An investigation into Implicit and Explicit Attitudes Toward Children with Autism Spectrum Disorder (ASD) versus Typically Developing Children

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the best cheerleaders!! Thank you so much.

To my participants'

Finally thank you sooo much to everyone who participated in my research. Couldn't have

done it without you guys.

Abstract

Research regarding attitudes toward individuals with Autism spectrum disorder (ASD), particularly the attitudes of adults and adolescents is notably lacking within the research literature. Previous research would suggest that adults with ASD have very poor outcomes in later life, particularly in areas of employment and relationships. Research surrounding attitudes suggests that attitudes have an impact on behaviour, highlighting the need to establish the attitudes that society currently hold toward ASD. However, there are inconsistencies within the literature regarding implicit and explicit attitudes toward ASD. Therefore, Study 1 aimed to examine adults' implicit and explicit attitudes toward ASD and sought to investigate the impact of gender on participants' attitudes. Participants (N = 41) completed several explicit measures; The Openness to Autism Scale (OAS), The Attitudes to autism scale (AAS) and The Knowledge of Autism Questionnaire (KAQ), participants also completed an implicit measure, the implicit relational assessment procedure (IRAP). Results revealed that adults had significantly positive attitudes toward ASD. It was also revealed that attitudes did not significantly differ across gender nor were there significant differences across explicit and implicit measures. While the results of Study 1 were notably positive previous research suggests that as a result of their advancing development adolescents may be better able to determine differences between themselves and their peers with ASD and therefore may be less inclined to initiate social interactions with these peers. Study 2 therefore sought to determine adolescents' attitudes toward their peers with ASD and investigate the effectiveness of an educational intervention to positively alter attitudes. Study 2 also employed a gender analysis. Participants (*N* = 31) completed the IRPA, the OAS and the AAS pre-and post the educational intervention. As a result of high attrition rates within the

participant sample ($N = 15$), resulting from failure to reach pre-intervention IRAP criteria, an intention to treat (ITT) analysis was employed. Overall, the intervention had no significant impact on students' attitudes regarding ASD. However, students reported significantly positive attitudes toward ASD prior to and following the implementation of the intervention. As with Study 1, no differences were found across gender within students' implicit attitudes. Finally, the use of ITT analysis was an exploratory but beneficial element to the current study and a number of differences were reported across the methods of ITT. Future IRAP studies should continue to examine alternative methods of data analysis for instances of high attrition rates.

Chapter 1
General Introduction

An investigation into Implicit and Explicit Attitudes toward Autism Spectrum

Disorder (ASD)

Autism Spectrum Disorder (ASD)

ASD is a pervasive developmental disorder characterised by stereotyped repetitive behaviour and persistent deficits in an individuals' social communications and interactions (Cooper, Heron, & Heward, 2014). With regards to treatment, the application of the principles of Applied Behaviour Analysis (ABA) within intervention programs and therapies is considered to be the main avenue of treatment for individuals with ASD (Eikeseth, Smith, Jahr, & Eldevik, 2007). The implementation of ABA involves the application of behaviour principles proposed by Skinner (1957) to bring about a positive change in socially significant behaviour (Cooper, Heron & Heward, 2014). For example, ABA can be implemented to teach effective means of communication (Aldred, Green, & Adams, 2004; Paden, Kodak, Fisher, GawleyBullington & Bouxsein, 2012) or to facilitate self-management skills (Kroeger & Sorensen, 2010; Pierce & Schreibman, 1994). Alzyoudi, AbedAlziz and Almuhiri (2014) implemented a video-modelling intervention to improve social skills in children with ASD. Results revealed significant improvements in all participants' social skills, with all children reaching desired criteria. DeRosier, Swick, Davis, McMillen and Matthews (2010) reported similar findings. All participants who received the social skills intervention reported significantly positive increases in social skills compared to participants who did not receive the intervention. These findings suggest that individuals with ASD should be able to engage in appropriate social interactions with their peers.

 For many years now ABA has made notable contributions regarding the treatment of those with ASD (Cooper et at, 2014). In America ABA is considered to

be the "standard approach" with regards to treating ASD (Wolfe & Neisworth, 2005). The seven principles of ABA; applied, behavioural analytic, technological, conceptual, effective and generalisability were proposed by Baer, Wolf and Risley (1987) have been used in the development of Early Intensive Behavioural Intervention (EIBI) to treat young children with ASD (Kuppens & Onghena, 2012). Following these seven principles, treatments should focus on behaviours that are socially significant for the individual or their significant others, the behaviour in question must be in need of change and the behaviour must be measurable, the intervention or treatment must be shown to reliable change the behaviour, this can be achieved through the use of demonstrating control, all operative procedures must be identified and described with sufficient detail, procedures for changing behaviour should be described in terms of the principles from which they were derived, the behaviour must change enough for it to be considered socially important and the effect of treatment or intervention must persist over time and appear in environments other than the one in which the intervention initially produced the change (Baer, Wolf & Risley, 1987).

Lovaas (1987) originally reported that the implementation of EIBI would enable clients to gain access to benefits such as greater access to mainstream services. Shi, Yu, Guo, and Li (2007) conducted a study to examine the effectiveness of EIBI over 3-12 months on children aged 2-8 years old. In a follow up examination, 43 of 48 children continued to experience improvements with 29 of the children having entered mainstream education. The use of EIBI has also been reported to have a significantly positively effect on IQ in children with ASD (Eldevik et al., 2009). Kovshoff, Hastings, and Remington (2011) explored the outcomes of EIBI for

children with ASD, two years' post cessation of the intervention. The implementation of EIBI was associated with a greater likelihood of attending mainstream education.

Considering the research surrounding EIBI and its increased popularity as a treatment for children with ASD it can be expected that an increasing number of children with ASD will continue to enter mainstream education similarly successful interventions aimed at promoting social skills in children with ASD (Alzyoudi et al., 2014; DeRosier et al., 2010) should help aid a successful transition into mainstream education. While there are no official statistics in Ireland of the number of people diagnosed with ASD, in a study conducted by Staines (2011) it was reported that the current rate in Ireland is 1 in 100 (Irish Autism Action, 2015). Similarly, the number of children with ASD entering Irish mainstream education system is continuously increasing. In a study by the National Council for Special Education (NCSE) (2016) it was reported that the number of children with ASD in the education system was 8829 between 2011-2012, this number was reported to increase to 10719 between 2012-2013. This highlights the need for efficient services to support these increasing numbers of students with ASD and highlights the need to obtain an accurate knowledge on how to implement services to achieve optimal results for all students concerned. Similarly, these services should support the ASD student for their entire educational career, not just their primary mainstream education.

Inclusion of Students with ASD in Mainstream Education

Inclusive education is the process of educating children with special education needs in the least intrusive environment possible alongside their typically developing peers (Boyd & Bee, 2015). This process is achieved by fully integrating the student into the mainstream classroom with extra support provided where needed or facilitating integration for part of the day. This decision is based on the needs of

the individual learner. For example, in 2011 it was reported 95% of students with disabilities attended mainstream education in the United States and over half of these students spent up to 80% of the day in a mainstream classroom (An & Meaney, 2015). In Ireland, the Education for Persons with Special Needs Act (EPSEN) (Department of Education and Science, 2004) was introduced in 2004. Under this act, individuals with special education needs (SEN) have the right to be educated in an inclusive environment alongside their typically developing peers. Research shows that inclusion can have multiple benefits for students with special education needs. Inclusion can benefit students with disabilities both socially (Fisher & Meyer, 2002) and academically (Cole, Waldron, & Majd, 2004). A number of studies have compared the effects of including children with SEN in mainstream settings to the effects of educating children with SEN solely in special education settings. Fisher and Meyer (2002) reported that children who were educated in inclusive settings reported significantly more social benefits compared to children in self-contained settings. Students reported significant benefits in development and their social competence. Regarding academic success, Salend and Garrick-Duhaney (1999) reviewed a number of studies on the effect of inclusion for children with SEN on their academic success. It was found that children in inclusive settings reported better gains in their reading skills compared to children with SEN that were not in inclusive settings. Peetsma, Vergeer, Roeleveld and Karsten (2001) reported similar findings, students in inclusive settings scored better in language and mathematic assessments compared to students in SEN settings. Dessemontet, Bless and Morin (2012) examined the effects of inclusion on children with SEN. Children with SEN who were included in mainstream education were compared to students who were educated in special schools. It was found that the children with SEN who were

enrolled in inclusive education settings achieved more academic progress and developed better adaptive behaviour compared to the students in the special education settings.

Successful inclusion involves examining the attitudes of all those involved in the process i.e. school faculty, family and typically developing students (Cole, 2005). While inclusion can have significant academic benefits for students, this is dependent on successful inclusion occurring. Vaughn, Gersten and Chard (2000) found all children within an inclusive setting benefited when teachers adapted their teaching strategies to include the needs of the children with SEN. However, teachers may not always be willing to do so. Yuen and Westwood, (2002) found that a significant number of secondary school teachers reported students with SEN to be a burden and reported that these students should not be included in mainstream education. It has also been reported that if teachers hold negative attitudes toward students with SEN, these attitudes can also impact typically developing students attitudes toward their peers with SEN and effect their intentions to socially engage with their peers with SEN (Ryan, 2009). If typically developing students' attitudes are negatively affected then this may pose a serious consequence as it has been reported that a key factor pertaining to successful inclusion is the role of the typically developing peer (Jones & Frederickson, 2010). Siperstein, Parker, Bardon and Widaman (2007) examined the attitudes of middle school students toward the inclusion of peers with SEN. Findings revealed that while students felt peers with SEN could be included, they felt this could only be achieved in non-academic classes. Students also reported not wanting to interact with students with SEN. These findings suggest that typically developing students hold negative attitudes toward inclusion which may in turn result in unsuccessful inclusion occurring.

