checks on observation data Small sample with limited generalization	
Gillespie-Lynch et al. 2015 North America	Online- self administered 75 PowerPoint slides covering 13 key concepts. Periodic comprehension checks before moving onto next section	Stigma decreased Autism Knowledge increased No significant improvements in open ended definitions of ASD	Quasi experimental so limited efficacy inferences. No assessment of generalization or maintenance	Class 4
Mavropoulou and Sideridis 2014 North Greece	Contact Weekly contact with a peer with ASD. Teacher led instructions carried out by integrated group in the classroom Short educational intervention prior to entry of peer with ASD to the classroom	Significant positive effects in levels of cognitive attitude, behavioral intention and knowledge of autism Positive findings maintained at three month follow up	Participants were not randomly allocated. No measure of affective component of attitude. Self-report measures can lead to socially desirable responses.	Class 4
Obeid et al. 2015 Lebanon and USA	Online- self administered 75 PowerPoint slides covering 13 key concepts. Periodic comprehension checks before moving onto next section	Increase in knowledge and decrease in stigma in both populations Stigma remained higher in Lebanon than USA after and before training	Quasi experimental so limited efficacy inferences. No assessment of generalization or maintenance Attrition rates higher in Lebanon than USA	Class 4
Ranson and Byrne 2014 Australia	Educational Intervention Descriptive, explanatory, directive information and contact with individual with HFA "understanding our peers" eight weekly 50-min class sessions. Online activity in web -based learning site as homework	In posttest the Intervention group -rated peers with HFA as significantly more similar to themselves. -were able to differentiate between strategies for effectively interacting with peers with HFA - increased knowledge about HFA. -demonstrated significant effect on attitudes towards peers with HFA, also shown in no intervention peer group	relatively low student participation rate (45%) participants from Catholic schools that explicitly place value on messages of social justice Self-report measures can lead to socially desirable responses.	Class 2

Table 1 (continued)

Authors and Country	Intervention procedure and type	Outcomes/ key findings	Limitation	Classification of evidence (AAN)
		- had marginally better behavioral intentions towards peers with HFA, but not maintained into following term.		
Reiter and Vitani 2007 Israel	Mediated learning 19, 60-min sessions once a week.	Significant negative relation between the behavioral and affective measures and burnout on the fatigue and lack of self-fulfillment scales Significant difference on each of the attitude questionnaire subscales between the pupils' attitudes towards their peers with ASD before and after program except on the cognitive measure.	No control group Small sample size Homogenous group Self-report measures can lead to socially desirable responses No follow up	Class 4
Silton and Fogel 2012 USA	Brief video intervention Video 1 – descriptive and explanatory information about autism Video 2,3,4 - descriptive and explanatory information about autism and one or more additional forms of intervention. Peer strategies and strengths information	Participants in all video conditions showed significant gains in behavioral intentions. Peer strategies conditions showed the highest and most positive scores on behavioral intention measure	Small sample size, all attended Jewish day schools so homogenous sample. Self-report measures can lead to socially desirable responses No no-intervention control group Video intervention with child actors who may not have displayed ASD accurately.	Class 2
Staniland and Byrne 2013 Australia	Educational Intervention Descriptive, explanatory, directive information and contact with individual with HFA "understanding our peers" six weekly 50-min class sessions. Online activity in web -based learning site as homework	In posttest the Intervention group -rated peers with HFA as significantly more similar to themselves. -were able to differentiate between strategies for effectively interacting with peers with HFA - increased knowledge about HFA. - demonstrated significant effect on attitudes towards peers with HFA, not shown in intervention peer group - had no significant difference in behavioral intentions towards peers with HFA	Participants all male and from middle class background Difficulties with randomization of participants Self-report measures can lead to socially desirable responses.	Class 3

Table 1 (continued)

Authors and Country	Intervention procedure and type	Outcomes/ key findings	Limitation	Classification of evidence (AAN)
Swaim and Morgan 2001 USA	3 video conditions - no autism - autism - autism and information	Less positive attitude towards peer with autism 6th grade and females gave lower activity rating to child with autism than typical peer. Information explaining autism had no effect on attitude or behavioral intention.	No pre-post measures Video intervention with child actors who may not have displayed ASD accurately.	Class 3
Tonnsen and Hahn 2016 USA	Online video blog- Six conditions ASD accepted socially – physically excluded ASD rejected socially – physically excluded ASD accepted socially – physically included ASD rejected socially – physically included control accepted socially – physically included control rejected socially – physically included	Social acceptance but not physical inclusion predicted highest reported attitude ASD diagnosis elicited more negative attitudes	Self-report measures can lead to socially desirable responses Video intervention with child actors who may not have displayed ASD accurately	Class 3

Study Design

In order to meet the inclusion criteria studies were required to have employed an experimental design either with pre-post measurement or include a control group. One of the studies had a mixed method design including qualitative pre- post data (Ezzamel and Bond 2017). Four studies utilized a control group for comparison with no pre-post measure (Campbell et al. 2004; Silton and Fogel 2012; Swaim and Morgan 2001; Tonnsen and Hahn 2016). Three studies employed pre-post design and control group comparisons, but they were not randomly allocated (Mavropoulou and Sideridis 2014; Ranson and Byrne 2014; Staniland and Byrne 2013). Three studies employed a pre-post design but no control group comparison (Gillespie-Lynch et al. 2015; Obeid et al. 2015; Reiter and Vitani 2007).

Intervention and Measurement Components

Type of Information Delivered to Participants (Descriptive, Explanatory or Directive)

Campbell (2006) explains and presents these types of information as follows: Descriptive information is designed to emphasize similarities between peers with and without ASD. Explanatory information focuses on what ASD is and how individuals with ASD do not have active control over their autistic traits or presentations. Directive information gives instruction and guidance on how to interact and feel confident in interactions with peers with ASD. Ten of the studies reported on the type of information the intervention delivered. Reiter and Vitani (2007) did not describe the type of information delivered, as the intervention was related to improving mediation between students with and without ASD. The intervention delivered by Gillespie-Lynch et al. (2015) and Obeid et al. (2015) was comprised of descriptive and explanatory information relating to current research about autism across the lifespan including definitions of ASD, identification, prevalence, causes, intervention, strengths and challenges faced and views of the neurodiversity movement. Two studies based in Australia delivered descriptive, explanatory and directive information which was specific to High Functioning Autism (HFA) (Ranson and Byrne 2014; Staniland and Byrne 2013). Three of the studies had a specific focus on comparing the effect of different types of information (Campbell et al. 2004; Silton and Fogel 2012; Swaim and Morgan 2001). In each of these studies the interventions were inclusive of descriptive and / or explanatory information (Campbell et al. 2004; Swaim and Morgan 2001), with the addition of directive or peer strategies and information about strengths of ASD (Silton and Fogel 2012). Explanatory, descriptive and directive information was incorporated into a study conducted in the UK (Ezzamel and Bond 2017). A video blog described by Tonnsen and Hahn (2016) provided some explanatory information, but was not explained further. Similarly, Mavropoulou and Sideridis (2014) described a short explanatory session prior to their peer-integration project.

Method of Intervention Administration The interventions reported for college students in the US and Lebanon (Gillespie-Lynch et al. 2015; Obeid et al. 2015) were delivered online utilizing 71 PowerPoint slides with no contact or in person delivery. For the two Australian studies (Ranson and Byrne 2014; Staniland and Byrne 2013), the