It has also been reported that successful inclusion is heavily dependent upon the willingness of school administrators to make decisions that provide ample opportunities for students with disabilities to participate effectively in the mainstream classroom with their peers (Praisner, 2003). In support of this it has also been reported that all those involved in the school environment both directly and indirectly, such as teachers, support staff, administrators and parents play key roles developing and maintaining successful inclusion (Praisner, 2003). However, regarding parents' attitudes toward inclusion there are mixed findings within the literature. De Boer, Pijl, and Minnaert (2010) conducted a review of the literature exploring the attitudes of parents with children with SEN toward inclusion and the attitudes of parents with children without SEN toward inclusion. It was found that parents of children with moderate and severe disabilities held negative attitudes toward inclusion. These findings highlight the significant impact of the role of a number of individuals within society regarding successful outcomes for individuals with ASD. These findings indicate a significant importance regarding the involvement of numerous individuals in the inclusion process for education and beyond.

Inclusion of Individuals with ASD Post Education

While the benefits of inclusion for students with SEN are evident, these benefits don't appear to appear to persist into later life for individuals with ASD. Gardiner and Iarocci, (2013) reported that students transitioning into third level education experience extreme difficulties, particularly in areas related to the social aspect of this environment, for example the expectation to engage in new social experiences and interactions with their peers. Similarly, it has been reported that students with ASD in higher education environments struggle to make new social

relationships (Orsmond, Shattuck, Cooper, Sterzing & Anderson, 2013). Adolescence is marked by a significant advancement in development which may result in adolescents being better able to distinguish behavioural differences between themselves and a peer with ASD, therefore they may be less inclined to interact with their peers with ASD (Rotheramfuller, Kasari, Chamberlain & Locke, 2010). This decreased desire for interaction and involvement with peers with ASD may continue to persist which may in turn lead to the benefits of inclusion in early life diminishing. Research exploring the later-life outcomes on individuals with ASD suggests that the quality of life for individuals with ASD decreases with age (Billstedt, Gillberg, & Gillberg, 2005).

Dillenburger, McKen, Jordan, Devine and Keenan (2015) reported that one of the factors related to successful social inclusion for an individual with ASD is to acquire a meaningful form of employment. Yet only 15% of adults with ASD were found to be in full time employment (Dillenburger et al., 2015). These findings are consistent with research that has examined adult outcomes for individuals with ASD. Eaves and Ho, (2008) carried out research to investigate the outcomes in adult life for individuals diagnosed with ASD. Data was taken across three different times; childhood, early adolescence and young adulthood. The study examined outcome in the areas of occupation, friendships and independent living, scores from these areas were totalled into an overall outcome rating (OOR) score. At young adulthood, the mean OOR was 6.79. This indicates on average a fair outcome, participants reported some degree of independence, required some support in their residential setting and finally reported no close friendships but some acquaintances. Given these poor outcomes research has also examined QoL under alternative circumstances. Bishop-Fitzpatrick et al. (2016), sought to generate a set of objective criteria to make QoL

more generalizable to individuals with ASD. Good physical health, good mental health, good quality of neighbourhood and frequent contact with siblings and extended family were taken into consideration. In a sample of 180 individuals with ASD, it was reported that only 2.8% of participants achieved all amended criteria for QoL. Research has examined outcomes across different levels of IQ. Research consisting solely of higher functioning adults with no diagnosis of an additional intellectual disability reported significantly low levels of paid employment compared to a typically developing matched sample (20% – 50%) with majority of this employment consisting of workshops and day programs (Gray et al., 2014). These findings also support the need to ensure that a variety of individuals within society are needed to foster successful inclusion.

Dillenburger et al. (2015) reported that international campaigns aimed at raising awareness of ASD have resulted in 80% of the population reporting awareness of ASD. With a greater awareness among the population it is important to establish how this awareness has equated to attitudes toward individuals with ASD and the inclusion of these individuals into our society. Dillenburger et al. (2015) carried out a survey to investigate how inclusive society is toward those with ASD. An annual population survey was used to gather information. Within this survey there was a specific section related to ASD that asked questions regarding participants' knowledge, attitudes and behaviours toward those with ASD. Overall results indicated that adults had very positive attitudes toward inclusively living with, working with and educating with children and adults with ASD. However, this study is limited in that participants' attitudes were assessed using explicit measures, i.e. surveys. These measures are prone to social desirability and the results may not be an accurate representation of adult's attitudes toward ASD. Similarly, these findings

notably contradict the findings regarding the outcomes for adults with ASD, thus highlighting the need for more up to date research regarding attitudes toward ASD.

Within attitudes related to employment it was found that 81% of participants reported they would feel comfortable working with someone with ASD. However, when asked about the suitability of certain jobs for individuals with ASD results varied. For example, only 42% of participants reported that a doctor would be a suitable job for an individual with ASD and only 50% of participants felt a lawyer would be a suitable job. With regards to inclusion within the community participants reported a potential need for support, however they also reported that this would depend on the individual. Similarly, a significantly high proportion of participants either disagreed or strongly disagreed with the statement "residential care is the best option for someone with severe autism". Similarly, a French survey indicated positive attitudes towards individuals with ASD (Durand-Zaleski, Scott, Rouillon & Leboyer, 2012). These research findings highlight inconsistencies regarding adults' attitudes towards working with individuals with ASD and actual figures of individuals with ASD in employment reported in previous studies discussed. While findings within the literature report inconsistencies regarding attitudes, research suggests that families, employment and social supports may play a vital role (Billstedt et al., 2005; Gray et al., 2014) in promoting successful inclusion, as such it is important to investigate the attitudes of those within these environments.

Attitudes

Attitudes can be described as a "relatively enduring organisation of beliefs, feelings and behavioural tendencies towards socially significant objects groups events or symbols" (Hogg & Vaughan, 2011). The main function of attitudes is object appraisal i.e. they orientate us to or away from objects (Fazio, Sanbonmatsu,

Powell, & Kardes, 1986). There has been much discussion in the research literature as to whether attitudes predict behaviour. Gregson, Elvy and Stacey (1981) found that self-reported attitudes toward alcohol consumption failed to reliably predict behaviour regarding alcohol consumption. Earlier research reported that a correlation between attitudes and behaviour is seldom high (Wicker, 1969), however in more recent years it has emerged that there is in fact an association between attitudes and behaviour but it is dependent on a number of conditions (Doll & Azjen, 1992; Hogg & Vaughan, 2011). For example, the more consistent an attitude the more likely it is to predict an individuals' behaviour under a given set of circumstances (Hogg & Vaughan, 2011).

Attitudes Towards Individuals with ASD

Research regarding attitudes toward individuals with ASD has predominantly focused on the attitudes of typically developing children toward children with ASD (Campbell, 2006; Campbell, Ferguson, Herzinger, Jackson & Marino, 2005; Swaim, & Morgan, 2001). Harnum, Duffy and Ferguson, (2007) compared adults' perceptions of a typically developing child to a child with ASD or a child with attention deficit hyperactivity disorder (ADHD). These attitudes were then compared to typically developing children's' attitudes of a typically developing child, a child with ASD or a child with ADHD. Participants were given one of three scenarios to read. Each child was described within a scenario. Participants were required to rate their agreement with statements presented following the scenarios. Results indicated that participants reported a child with ASD to be considerably more disliked and to be avoided compared to a typically developing child. A statistically significant difference was found across age, with children reporting more of a dislike and avoidance compared to adults. Similarly results indicated no statistically significant

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difference for dislike or avoidance across the child with ASD, the child with ADHD and the typically developing child across adult participants. These findings suggest that individuals may develop more positive attitudes as they progress into adulthood. However, of the three scenarios depicted in the study the child with ASD was the only child that the adult participants reported as being unlike them.

Chambers, Auxiette, Vansingle and Gli (2008) investigated the effect on adults' attitudes of providing the label of ASD to a child exhibiting problematic behaviours compared to not providing the label. Participants were required to watch four videos, each depicting a child engaging in a behaviour, two of the behaviours were problematic and two were not. All participants watched the same four videos, half of the participants were informed that the child had ASD and the other half were not. Upon the ending of each video participants were required to rate the child's behaviour in several circumstances; social, cognitive and emotional. Participants reported significantly more positive attitudes when they were informed of the child's ASD diagnosis compared to participants who were not informed. This suggests that if a behaviour does not conform with social norms, adults will view this as more normal if they are aware that the behaviours are a result of the child's autism. This highlights the potential importance of knowledge and understanding of ASD in relation to attitudes.