intervention was delivered in the school setting as an educational program supplemented by web-based learning. One session was reported to include an invited speaker with HFA, and video material of people with HFA. The study based in Israel (Reiter and Vitani 2007) taught mediated learning strategies to students without ASD. Sessions included promoting group cohesion, experiential learning through role play of inclusion, presentation, simulation, modelling and practice of mediation and discussion. All participants also had inclusive opportunities with students in special ASD classes to implement these mediated learning strategies (Reiter and Vitani 2007). Four of the included studies (Campbell et al. 2004; Tonnsen and Hahn 2016; Silton and Fogel 2012; Swaim and Morgan 2001) delivered material which was video-based, with child actors playing a boy and a girl with ASD. For three of these studies the actors did not have a diagnosis of ASD (Campbell et al. 2004; Silton and Fogel 2012; Swaim and Morgan 2001). Tonnsen and Hahn (2016) reported that a child actor with a diagnosis of ASD delivered the material. However, there was no direct contact with students with ASD in any of these interventions. Ezzamel and Bond (2017) included "whole class awareness" sessions, small group peer network sessions and contact with one child with ASD. Five of the included studies incorporated direct contact with a peer or student with ASD. In two studies, this was a once off presentation (Ranson and Byrne 2014; Staniland and Byrne 2013); in another, direct contact with one child with ASD was reported and peers were not aware of this diagnosis (Ezzamel and Bond 2017). In two additional studies, direct contact was part of a program of integration between a number of peers and the students with ASD (Mavropoulou and Sideridis 2014; Reiter and Vitani 2007).

Length of Intervention The length of interventions varied widely from one-off sessions to 19 weeks. The shortest interventions reported employed video-based intervention lasting between two minutes and 22 minutes (Campbell et al. 2004; Silton and Fogel 2012; Swaim and Morgan 2001). Online training and video blogs were viewed at the students' own pace but reported to last approximately one hour (Gillespie-Lynch et al. 2015; Obeid et al. 2015; Tonnsen and Hahn 2016). Two Australian studies (Staniland and Byrne 2013; Ranson and Byrne 2014) comprised of six and eight 50-minute class length sessions, inclusive of data collection respectively. The mediated learning strategies were taught over 10 class sessions (60 minutes in length) (Reiter and Vitani 2007). Ezzamel and Bond (2017) utilized two full class sessions and six small group sessions. Mavropoulou and Sideridis (2014) did not report on intervention length, but contact sessions appear to have happened over a school term (19 weeks), with one class period being utilized for an education about ASD session prior to the contact sessions commencing.

Interventionists For all of the included studies the intervention was either designed and/or delivered by the researcher(s). Two studies also reported utilizing a teaching assistant or expert in the area (Ezzamel and Bond 2017; Reiter and Vitani 2007). For on-line and video interventions there was no personal delivery of content (Campbell et al. 2004; Silton and Fogel 2012; Swaim and Morgan 2001).

Measures Employed The most common administered measure of change employed in seven of the included studies was the Adjective Checklist (Siperstein 1980). This