Attitudes Toward Inclusion of Students with ASD

In general, education policies in western societies has moved toward inclusive education, facilitating access to normalised school environment and contact with typically developing peers to improve quality of life experienced by individuals with a disability. Research has also investigated college students' attitudes toward ASD (Nevill & White, 2011). Nevill and White (2011) investigated the attitudes of an

undergraduate population toward ASD. Attitudes were examined in terms of participant's tolerance and acceptance to a peer with ASD. The openness to autism scale (Harnum et al., 2007) was adapted to assess the attitudes of an adult population. Overall participants reported high levels of openness toward peers with ASD. However, there were significant differences among participants across several areas. Participants who reported having a family member diagnosed with ASD yielded a statistically significant higher openness scores compared to participants who did not have a family member diagnosed with ASD. Overall there was no statistically significant difference across college course but there were significant differences on several items on the scale. For example, participants who reported to be attending a social science course indicated significantly less fear toward a peer with ASD compared to participants who reported attending an engineering or physical science course. The study by Neville & White (2011) was not without its limitations. While participants were asked to indicate if they had a family member diagnosed with ASD they were not asked to specify the level of contact they engaged in with this family member. Having a family member with ASD does not necessarily equate to greater exposure or contact to ASD compared to an individual who does not have a family member with ASD. Similarly, participants' knowledge or understanding of ASD was not assessed. While an individual may be aware that someone has a diagnosis of ASD they may not understand the additional difficulties that these individuals can experience (Howlin, Goode, Hutton, & Rutter, 2004; Jobe & White, 2007).

In a similar study to that of Nevill and White, (2011), knowledge and stigma were assessed in an undergraduate population prior to and following an online educational intervention (Gillespie-Lynch et al., 2015). Participants completed a self-report measure of stigma related to ASD and a self-report measure of autism

knowledge. These were completed immediately before and immediately after the online training program. Results following the intervention revealed a significant increase in knowledge and a significant decrease in stigma. Direct contact with a family member was also found to be significantly related to less reported stigma. Scores for knowledge of autism indicated participants already had a relatively high knowledge of ASD prior to the intervention, this would suggest that knowledge of ASD is not necessarily a factor related to attitudes toward ASD. However, post intervention scores also indicated a significant increase in participants' knowledge regarding ASD and a significant decrease in stigma scores (Gillespie-Lynch et al., 2015). It has been reported that students with ASD who experienced positive behavioural intentions among their typically developing peers achieved greater academic success compared to students with ASD who experienced more negative attitudes among their typically developing peers (Campbell, 2006). Therefore, it is essential that an environment is created where students with ASD have the same opportunities as their typically developing peers to achieve their optimum academic potential. However, there have been discordant research findings suggesting the effects of inclusion with populations with ASD may be less optimal. Previous research has detailed the negative impact of inclusion on students with ASD and other learning disabilities. Campbell (2006) reported that children with ASD are frequently subjected to peer isolation and bullying. In support of this it has been documented that children with psychiatric illnesses and developmental and learning disabilities experience greater social rejection and negative evaluation compared to students with physical disabilities (Gordon, Tantillo, Feldman, & Perrone, 2004; Nowici & Sandieson, 2002).

During recess periods children with ASD are often isolated and engage in solitary play (Anderson, Moore, Godfrey, & Fletcher-Flinn, 2004). Tonnsen and Hahn, (2016) examined middle school students' attitudes toward a peer with ASD. Attitudes were assessed in terms of the peers' physical inclusion and in terms of the students' perceptions of their typically developing peers' attitudes toward the peer with ASD. A significant result emerged for social acceptance, participants reported more favourable attitudes toward their peer with ASD when the peer was depicted as accepted among typically developing peers. A negative relationship was found between age and attitudes. Younger participants reported greater positive attitudes compared to older participants. A study investigating college students' attitudes toward peers with ASD reported that students demonstrated statistically significant positive attitudes toward their peers with ASD. Yet these results were not mirrored when participants were provided with a description of a student with ASD without the label "ASD" (Matthews, Ly & Goldberg, 2015). These results are consistent with research regarding adults' attitudes toward ASD (Chambers et al., 2008). This suggests that the accurate presentation of knowledge may be an important factor when investigating attitudes. Empirical evidence highlights the importance of knowledge during the attitude formation process (Fabrigar, Petty, Smith & Crites, 2006). Campbell and Barger (2011) investigated middle school students' knowledge of autism. The researchers devised a ten-item true/false questionnaire to yield an overall score of students' knowledge pertaining to autism. Students' knowledge was examined across age, grade, school and in relation to students' prior awareness of autism. Results indicated a significant relationship between higher scores on the knowledge of autism questionnaire and reported prior awareness of autism. Campbell, Morton, Roulston and Barger (2011) investigated middle school students'

conceptions of ASD; knowledge was assessed across various aspects related to the disorder; etiologic, core symptoms, associated problems and outcomes. Results indicated that while students were accurate in identifying autism as a type of disability their knowledge regarding aspects of the disorder were lacking in areas such as symptoms and difficulties faced by those with ASD. If students are unaware of what difficulties are faced by their peers with ASD then they may display negative behavioural intentions toward their peers. For example, in a study investigating children's attitudes toward children with either a physical or learning disability it was reported that children displayed more positive behavioural intentions toward the children who had a physical disability compared to the children with a learning disability (Campbell, 2006). As the children with a learning disability had no obvious physical disability the typically developing children were more likely to place the blame of any inappropriate behaviours exhibited on the child themselves as opposed to associating the inappropriate behaviours with an obvious physical disability.

Attitudes and Gender

Rosenbaum, Armstrong, and King (1988) reported sex to be a considerably important factor when examining attitudes toward children with disabilities, with girls displaying more positive behavioural intentions toward children with disabilities compared to boys. With regards to adolescents Gray and Rodrigue (2001) reported girls rated new peers with cancer more favourable compared to boys. To date there are inconsistencies in the literature regarding gender differences in attitudes toward individuals with disabilities. Slininger, Sherrill and Jankowski, (2000) measured attitudes across gender on an intention scale and found girls to have significantly more positive attitudes towards their peers with severe disabilities compared to boys' attitudes toward their peers with disabilities. Nevill and White (2011) investigated the

impact on gender on students' openness toward ASD. Overall there was no significant effect of gender on openness however there were a few group differences on individual items from the scale, based on gender. For example, males reported a greater likelihood to spend their free time with their peer with ASD and males also reported feeling more comfortable around the peer compared to females. Similarly, it was reported that males had significantly more positive attitudes toward peers with ASD (Matthews et., 2015). Therefore, gender may still be considered a significant factor regarding aspects of openness such as level of comfort with the individual or likelihood of engaging with the individual (Griffin, Summer, McMillan, Day & Hodapp, 2012; Nevill & White, 2011). These sex differences regarding gender appear to remain consistent across an individuals' lifespan. For example, Rosenbaum, Armstrong, and King (1988) compared parental ratings of children with disabilities and reported that mothers tended to rate children with disabilities more favourably compared to fathers. Chambers et al. (2008), found female participants reported significantly more positive attitudes compared to male participants However, there was no significant difference across gender for the participants who were provided with the relevant knowledge i.e. informed that the child had ASD. Further research in this area is needed to clarify the role of gender in attitudes toward students with ASD.

Attitudes and Behaviour Prediction

As previously reported attitudes may predict behaviour under certain conditions. Holland, Verplanken and Van Knippenberg, (2002) found that people with very positive attitudes toward Greenpeace were significantly more likely to donate to the cause compared to people with considerably milder positive attitudes. Another factor related to behaviour prediction may be the automaticity of the attitude. As it was noted that strength of an attitude is important, the strength is

related to automaticity. For example, it was reported that if an attitude is elicited automatically upon encountering the object to which the attitude is related then that attitude is significantly more likely to influence the individual's behaviour toward that object (Fazio et al., 1986). Direct experience of an object may also have a considerable impact on peoples' attitudes and it is related behavioural intentions (Hogg & Vaughan, 2011). It is expected that mainstream students and individuals alike now have more direct contact with students with ASD, thus creating stronger attitudes; negative or positive. Research into measuring attitudes and attitude change in the past has focused on the use of direct procedures such as interviews and self-report measures (Hogg & Vaughan, 2011). However, these measures are subject to social desirability effects in that people may answer in such a way they believe will put them in a favourable light in the eyes of the researcher (Hogg & Vaughan, 2011) and reporting in such a way could have a detrimental impact on the validity of a study. These traditional methods of examining attitudes produce information regarding our deliberate and controlled behaviours (Gawronski & Bodenhausen, 2006). Yet people also possess implicit attitudes. This distinction between these two types of attitudes is that implicit attitudes are considered automatic and unconsciously guide behaviour, i.e. individuals cannot control their behaviour (Dovidio, Kawakami, Johnson, Johnson & Howard, 1997; Fazio & Olson, 2003; Greenwald & Banaji, 1995). Similarly, it has been reported that implicit attitudes are attitudes that people may be aware of having but they also attempt to conceal them (Hogg & Vaughan, 2011).

Behavioural predictions can improve if the measures of attitudes are specific (Hogg & Vaughan, 2011), thus if we have a more accurate understanding of an individual's attitude toward a specific disability such as ASD, then specific

interventions or procedures can be put in place to appropriately deal with these attitudes if required. If adolescence is a crucial period for which to intervene on an attitude, then it is imperative that a comprehensive understanding of the attitude is established. Implicit attitudes can be described as unidentified experiences that facilitate desirable or undesirable thoughts or behaviours toward an object (Greenwald & Banji, 1995). Implicit attitude measures were developed to overcome these issues associated with self- report measures (Calanchini, & Sherman, 2013) and explore explicit attitudes. The Implicit Association Test (IAT) is a widely-used measure for assessing indirect attitudes (Greenwald, McGhee, & Schwartz, 1998). The IAT is based on the idea that it should be easier to associate two concepts together when they are in some way similar, for example "tulip" and "love" compared to concepts that are dissimilar, for example "beetle" and "love" (DeHower, 2002). The IAT is a computerised program that measures the strength of an association between a target concept (flower) and an attribute (pleasant). The strength of this association is compared to the strength of an association of a contrasting category (insect) and attribute (unpleasant). Participants complete a number of tasks in which they are presented with the target concepts and attributes. During these tasks participants are required to respond in both a congruent way (flowers/pleasant or insects/unpleasant) and incongruent way (flowers/unpleasant or insects pleasant). An IAT score is produced based on participants' response latencies to the tasks. According to Greenwald et al. (1998) it should be easier for participants to respond to congruent tasks, (flowers/pleasant or insects/unpleasant) and therefore should respond quicker, compared to incongruent tasks (flowers/unpleasant or insects/pleasant), where it will not be as easy for participants to respond to and therefore producing lower response latencies for incongruent tasks, thus indicating a

positive implicit attitude toward flowers compared to insects. A number of studies have demonstrated the effectiveness of the IAT to predict individuals' implicit attitudes (Dasgupta, McGhee, Greenwald, & Banji, 2000; De Houwer, 2002; Greenwald et al., 2002; Swanson, Rudman & Greenwald, 2001). While the IAT is a commonly used measure for assessing implicit attitudes', there are a number of limitations associated with the IAT. One such limitation is that the IAT measures the relative strength of associations (Barnes-Holmes, Barnes-Holmes, Stewart & Boles, 2010). For example, results from the IAT may indicate that both flowers and insects are liked but flowers are more liked, similarly results could indicate that both flowers and insects are disliked but insects are disliked more than flowers (Barnes-Holmes et al., 2010). Therefore, additional methods of assessing implicit attitudes were developed which aimed to test the strength and direction of associations. These methods include the Extrinsic Affective Simon Test (EAST; DeHower, 2003) and the Go/No-Go Association Task (GNAT; Nosek & Banaji, 2001).

The Implicit Relational Assessment Procedure (IRAP)

Another measure which was developed to examine the strength and directions of associations was the IRAP (Barnes-Holmes et al., 2006). The IRAP was developed from relational frame theory (RFT; Hayes, Barnes-Holmes, & Roche, 2001), a behavioural approach to human language and cognition. Behaviour analysis has led to the development of RFT and therefore to a behavioural approach to assessing implicit attitudes.

Verbal behaviour. Skinners verbal behaviour work (1957) was a notable contribution to behaviour analysis. Skinner proposed that the functional relation between a response and the verbal operant were the important elements of language. Essentially the environmental variables that control all other behaviours, also control

language (Cooper, Herron & Heward, 2014). Skinner's account of verbal behaviour has been widely accepted and has been incorporated into interventions for the treatment of individuals (Barnes-Holmes, Barnes-Holmes & Murphy, 2003; Lamarre & Holland 1985; Sundberg & Michael, 2001). However, Skinner's account of language being a learned behaviour has received some criticisms in the literature. Chomsky (1959) argued that initial acquisition of language does not require teaching and that Skinner's theory does not account for the ability of individuals to be able to understand language that has not been previously taught.

Relational Frame Theory (RFT). Relational Frame theory is the study of human language and cognition (Hayes & Barnes-Holmes 2004). In 1971 Sidman discussed the process of stimulus equivalence as the emergence of behaviour in the absence of direct reinforcement of that behaviour. Sidman found that participants were able to respond to nonreinforced stimulus-stimulus relations following reinforced response to other stimulus-stimulus relations. In more recent years there has been evidence to support the finding that there is a strong between stimulus equivalence and language (Barnes-Holmes, Barnes-Holmes, Smeets, Cullinan & Leader, 2004). Early studies examining stimulus equivalence and derived stimulus relations involved training and testing for laboratory induced equivalence classes (Watt, Keenan, Barnes & Cairns, 1991). It was predicted these laboratory induced equivalence classes would be difficult to report and assess due to the natural verbal relations. This study explored the relations between religion associated names and symbols (Watt et al., 1991). Participants were either living in Northern Ireland or were British citizens not living in Northern Ireland. In Northern Ireland individuals have been reported to connect certain family names and symbols with either the Catholic or Protestant religion (Cairns, 1984), but this verbal connection between

names and symbols is rarely found in England. Participants were initially trained to match a Catholic family name to a nonsense syllables, and trained to match the same nonsense syllable to Protestant symbols (Watt et al., 1991). Following this training participants were required complete an equivalence test, whereby participants were required to match the Catholic family names to the Protestant symbols. A number of the Norther Irish participants failed this test but the English participants did not. This indicates that the Northern Irish participants' laboratory induced equivalence relations formation was impacted by previously established verbal relations in the Northern Irish participants. This finding has received further support in a number of areas of research (Barnes, Lawlor, Smeets & Roche, 1996; Dixon, Rehfeldt, Zlomke, & Robinson, 2006; Leslie, et al., 1993; Merwin & Wilson, 2005).

Implicit Relational Assessment Procedure

The IRAP was derived from the core RFT assumption and drew heavily on the work of Relational Evaluation Procedure (REP). The REP presents participants with a task for which they are required to evaluate or report on the stimulus relation that is presented on a given trial (Barnes-Holmes et al., 2006). The IRAP developed its methodological process from the REP. For example, early IRAP studies presented participants with a task in which they were required to evaluate a stimulus relation presented across trials (Barnes-Holmes et al., 2006). The process of conducting an IRAP involves presenting specific relational terms for example similar, opposite, more, less, so that the properties of the relations among the relevant stimuli can be assessed (Barnes-Holmes et al., 2010).

In an early study investigating relations among stimuli attitudes toward autism were assessed (Barnes-Holmes et al., 2006). Participants were divided into three different groups based on the amount of experience participants had working

with individuals with ASD. The two sample phrases used in this study were "Autism Spectrum Disorder" and "Normally Developing". Target words presented with these phrases included Difficult, Negative, Easy and Positive (Barnes-Holmes et al., 2006). In such tasks participants are required and instructed to respond quickly and accurately in ways that are either consistent or inconsistent with their pre-experimentally established verbal relations (Barnes-Holmes et al, 2006). The basic hypothesis for IRAP procedures is that the average response latencies will be shorter across tasks of consistent relative stimuli compared to tasks of non-consistent stimuli. Essentially it states that participants will respond more quickly to tasks that reflect their current attitudes compared to task that do not (Barnes-Holmes, et al, 2006). Response latencies on inconsistent tasks which involved Autism Spectrum Disorder-positive/Normally Developing-negative relations were significantly longer that consistent task across all three groups. However, over the course of the study participants were also required to fill out a number of self-report measures examining attitudes to autism. Results from these questionnaires suggested that there was a statistically significant difference in attitudes toward autism across the three different groups. Those in the two groups with experience of working with individuals with autism reporting significantly more positive attitudes toward autism (Barnes-Holmes et al., 2006). This highlighted the discrepancies between implicit and explicit measures of attitudes, when given the opportunity to answer freely on the self-report measures, participants could answer in a more favourable way, this is possibly related to problems noted previously related to self-report measures.

This study was only the second IRAP study conducted, more recent studies have also demonstrated this discrepancy between the two types of attitudes. Another IRAP study investigated the likability toward other social groups and it examined the

results of both implicit and explicit measures (Power, Barnes-Holmes, Barnes-Holmes, & Stewart, 2009). As with the above study the IRAP revealed that participants indicated a favourable bias toward social groups who are more similar to them, for example IRAP results revealed that Irish participants indicated a strong preference for Irish individuals compared to Scottish individuals, however results from the explicit measures suggested that participants had no preference for any social group. Vahey, Boles and Barnes-Holmes, (2010) reported similar findings when investigating adolescents' social identity preferences to smokers or nonsmokers with the use of implicit and explicit measures. IRAP results indicated that adolescent smokers tended to view smoking as more social acceptable compared to non-smokers. The relational elaboration and coherence (REC) model has been put forward to explain these discrepancies between the two measures (Barnes-Holmes et al., 2010). The REC module postulates that due to the necessary immediacy with responding an immediate relational response is produced. Essentially responses during trial types will be immitted more quickly when required responses are more consistent compared to inconsistent trial types.

To date IRAP studies would suggest that individuals have significantly negative attitudes toward ASD (Barnes-Holmes et al., 2006). In more recent years the IRAP has also been used to investigate professionals' attitudes toward ASD (Kelly & Barnes-Holmes, 2013). All participants were recruited from within the educational sector, they were either ABA tutors or primary school teachers. Surprisingly results revealed that participants had significantly negative attitudes toward ASD, a finding that notably contradicted previous findings regarding adults' attitudes to ASD (Harnum, et al., 2007; Nevill & White, 2011). As mentioned previously explicit measures of attitudes are extremely susceptible to social

desirability effects. Essentially on self-report measures individuals can fake their answers and portray a desirable behaviour intention. This may explain why the above IRAP findings significantly differ to previous findings regarding attitudes to ASD with self-report data.