measure assesses self-reported cognitive attitude towards a hypothetical target child (with ASD in these studies) by looking at the number of positive and negative adjectives attributed to them (Campbell et al. 2004; Mavropoulou and Sideridis 2014; Ranson and Byrne 2014; Silton and Fogel 2012; Staniland and Byrne 2013; Swaim and Morgan 2001; Tonnsen and Hahn 2016). Six studies used the Shared Activity Questionnaire (SAQ) (Morgan, Walker, Bieberich, & Bell, 1996). The SAQ is self-report scale which assesses intentional behavior to share academic, active recreational and general social activities with a hypothetical peer with a disability (in this case ASD) (Campbell et al. 2004; Mavropoulou and Sideridis 2014; Ranson and Byrne 2014; Silton and Fogel 2012; Staniland and Byrne 2013; Swaim and Morgan 2001). The Chedoke-McMaster Attitudes Towards Children with Handicaps Scale (CATCH) (Rosenbaum et al. 1986) was utilized in two studies. The CATCH is a 40 item self-report scale of general attitude towards children with disabilities (Reiter and Vitani 2007; Tonnsen and Hahn 2016). Qualitative measures were included in three studies (Ranson and Byrne 2014; Staniland and Byrne 2013; Ezzamel and Bond 2017), with only one using face to face interview techniques (Ezzamel and Bond 2017). Ezzamel and Bond (2017) also utilized an observational scale, the Playground Observation of Pupil-Peer Engagement (POPE) (Kasari et al. 2005). Five studies measured knowledge of ASD. Gillespie-Lynch et al. (2015) and Obeid et al. (2015) utilized an adapted versions of the autism awareness survey (Stone and Rosenbaum 1988), Ranson and Byrne (2014) and Staniland and Byrne (2013), devised a bespoke measure and Mavropoulou and Sideridis (2014) used the knowledge of autism questionnaire (KAQ) (Ross and Cuskelly 2006). Two studies reported on a measure of stigma, which was adapted by Gillespie-Lynch et al. (2015) from the Social Distance Scale (Bogardus 1933) in relation to college students' willingness to engage with people with ASD at varying levels of intimacy. Other measures were reported which were either developed for the intervention specifically or measured aspects unrelated to attitude, intentional behavior or knowledge. Many of the authors acknowledged the risk of socially desirable responses on self-report measures, and in two instances employed second versions of the self-report measure to ask how 'others' might view the hypothetical child (Swaim and Morgan 2001; Tonnsen and Hahn 2016).

Outcomes and Findings

Outcome Variables All included studies measured attitude to persons with ASD, except for Ezzamel and Bond (2017), who employed a qualitative approach, and reported on perceptions and acceptance. Six studies specifically measured intentional behavior, five measured knowledge and two measured stigma as outcome variables. One study examined nationality as a variable, comparing college students after an online intervention in the USA and Lebanon (Gillespie-Lynch et al. 2015). The study by Mavropoulou and Sideridis (2014) specifically examined contact with peers with ASD as a variable in changing attitude and intentional behavior. Three studies focused on how information was delivered as a variable in influencing attitude and intentional behavior (Campbell et al. 2004; Silton and Fogel 2012; Swaim and Morgan 2001). Reiter and Vitani (2007) examined burnout as a variable in contact sessions with peers with ASD. Physical inclusion and social acceptance were examined as influencing

Table 2 Effectiveness of Intervention according to measured change in knowledge, attitude/stigma and behavioral intention

Author	Knowledge	Attitude / Stigma	Behavioral Intention *
Campbell et al. 2004	n/a	For descriptive and explanatory – more positive for 3rd (d = .42) and 4th grade (d = .51) not 5th grade	Increase in total score when descriptive and explanatory information given (d = .27)
Ezzamel and Bond 2017	n/a	More positive (qualitative)	n/a
Gillespie-Lynch et al. 2015	Increased ($p < .001$)	lower stigma ($p < .001$)*	n/a
Mavropoulou and Sideridis 2014	Increased ($p < .05$)	more positive ($p < .05$)	Increased for academic and social ($p < .05$)
Obeid et al. 2015	Increased ($p < .001$)	lower stigma ($p < .001$)*	n/a
Ranson and Byrne 2014	Increased ($p < .001$)	more positive ($p = .05$)	no significant effect ($p = .44$)
Reiter and Vitani 2007	n/a	more positive ($p < .001$)	n/a
Silton and Fogel 2012	n/a	no effect ($p = .26$)	Increase for total ($p = .034$) and recreational ($p = .029$)
Staniland and Byrne 2013	Increased ($p < .001$)	more positive ($p = .01$)	no significant effect ($p = .37$)
Swaim and Morgan 2001	n/a	more positive ($p < .005$)	no significant effect
Tonnsen and Hahn 2016	n/a	no effect	n/a

*The SAQ measures the academic, active social and recreational domains of Intentional Behavior, there is also a total score

variables in peers' attitudes towards ASD by Tonnsen and Hahn (2016). Gender and/or age as influencing variables were also examined by seven of the studies (Campbell et al. 2004; Gillespie-Lynch et al. 2015; Mavropoulou and Sideridis 2014; Obeid et al. 2015; Ranson and Byrne 2014; Silton and Fogel 2012; Staniland and Byrne 2013; Swaim and Morgan 2001; Tonnsen and Hahn 2016).