Research has been conducted on the IRAP to assess if it is possible to fake ones' answers during the procedure. McKenna, Barnes-Holmes, Barnes-Holmes & Stewart, (2007) investigated participants' ability to fake their response on the IRAP. Participants were required to complete an initial IRAP examining relations among relevant stimuli. After completing the first IRAP participants where then informed how the IRAP works, following this explanation a number of participants were asked to fake the next IRAP, of these participants asked to "fake" a number of participants were then given strategies on how to fake an IRAP. Results from the study indicated that neither form of faking instructions had an impact on participants' ability to fake their performance and the effect of the IRAP remained consistent across phases (McKenna et al., 2007). However, it must also be noted that it was not in fact impossible for participants to fake their responses, two participants were able to reverse the effect, this number is extremely small compared to the numbers able to fake in the IAT, thus while suggesting it may be possible to fake it is extremely difficult to do so. To date, while there is a limited number of studies examining implicit attitudes toward ASD, a number of IRAP studies have been conducted in a variety of other areas related to attitude; racial bias (Barnes-Holmes, Murphy, Barnes-Holmes, & Stewart, 2008; Power, 2010), food (Barnes-Holmes, Murtagh, & Barnes-Holmes, 2010) and attitudes toward country life versus city life (Barnes-Holmes, Waldron, & Barnes-Holmes, 2009).

Changing Attitudes

Research is plentiful regarding children's attitudes toward their peers with learning difficulties and effective interventions to foster more positive attitudes (Armstrong, Morris, Abraham & Tarrant, 2017; Triliva, Anagnostopoulou, Hatzinikolaou, Chimienti & Mastorakou, 2009). However, there is a paucity of research regarding the attitudes of adolescent students particularly toward their peers with ASD. As stated previously there is research to suggest that students with ASD experience a number of difficulties in the secondary school environment and thereafter, highlighting the potential need for effective interventions to be established and implemented during this phase of the education cycle. Research suggests that a potentially potential effective method of attitude change is the introduction of an educational intervention (Campbell, 2006; Li, Wu, & Ong, 2014). In further support of an educational intervention to alter attitudes of typically developing peers toward their peers with ASD, Nevill and White (2011) reported that lack of accurate knowledge corresponded with less positive attitudes. Harnum et al., (2007) reported similar findings regarding knowledge; participants were significantly more positive when they were provided with diagnosis information compared to no diagnosis information.

Within educational interventions, the focus should be on abilities of the peers with SEN rather than disabilities to enable highlighting the similarities as opposed to differences between typically developing individuals and individuals with SEN (Campbell, 2006). Lindsay and Edwards, (2013) conducted a systematic review of disability awareness interventions. In this review, it was reported if interventions are to successfully promote positive attitude change they should incorporate elements that aim to improve students' knowledge and understanding of people with disabilities as peoples' perceptions often influence attitude formation. There are

several factors within these interventions that may play a key role in the effectiveness of the intervention (Campbell, 2006). Campbell (2006) investigated the use of persuasive communication to bring about a positive behavioural attitude in typically developing children's attitudes toward their peers with ASD. Persuasive communication focuses on the method of delivery and whom it is delivering the message. With regards to the source of the message researchers have investigated likability, credibility and power (Pornitakpan, 2004). Feldman (1984) reported that sources of greater similarity fostered more favourable attitudes compared to other sources.

Another important factor related to source may be that of power, status and authority (Campbell, 2006). Rosenbaum et al. (1988) reported that in the developmental period of adolescents, individuals are most strongly influenced by their peers. Type of message can also play an important role (Campbell, 2006). Nabors and Larson, (2002) outlined two important factors in the "type" of message used in an intervention; descriptive information and explanatory information. The descriptive element of the intervention should highlight to typically developing students the similarities between themselves and their peers with disabilities. This is based on the cognitive consistency theory which theorises that perceived similarities with others increases attraction (Millar & Tesser, 1989). Bak and Siperstein, (1987) investigated the effect of highlighting similarities between an "unfamiliar" child and a group of typically developing children. Children who reported viewing themselves as more like the "unfamiliar" child were also reported as having greater positive behavioural intentions. Girls and boys do not differ in terms of their behavioural and cognitive attitudes toward ASD when only descriptive information is presented (Campbell et al., 2004; Swaim & Morgan, 2001). However, girls report more

favourable behavioural attitudes when descriptive and explanatory information about autism is presented when compared to descriptive information alone (Campbell et al., 2005).

The use of explanatory information is based on attribution theory (Campbell, 2006). This theory postulates that people assign a cause(s) to behaviour and these interpretations of the "cause" play a vital role in how we respond to this behaviour (Kelley & Michela, 1980). Campbell, (2006) reported that typically developing students were significantly more likely to reject peers with learning difficulties compared to those with physicals difficulties. While Campbell et al., (2005) found there to be a positive effect of explanatory information in changing attitudes there are inconsistencies in the literature. Swaim and Morgan (2001) reported the use of explanatory information to be unsuccessful in altering attitudes. Therefore, this element of the educational intervention needs further examination. How the message is delivered is also an important factor (Campbell, 2006). The literature discusses a number of ways in which the "message" can be delivered; in-vivo presentation, videotape and written materials (Campbell, 2006). Reinke, Corrigan, Leonhard, Lundin and Kubiak, (2004) investigated the impact of different media modalities when attempting to change college students' attitudes toward adults with schizophrenia. No significant difference was found between the use of in-vivo messages and video-presentation methods. Similarly, for changing attitudes toward individuals with ASD no significant difference was reported between the two forms of message delivery (Campbell, 2006).

Effectiveness of Interventions

De Boer, Pijl, Minnaert and Post (2013) investigated the effect of an educational intervention on changing students' attitudes toward students with

disabilities. The intervention detailed the life of girl living with a sister with an intellectual or physical disability. Preliminary findings reported an increase in negative attitudes corresponded with the older age group of students. While the intervention produced significant results in positively altering kindergarten students attitudes the intervention had no effect on the older school population (De Boer et al., 2013). However, this intervention did not focus on one single disability such as ASD, students received an intervention detailing a peer with a physical disability, an intellectual disability or both. This intervention may work best when targeting one specific disability. Similarly, while the intervention explored two different types of interventions, for example, in-vivo or video, the effects of one type of modality were not investigated compared to the other. Finally, there were no considerations put in place regarding "who" delivered the intervention. Li et al. (2014) investigated the impact of a tenweek educational course-based intervention on college student's attitudes toward people with intellectual disabilities. As with other interventions a core aspect of this intervention was to improve knowledge (Campbell, 2006). This intervention significantly increased students' scores in terms of similarity i.e. students rated themselves to be more similar to individuals with disabilities post intervention. This supports the importance of an intervention to improve knowledge regarding ASD when attempting to foster greater positive attitudes toward students' with ASD.

With the increasing successfulness of ABA and EIBI to treat children with ASD it is inevitable that the number of children with ASD attending mainstream education will continue to increase. Likewise, the number of individuals with ASD entering post-secondary education environments is expected to increase. However, individuals with ASD and other disabilities are often met with negative behavioural

intentions. There are discrepancies in the literature regarding the attitudes of students at different stages in the education system and beyond and whether these attitudes are dependent on gender. The purpose of the present study is to add to the current literature regarding attitudes toward inclusion of individuals with disabilities particularly related to ASD. To date research regarding attitudes has predominantly employed the use of explicit measures. Explicit measures are highly susceptible to social desirability and may potentially affect the credibility of results. The current research will therefore seek to further the existing knowledge related to the use of the IRAP as a tool for exploring attitudes.

Current Research

The current research aims to establish and investigate attitudes toward individuals diagnosed with ASD. Given that it has been reported that attitudes are likely to predict behaviour under certain conditions, a number of these conditions were factored into the design of the study. Research related to attitudes is dominated by the use of explicit measures. Both studies will employ the IRAP to further develop existing knowledge on the use of the IRAP when exploring attitudes. Similarly, while explicit measures tend to reveal individuals controlled and intentional behaviours, implicit measures reveal an individuals' automatic and uncontrolled response. Direct experience with an object has also been reported to significantly impact individuals' attitudes and behavioural intentions and will therefore be examined as a factor related in attitudes in the current research. Finally, as it has been reported that behavioural predictions can improve if the measures of attitudes are specific the current research will compare the use of both explicit and implicit measures of attitudes to obtain a more accurate understanding of individuals' attitudes toward ASD. Previous research has predominantly focused on children's attitudes toward a peer with ASD. The first

study will seek to examine adults' attitudes toward ASD. The second study will seek to investigate secondary school students' attitudes toward ASD. Adolescents have been found reported to hold more negative attitudes toward individuals with disabilities compared to adults, therefore this study will also examine the use of an educational intervention to positively alter attitudes toward ASD.

Study 1. This study employed the use of an IRAP to measure adults' attitudes to ASD. Explicit measures were also used for comparison purposes. The following research questions and hypotheses were proposed;

1) Do typically developing, community dwelling adults show implicit and/or explicit negative bias toward students with ASD? (2) Does participant gender or previous contact with individuals with ASD influence attitudes toward ASD? (3) Are there differences between the results found when using implicit versus explicit measures? Based on these questions the following hypotheses were developed; (1) Will adults will have significantly more positive attitudes toward typically developing children compared to children with autism spectrum disorder. (2) Will there will be a significant gender difference across attitudes toward ASD. (3) Will previous contact with ASD affect adults' attitudes toward ASD (4) Will explicit measures report significantly more positive attitudes compared to implicit measures?

Study 2. Study 2 aimed to further expand on the knowledge regarding attitudes' to ASD in a specific population; secondary school students. Adults with ASD are experiencing poor social outcomes in later life. Interventions have successfully altered children's attitudes' toward ASD therefore study 2 incorporated the use of an educational intervention aimed at positively altering attitudes. The following research questions and hypotheses were proposed;

(1) Do typically developing, secondary school students show implicit and/or explicit negative bias toward students with ASD? (2) Does participant gender or previous contact with individuals with ASD influence attitudes toward ASD? (3) Can an educational intervention positively alter secondary school students' attitudes toward ASD? (4) Are there differences between the results found when using implicit versus explicit measures? (1) Will Students attitudes toward typically developing students will be significantly differ compared to attitudes toward students with autism spectrum disorder? (2) Will students' attitudes' toward ASD will significantly differ across gender? (3) Will previous contact with ASD have a significant impact on students attitudes toward ASD. (4) Will an educational intervention significantly alter students attitudes toward ASD? (5) Will results will reveal significant differences for implicit attitude scores compared to explicit attitude scores.

Chapter 2 Study 1

An investigation into adults implicit and explicit attitudes toward Autism Spectrum Disorder

An investigation into adults implicit and explicit attitudes toward Autism

Spectrum Disorder

A significant amount of research has explored and reported on the success of early intervention treatment to enable children with ASD to cope with and be ready for the academic and social aspects of mainstream education (Kovshoff et al., 2011). Research documenting the inclusive experiences of individuals with ASD highlights both academic and social benefits of this process (Col, et al., 2004; Fisher & Meyer, 2002). However it would appear that these benefits do not translate for individuals with ASD in later life (Eaves & Ho, 2008; Gray, et al., 2014). Individuals with ASD may be experiencing these poor outcomes because of the attitudes held by society. For example, families, employment and social supports are suggested to play a vital role in promoting successful inclusion (Billstedt et al., 2005; Gray et al., 2014). Research exploring attitudes towards ASD has predominantly focused on children's attitudes toward their peers with ASD (Campbell et al., 2005; Swaim & Morgan, 2001) and overall it has been reported that these individuals have significantly negative attitude toward their peers with ASD (Harnum et al., 2007).

Research examining the attitudes of community dwelling adults towards people with ASD is limited, with inconsistent findings among those studies conducted. For example, early research suggested that gender differences may exist in relation to adults' attitudes towards ASD (Rosenbaum, et al., 1987), however later studies have reported contrary findings (e.g. Nevill & White, 2011). Prior studies have also suggested that the level of contact or experience adults have with individuals with ASD may be a factor related to attitude formation, in that those with greater experience have more positive attitudes (Gardiner & Iarocci, 2013; Nevill & White, 2011). These studies have utilised explicit measures to investigate attitudes.

However, these findings may not present accurate information regarding attitudes toward ASD. Gregson, et al. (1981) found that self-reported attitudes toward alcohol consumption failed to reliably predict behaviour regarding alcohol consumption.

Similarly, preliminary results from IRAP studies have reported inconsistent findings within the current literature regarding attitudes toward ASD (Barnes-Holmes et al., 2006; Kelly, & Barnes-Holmes, 2013). When attitudes towards ASD were assessed via explicit and implicit measures, implicit measures showed that experience had little effect on reducing biases while explicit measures showed the opposite effect (Kelly & Barnes-Holmes, 2013). To date there is no IRAP research examining typically developing attitudes toward ASD. The current study will contribute significantly to the research literature in this area by examining attitudes of community dwelling adults towards ASD; by assessing gender differences in relation to positive or negative ASD biases; and by examining the impact of the experience of participants with individuals with ASD on attitudes.

Attitude research has largely been dominated by the use of explicit measures i.e. self-report questionnaires. However self-report measures are susceptible to social desirability effects (Hogg & Vaughan, 2011). The use of these measures may lead to biased and misleading results. As outlined previously, researchers are increasingly turning to the use of implicit measurement tools to assess attitudes and biases, particularly those of a sensitive nature, as implicit measures are thought to be less susceptible to the effects of socially desirable responding as a result of the immediacy with which respondents are required to emit a response (Barnes-Holmes, Barnes-Holmes, et al., 2010). The current study will add to existing attitude research by employing an IRAP and a range of questionnaires; and comparing results across

measures to examine both implicit and explicit attitudes of adults towards individuals with ASD.

The IRAP used in the current study consisted of the label stimuli (e.g. Autism Student/ Normal Student) and target stimuli (e.g. difficult/ happy); and aimed to assess adults' attitudes towards students' with and without ASD across four IRAP trial-types (Normal Student-Good/ Normal Student-Bad/ ASD Student-Good/ ASD Student-Bad). Explicit measures used included the Knowledge of Autism Questionnaire, the Openness to Autism Scale and the Attitudes to Autism Scale. Gender differences were compared across the four IRAP trial-types. Demographic information collected from research participants provided information about their level of experience with individuals with ASD. The following research questions and hypotheses were proposed;

1) Do typically developing, community dwelling adults show implicit and/or explicit negative bias toward students with ASD? (2) Does participant gender or previous contact with individuals with ASD influence attitudes toward ASD? (3) Are there differences between the results found when using implicit versus explicit measures? Based on these questions the following hypotheses were developed; (1) Will adults will have significantly more positive attitudes toward typically developing children compared to children with autism spectrum disorder. (2) Will there will be a significant gender difference across attitudes toward ASD. (3) Will previous contact with ASD affect adults' attitudes toward ASD (4) Will explicit measures report significantly more positive attitudes compared to implicit measures?

Method

Participants/ Setting

Forty-seven participants were recruited for this study. For the purposes of data analysis, data from 41 participants were included as 6 participants failed to meet the predefined pass criteria on the IRAP (see procedure section). The final sample consisted of 41 participants (28 females and 13 males, Mage = 30.93, age range: 18-56). Participants were recruited through means of convenience sampling and were recruited within the Dublin area. It should be noted that as a result of convenience sampling a large number of participants were known to the researcher. Such methods of recruitment may have had an impact on the results of the study as participants attitudes toward ASD may have been biased as a result of their contact with the researcher. However, given the need to recruit participants from a number of occupations so as to ensure a representative sample of the adult population convince sampling was the most desirable method of participant recruitment. Experimental procedures were conducted in a quiet room in the researcher's home or in the participants' homes with the door closed to ensure minimal noise distraction.

Design

The research was conceptualised as a mixed between-within participant design. The between participant independent variable (IV) was gender (male and female); and the within participant IV was IRAP trial-type (Normal Student-Positive, Normal Student-Negative, Autism Student-Positive, Autism Student-Negative). The dependent variable was participant responses (D-scores and responses on explicit measures).

Apparatus/Materials

Demographic questionnaire. This questionnaire required participants to provide information such as age, gender, occupation, if they knew someone diagnosed with Autism Spectrum Disorder and to state the level of contact if applicable (See Appendix 1).

The Knowledge of Autism Questionnaire (KAQ; Campbell and Barger, 2011, see Appendix 2). This is a ten-item true/false questionnaire designed to measure students' knowledge of the course, symptoms and communicability of autism. It presents 10 statements for which the participants must indicate whether they are true or false. Internal consistency for the KAQ scale is low with Cronbachs α = .47.

The Openness to Autism Scale (OAS; Nevill and White, 2011, see Appendix 3). The OAS is a modified version of the Openness Scale (Harnum, Duffy & Ferguson, 2007) is designed to examine students' willingness to be educated alongside a peer with ASD. For the purpose of the current study the questionnaire was amended to be applicable for adult participants in employment (see Appendix 4). This questionnaire presents a short scenario for participants to read. This scenario describes the life of a student with ASD. After reading the scenario participants must answer 7 statements based on the scenario. These statements are to be rated on a five-point Likert Scale (i.e. Strongly Disagree, Disagree, Don't Know, Agree, Strongly Agree). The OAS has been found to have a moderate/high internal consistency with Cronbachs α = .77.

The Attitudes to Autism Scale (AAS; Barnes-Holmes et al., 2006, see Appendix 5). The AAS consists of ten statements in relation to children with autism or normally developing children; participants are required to rate their level of

agreement with these statements on a scale of 1 to 5 (1=Strongly Agree   2= Agree

3= No Opinion 4= Disagree 5= Strongly Disagree).

The Implicit Relational Assessment Procedure (IRAP; Barnes-Holmes, et

al, 2009). The IRAP is a computerised program written in Visual Basic 6.0, designed

to investigate response latency on the presentation of the stimuli. In all instances of

data collection, the IRAP was conducted on a personal Toshiba laptop. The IRAP

program presented all stimuli and automatically recorded the correct and incorrect

responses for all participants. The IRAP also measured the duration between the

onset of the stimuli and the participants' response. The stimuli presented by the

IRAP comprised of six "positive" characteristics (e.g., Happy, Calm, Intelligent etc.)

and six "negative" characteristics (e.g., Sad, Difficult, Mean etc.), and the two labels,

"Normal Student" and "Autism Student". In addition, the words "True" and "False"

were presented as response options. These stimuli were selected based on pilot work

conducted before the current study and based on previous IRAP stimuli. The

stimulus arrangements and word groups employed in the current study are presented

in Table 1.

Table 1. *Stimulus Arrangements and Word Groups Presented by the IRAP*

Normal Student Targets deemed consistent with Sample 1	Autism Student Targets deemed consistent with Sample 1
Happy	Sad
Calm	Angry
Intelligent	Unintelligent
Good	Bad
Friendly	Mean
Easy	Difficult
Response Option 1 True	**Response Option 2** False

Ethical considerations

A research proposal was submitted for ethical approval to the Department of Ethics Sub Committee in Maynooth University, and approved January 2016. The researcher adhered to relevant ethical principles and guidelines during all aspects of participants' recruitment and experimental procedures. All participation was voluntary and conducted only with participants' informed consent. The researcher ensured all participants of data confidentiality and their right to withdraw from the study. This information was reiterated on the participants' information sheet (See Appendix 6 for information sheet/consent form). In return for participation, the researcher provided participants with a chance to enter into a raffle to win a small prize; all participants received a raffle ticket whether or not they completed all research procedures. When the research was complete, participants were thanked and fully debriefed (see Appendix 7 for debriefing sheet).