Findings Relating to Knowledge, Attitude and Intentional Behavior The reported effectiveness of the interventions employed within included studies is summarized in relation to the variables of attitude/stigma, intentional behavior and knowledge in Table 2. One study calculated effect sizes using Cohen's d (Campbell et al. 2004). The other studies reported statistical significance using p values, except Ezzamel and Bond (2017) which employed qualitative outcomes. Table 2 indicates that for the five studies which measured knowledge as an outcome, there was a statistically significant increase in levels of knowledge (Gillespie-Lynch et al. 2015; Mavropoulou and Sideridis 2014; Obeid et al. 2015; Ranson and Byrne 2014; Staniland and Byrne 2013). Other than Silton and Fogel (2012) and Tonnsen and Hahn (2016) all other studies reported either lower stigma or improved attitudes of peers, except for 5th grade peers in Campbell et al. (2004) study who did not demonstrate more positive attitudes. In relation to intentional behavior the findings were more varied (see Table 2). Three studies reported no significant change in measures of intentional behavior (Ranson and Byrne 2014; Staniland and Byrne 2013; Swaim and Morgan 2001). The other studies which reported measures of intentional behaviour had mixed findings which Table 2 indicates.

Findings Related to Other Outcome Variables Additional findings relate to other outcome variables, not specific to knowledge, attitude/ stigma or intentional behaviors. There were mixed findings related to gender and age, with some evidence that girls had slightly higher academic behavioral intentions and attitude by Campbell et al. (2004) and Tonnsen and Hahn (2016). The younger cohorts also appeared to have more positive attitudes and behavioral intentions in three studies where comparisons between age groups were carried out (Campbell et al. 2004; Swaim and Morgan 2001; Tonnsen and Hahn 2016). In Obeid et al. (2015) stigma and knowledge was lower for students from Lebanon compared to the USA post-intervention. In terms of information type, Campbell et al. (2004) demonstrated descriptive and explanatory information were superior to descriptive alone. Silton and Fogel (2012) demonstrated the most positive findings for behavioral intentions when explanatory, descriptive, strategies and strengths information were given.

Social Validity For the majority of studies there was no reference to feedback from participants or attempts to examine feasibility of future implementation of the intervention. Ezzamel and Bond (2017) reported qualitative perceptions of teachers and peers, as a large part of their study involved staff and students' perceptions of the intervention. Feedback was positive, with some concerns about the use of terminology and training required in order to implement the program independently. A qualitative feedback survey was referred to by Ranson and Byrne (2014) but findings were not reported.

Quality Evaluation

The American Academy of Neurology's (AAN) classification system of evidence for therapeutic intervention (Edlund et al. 2004) was employed. Five of the studies were assessed as presenting the lowest level of quality i.e., Class 4 (Ezzamel and Bond 2017; Gillespie-Lynch et al. 2015; Mavropoulou and Sideridis 2014; Obeid et al. 2015; Reiter and Vitani 2007). Four studies met the criteria for Class 3 (Campbell et al. 2004; Staniland and Byrne 2013; Swaim and Morgan 2001; Tonnsen and Hahn 2016). The other two were classified as Class 2 (Ranson and Byrne 2014; Silton and Fogel 2012). Using this research metric, the presence of at least one Class 2 study or two consistent Class 3 studies indicates the intervention is possibly effective for the given condition and specified population. Table 1 displays these classifications alongside the study characteristics.

Discussion

This scoping review delivers the evidence base for and description of published research on intervention studies which were designed to specifically improve aspects of autism awareness for children and adolescents without ASD. The mix of intervention types, methods and measures, makes it challenging to draw any overall conclusions. Although all of the studies aimed to examine aspects of knowledge, attitude or intentional behavior change, with a view to improving the inclusive experiences of students with ASD.