Procedure

Prior to commencing data collection procedures participants were provided with a brief information sheet/consent form which detailed the aims and experimental procedures pertaining to the current study. Upon reading the information sheet participants were required to sign a consent form. Participants were then provided with a demographic questionnaire.

Explicit Measures. Upon the return of completed consent forms and demographic questionnaires experimental procedures commenced. Participants' were first provided with the three questionnaires (KAQ, OAS and AAS). For the KAQ participants were asked to circle the answer they felt most accurate. For the OAS and AAS participants were informed that there was no right or wrong answer but that they should circle or rate the answer according to the most appropriate response for themselves on each statement. On completion of all three questionnaires participants

were asked if they wanted to take a short break before commencing the next stage of data collection and if they agreed to continue on to the next phase.

Implicit Relational Assessment Procedure (IRAP). Prior to conducting the IRAP the experimenter explained to each participant what the IRAP task would entail. As participants need an 80% pass rate it is essential that participants fully understand the IRAP task. The experimenter followed the instructions protocol provided in the IRAP manual (Version 1.6 Ian Hussey). The same instructions protocol was used with all participants. Following the run through of the instructions the experimenter asked each participant if he or she understood what was required of them to complete the IRAP task. All participants were exposed to practice blocks before formal IRAP testing commenced. Each participant was informed that the practice blocks had to be successfully completed before progressing to the test blocks. If participants were unsuccessful in achieving the required criteria in one or both practice blocks (i.e. 80% correct and < 2000 ms to respond), feedback informed them that they had to carry out the practice blocks again. If participants failed to reach the criteria after the fourth exposure to the pairs of practice blocks (i.e. eight blocks in total) text appeared on the screen indicating the end of the experiment. At this point, the participant was thanked and debriefed. If participants reached the required performance criteria for each of the two blocks, they commenced the test blocks. Information was presented onscreen to the effect that the participant was about to begin the test blocks.

On each IRAP trial, in both test and practice blocks, the sample stimuli (Normal Student or Autism Student), one of the twelve target stimuli and both response options (True or False) were presented simultaneously on the computer screen. Participants were required to choose the correct response option by pressing

either the "d" key (True) or the "k" key (False) on the computer or laptop key board. Only upon choosing the correct response option the stimuli would be removed from the screen and the next trial was presented. Should the participant have chosen the incorrect response option then a red X would appear on the screen directly underneath the target stimulus. This X would only disappear when the correct response was chosen. Upon choosing the correct response the X along with the stimuli would disappear and the participant would then be presented with the next trial. If a participant failed to respond within 2000ms from the start of a trial the words "Too Slow" appeared under the target word and remained on the screen until a response (correct or incorrect) was emitted.

During all trial blocks participants were required to answer in a way that was either consistent or non-consistent with the sample stimuli. Participants were informed on how to answer from a rule that was presented to them on the computer screen. One of two rules ("Please answer as if Normal Student Positive and Autism Student Negative" or "Please answer as if Normal Student Negative and Autism Student Positive") was presented on the screen prior to the presentation of the trial block. Upon reading this rule participants were required to press the space bar on their keyboard so as to enable the presentation of the test block. During consistent trial blocks if the sample stimulus "Normal Student" was presented with positive target stimuli i.e. "Happy" the designated correct response involved choosing the response option "True". Should participants have selected the response option "False" this would have been deemed incorrect and the red X would have appeared. However, if the sample stimulus during the consistent block was "Autism Student" and a positive target stimuli i.e. "Happy" was presented then the designated correct response was "False". In this instance choosing "True" would have been deemed

incorrect and the red X would have appeared. Similarly, during inconsistent trial blocks if the sample stimulus Normal Student was presented with a positive target stimulus i.e. "Happy" the designated correct response option was "False". Similarly, during inconsistent trial blocks if the sample stimuli "Autism Student" was presented with a positive target stimulus i.e. "Happy" the designated correct response option was "True" (See Figure 1 for example of consistent and inconsistent test blocks). Following the completion of each trial block feedback was presented on the screen.

This feedback indicated the participants' percentage of correct responses and the median response time in milliseconds for that block. Following the presentation of feedback the rule which had not been presented in the previous block was now presented to the participant on the computer screen. Order of presentation of consistent and inconsistent trial blocks was counterbalanced across all participants. Following the completion of all test blocks the end of the experiment was signalled by a blue a screen with the instruction *"Please notify the researcher"*.
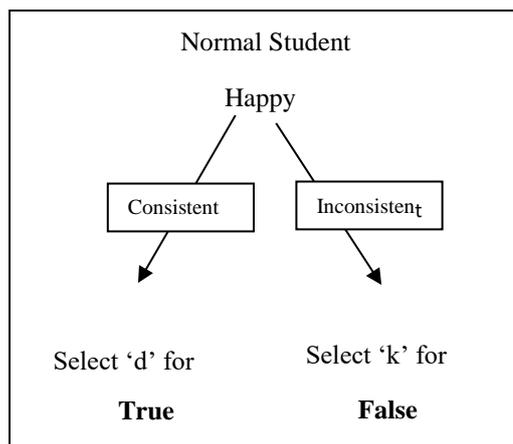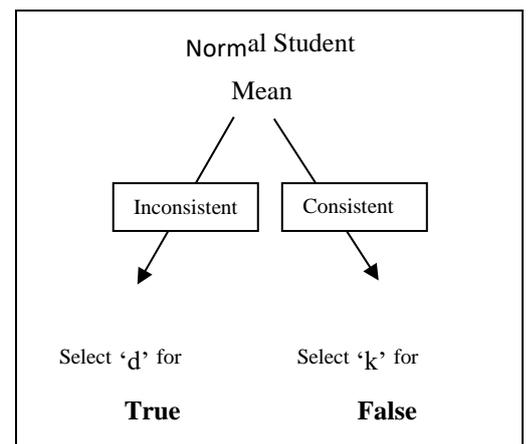
Normal-Positive trial-type   *Normal-Negative trial type*
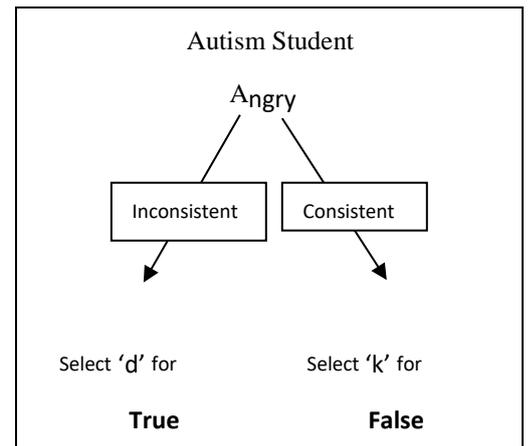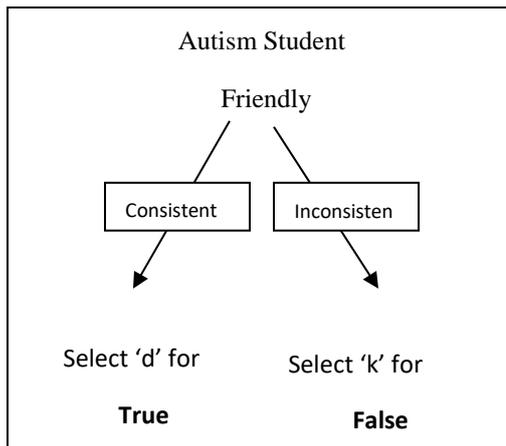
Autism –Positive trial-type   Autism-Negative trial-type

Figure 1. *Examples of consistent and inconsistent test blocks*

Including the practice trials the IRAP experimental procedure consisted of a minimum of two practice blocks and a fixed set of 6 practice blocks. Each block consisted of 24 trials with each of the twelve target stimuli presented in a quasi-random sequence. All the target stimuli were presented once with each of the sample stimuli "Autism Student" and "Normal Student". As a result, four trial types were yielded from the IRAP; *Normal Student-Positive, Normal Student-Negative, Autism Student-Positive, Autism Student-Negative*. Following the completion of the IRAP participants were fully debriefed (see Appendix) and thanked for their participation in the research.

Interobserver Agreement

Following experimental procedures Interobserver agreement (IOA) was calculated to determine the believability of the data. This was achieved by comparing independent observations from explicit measures across two or more people. The IOA scoring for the KAQ scores was calculated using the scoring sheet as used by Campbell and Barger (2010) (see Appendix 8). The scores for each participant were

added together to obtain an overall total score for the KAQ. An independent observer also carried out these calculations. To obtain an IOA percentage the researchers total score for the KAQ was divided by the independent observers total score for the KAQ with the outcome multiplied by 100. The OAS was calculated using the scoring sheet as used by Nevill and White (2011) (see Appendix 8). To obtain an IOA score the method was carried out as detailed for the KAQ. The IOA for the OAS scores was calculated using the scoring sheet as used by Nevill and White (2011) (see Appendix 9). The IOA for AAS scores was calculated using the scoring sheet as used by Barnes-Holmes et al., 2006 (see Appendix 9). IOA was calculated by dividing the total number of agreements by the total number of explicit measures and multiplying by 100. Due to the nature of the IRAP i.e. the IRAP program calculates and provides the *D*-IRAP scores it is not necessary to calculate IOA.