In terms of the interventions/educational programs presented, there was a notable variety, particularly in the length of interventions from one very short video-based session to interventions which took place over the whole school year. It is suggested that in disability awareness and acceptance programs that longer interventions are more effective (Rillotta and Nettelbeck 2007). There was no comparison made between intervention lengths in the studies included in this review. The studies did not present any evidence-based argument for their chosen length and it was not described as a factor in reporting of results. However, it would seem in order to effect attitude or intentional behavioral change programs or intervention would need to run for more than one session. It would appear that multi-session interventions may be more effective (Ranson and Byrne 2014; Staniland and Byrne 2013). There is also evidence that smaller group sizes have higher impact on social interactions particularly (Carter et al. 2008).

Common elements of the programs related to the provision of descriptive and explanatory information, which was found to be more impactful than just one type of information (Campbell et al. 2004). Despite different delivery methods such as video, online or in person, the majority of interventions did report some positive change on knowledge and attitude or levels of stigma. Behavioral intention was less well effected, with aspects of behavioral intention reported to improve by Silton and Fogel (2012) when additional information related to strengths and directive strategies was introduced, and in the largest sample size study which measured these variables (Campbell et al. 2004). The other study which demonstrated improved behavioral intention scores was the intervention

which had prolonged contact between students with and without ASD (but little information/education) (Mavropoulou and Sideridis 2014). A deduction from this analysis could be that a combination of all these delivery methods may be the most useful i.e., descriptive, explanatory, directive and contact. In a review of disability awareness interventions, Lindsay and Edwards (2013) similarly report social contact as a component of a successful intervention and conclude by recommending multiple-components and interactive elements to these programs. This would follow the logic that accurate knowledge can inform positive development of attitudes, reduction is stigma and therefore higher likelihood of behaving in a positive and inclusive manner. Also, if students understand the social challenges for those with autism to be mutual, there is a better chance of impacting on the challenge (Gillespie-Lynch et al. 2017). But before they can do this, they need to understand autism. Being made aware of autism has been shown to improve attitudes towards those with autism (Brosnan and Mills 2016). Gardiner and Iarocci (2014) study of university students' acceptance of ASD and intention to volunteer with students with ASD demonstrated a positive attitude towards students with ASD is likely to predict positive changes in behavior. Similarly, Campbell et al. (2004) purports that behavioral intentions are one of the best predictors of actual behavior. The idea that students could learn about ASD without actually meeting a person with ASD appears almost incredible, but many of the reviewed programs did not offer the opportunity for social contact. Allport's (1954) contact theory asserts that contact should lessen negative attitudes. However, the quality and nature of the experience should also be taken into account (McManus et al., 2010). This is potentially where facilitating directive communication strategies around appreciating the differences between how students with and without ASD communicate may come in useful prior to a first social contact. The directive strategies may simply enable the students to feel more confident in their interactions as suggested by Campbell and Barger (2014).

The cultural, gender and age diversity to the interventions reviewed is also highlighted. More successful interventions tended to be with older students e.g., secondary school and college age. College students demonstrate more positive findings than those of younger primary school aged children (Gillespie-Lynch et al. 2015; Morgan et al. 1996; Nevill and White 2011). It is suggested that more disability specific and detailed programs have greater impact on older students (Lindsay and Edwards 2013). Gender did not appear to be an influencing factor on outcomes, although girls were reported to have better pre-intervention attitudes in some studies. Younger girls are generally thought to have more empathetic attitudes, but this has not held true in studies with older participants (Nevill and White 2011). The co-educational contexts of many of studies may well have moderated the effect of gender. Often hypothesized peers with ASD presented in questionnaires such as the SAQ are male, Fleva (2014) suggests that this may influence males more positively. The varying socio-cultural context of the studies challenge comparisons also. Obeid et al. (2015) study indicated the cultural differences in knowledge and attitude, but also demonstrated culture did not influence learning. Three of the interventions appeared to relate specifically to the socio-cultural context and would be difficult to transfer into other settings (Mavropoulou and Sideridis 2014; Reiter and Vitani 2007; Silton and Fogel 2012).

Future Directions and Conclusion

Despite reports of the challenges of the social environment of schools and colleges for students with ASD, and the obvious connection between peers awareness and improved social relations, there exists a paucity of studies in the area (Bellini 2006; Humphrey and Symes 2011). It is clear from the current review that those which have been carried out vary greatly in terms of quality and outcomes. There is little consensus on what type of interventions work and how. There is also no information on the longer-term outcomes or implications of these types of interventions on social relations between those with and without ASD. Further there are no reports of whether knowledge about autism or attitudinal change is maintained over time or on stakeholder's views and feedback in relation to these interventions.

The review also demonstrates that research into addressing peers' awareness of autism lacks emphasis on whether the outcomes benefited students with ASD directly in the context of the school or college. Nor do the studies address if there is a wider benefit in terms of autism acceptance and behavioral change in the peers who learn about ASD. Understanding the benefits of autism awareness to the autism community is an emerging area for research. There are early indicators of positive links between societal acceptance of ASD and more positive mental health for those with ASD (Cage et al. 2017).

It is acknowledged that peer educational programs are only one aspect of improving integration and inclusion for students with ASD in schools and colleges. Many other interventions exist which have demonstrated improved social experiences for students with ASD, which do not address knowledge, attitudes or similar concepts in peers (e.g. Carter et al. 2016). Of note is the evidence base for PMI (Chang and Locke 2016; Watkins et al. 2015) which have proved to be effective in improving social skills for students with ASD within integrated learning environments. However, little is known from these PMI studies about the effect for the peers in terms of their knowledge and understanding of ASD, and their attitudes towards students with ASD resulting from their role.

This review addressed a gap in the knowledge base and literature in relation to evidence for autism awareness programs for young people. It presents some emerging evidence for their effectiveness in changing knowledge, attitude and intentional behaviors of students without ASD. However, this is a small pool of studies, with variations in quality and sample sizes to inform future studies and intervention programs. Analysis points to the use of mixed delivery methods in these types of program. This could include educational sessions which present both explanatory and descriptive information about ASD. There is also some evidence that delivery of these sessions by an 'expert' in the area has more impact than if delivered by a teacher (Campbell and Barger 2014). There is little acknowledged about contributions from individuals with ASD to these programs. Contact between those with and without ASD is presented in some of the research. More effective programs appear to have a direct contact element to them alongside the educational information. Including the students with ASD directly in these types of intervention would appear to be the most inclusive way to deliver programs of this nature. Certainly, if part of the goal of the program is to improve interaction and social relations between those with and without ASD, it would seem imperative that contact is a component of the program. The length of the

programs is also hugely variable and requires more research and consideration in the field. Impacting knowledge may happen quite quickly through a brief educational intervention, but attitude and behavioral change would appear to require a more sustained approach.

In conclusion with analyses of the published studies, but limited research evidence there are indicators that multiple components, with interactive and contact elements are positive to an intervention. If these types of intervention are introduced into mainstream schools and colleges, more understanding of their setup and place within the curriculum would also need to be addressed. Questions about feasibility of delivery, including by whom, in what format and for how long all require further research. Due to the limitations of sample sizes, the wide variety of ages, cultures and interventions presented in the published research, it is very difficult to form any resolute conclusions. Future research should employ more rigorous designs with interventions implemented across multiple sites. Researchers should also consider the socio-cultural context, the length of intervention and crucially consultation and contact with students with ASD.

Compliance with Ethical Standards

Conflict of Interest None of the authors have any conflict of interests with the information or studies presented within this article.

Ethical Approval This article does not contain any studies with human or animal participants performed by any of the authors.

Informed Consent No informed consent was required in this study.

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