Results Implicit Relational Assessment Procedure Analysis

The primary datum was response latency which can be defined as the time in milliseconds (ms) between the onset of the trial and a correct response emitted by participants. For each participant, the response latency data was transformed into *D*-IRAP scores (Barnes-Holmes, Barnes-Holmes, et al., 2010; Cullen & Barnes-Holmes, 2008). This data is an adaptation of the *D*-algorithm developed by Greenwald, Nosek and Banaji (2003). The following steps were undertaken to calculate the *D*-IRAP scores. (1) Response latency data from the test blocks were used; (2) any latencies above 10,000ms were removed; (3) if any data contained latencies less than 300 ms on more than 10% of test blocks they were removed; (4) 12 standard deviations for the four trial-types were calculated: four for the response latencies from test blocks 1 and 2, four from the latencies from test blocks 3 and 4, and four from the latencies from test 5 and 6; (5) From the four-trial types in each

test block, 24 mean latencies were calculated; (6) difference scores for each of the four trial-types were calculated for each pair of test blocks by subtracting the mean latency of the *Autism Student – Positive* test block from the mean latency of the corresponding *Autism Student – Negative* test block; (7) the difference scores were then divided by its corresponding standard deviation from step 4, yielding 12 *D*-IRAP scores, one score for each trial-type for each pair of test blocks, (8) four overall *D*-IRAP scores were calculated by averaging the three scores for each trial-type across the three pairs of test blocks. (9) two *D*-IRAP scores, one for *Autism Student -Positive* and one for *Autism Student -Negative* were then calculated by averaging the two autism trial types and the two normally developing trial types; (10) an overall *D*-IRAP score was then calculated by averaging all 12-trial type *D*-IRAP scores from step 7. Given the foregoing data transformation, positive *D*-scores indicated a stereotype consistent pattern of responding (i.e. Normal Students-Positive/ Autism Students-Negative) while negative *D*IRAP scores indicated a stereotype inconsistent pattern of responding (i.e. Normal Students Negative/ Autism Students-Positive). See Figure 2. Mean *D*-IRAP scores and standard deviations along with *t*-values and p-values from one sample *t*-tests can be seen in Table 2.
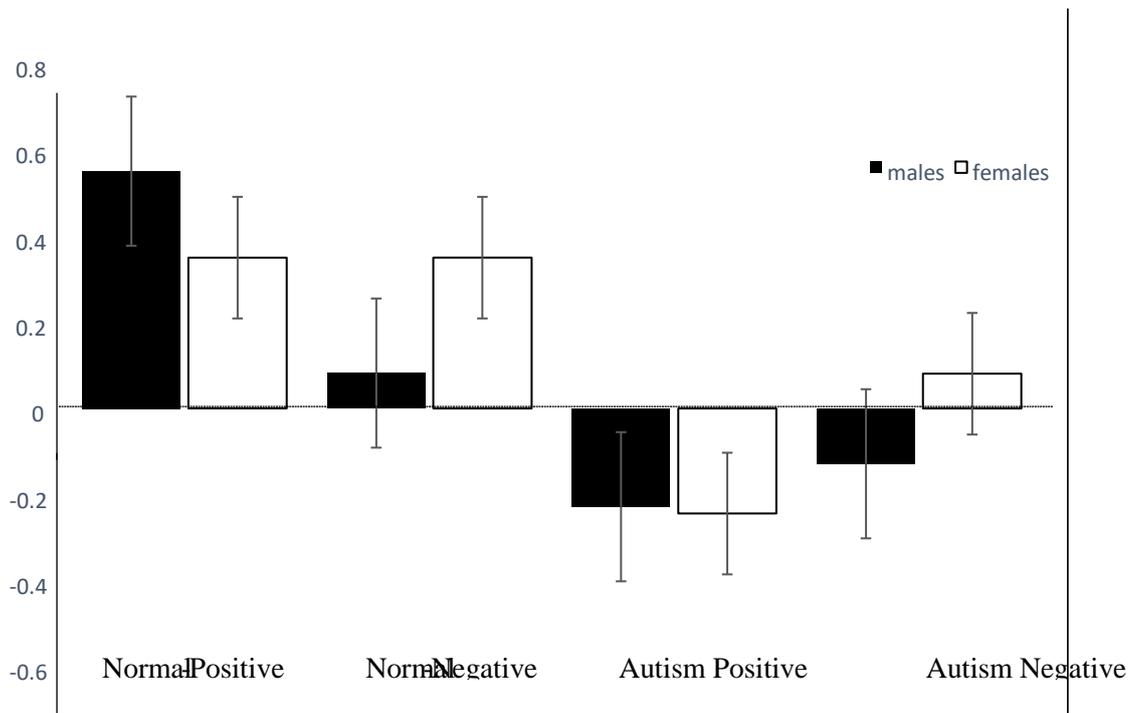
Figure 2. Graph shows Mean *D*-IRAP scores with standard error bars representing participants' responses on the four IRAP trial-types. Positive *D*-scores (above the x-axis) represent Normal-Positive/Autism-Negative responses; negative *D*-scores (below the x-axis) represent Normal-Negative/ Autism-Positive responses.

For the purposes of statistical analysis in SPSS, *D*-scores from IRAP trial-types 3 and 4 were inverted in accordance with recommendations by Hussey et al. (2015). One sample *t*-tests were conducted to determine the strength of the IRAP effect across trial-types. Results indicated a significant difference from zero for Normal-Positive, $t(40) = 7.951$, $p < 0.001$, Normal-Negative, $t(40) = 3.097$, $p = 0.004$, and Autism-Positive, $t(40) = 4.091$, $p < 0.001$ but not for Autism-Negative ($p = 0.827$). See Table 2.

A 2x4 analysis of variance (ANOVA) was conducted to examine the effect of gender across the four IRAP trial-types. Trial type was the within participant variable and gender (males versus females) was the between participant variable. The main effect for trial-type was significant $F(3, 39) = 8.948$, $p < 0.001$, partial eta squared = 0.187. Pairwise comparisons revealed significant differences between Normal-

Positive versus Normal-Negative, *p*= 0.002; Normal-Positive versus Autism-Positive, *p*= 0.018; and Normal-Positive versus Autism-Negative, *p*<0.001.

There was no significant interaction effect between trial-type and gender $F(3, 39) = 1.901$, *p*= 0.133, partial eta squared = .046, and no significant main effect for gender $F(1, 39) = 1.070$, $p = 0.307$, partial eta squared = .027.

Table 2. *Descriptive Statistic, mean and standard deviation IRAP scores*

	Males (*n*=13)		Females (*n*=28)		Total (n=41)	
D-IRAP Scores	*M*	*SD*	*M*	*SD*	*t*	*p*
Normal-Positive	.55	.38	.35	.29	7.951	.000
Normal-Negative	.08	.19	.209	.39	3.097	.004
Autism-Positive	.23	.35	.244	.39	4.091	.000
Autism-Negative	.13	.33	-.086	.437	-.220	.827

Note: t-values calculated using one sample t-tests to test significance from zero.

Explicit Measures Analysis

Participants mean and standard deviation scores for all explicit measures are presented below in Table 3. Independent sample *t*-tests were conducted to determine gender differences on each of the explicit measures. Results revealed no significant differences for males versus females on the KAQ, $t = -0.010$, $df = 39$, $p = .992$; on the OAS, $t = -1.750$, $df = 39$, $p = .088$; or on the AAS, $t = -1.407$, $df = 39$, $p = .167$.

Table 3. *Descriptive Statistics for Explicit Measures*

	Males (n=13)		Females (n=28)	
Explicit Measures	*M*	*SD*	*M*	*SD*
Knowledge of Autism	9.46	.66	9.46	.92
Openness to Autism	30.15	2.94	32.07	3.4

	33.46	5.6	36	5.29
Attitudes to Autism				

Note: Max score for KAQ= 10; max score for OAS= 40; max score for AAS= 50

Interobserver Agreement

Interobserver agreement (IOA) for the explicit measures was assessed with an independent observer. IOA was calculated at 100% for all explicit measures. Due to the nature of the IRAP i.e. the IRAP program calculates and provides the *D*-IRAP scores, therefore it is not necessary to manually calculate IOA.

Correlational analysis

Preliminary analysis confirmed that data did not violate assumptions of normality, linearity and homoscedasticity. Pearson product-moment correlation coefficient was used to examine relationships between explicit measures, implicit measures and level of contact with ASD. All four *D*-IRAP scores were entered into a correlation matrix with the scores from the three explicit questionnaires and the level of contact. There was a significant positive correlation between the OAS and AAS, *r* = .442, *n* = 41, *p* = .004; there was a significant positive correlation between the Autism-Positive and Normal-Positive trial-types, *r* = .327, *n* = 41, *p* = 0.037; there was a significant positive correlation between KAQ scores and the Autism-Positive trial-type, *r* =.373, *n* = 41, *p* = 0.016; there was a significant positive correlation between OAS scores and level of contact with ASD, *r* = .363, *n* = 41, *p* = .02; finally, there was a significant positive correlation between the Normal-Negative trial-type and level of contact with ASD, *r* = .386, *n* = 41, *p* = .013.

Demographic Questionnaire

Brief demographic analysis was conducted to explore the impact of contact with an individual with ASD on attitudes. The majority of participants had either "no contact" (35.7% females, 38.4% males) or contact "less often" (17.8 females, 38.4

males) with an individual with ASD. The highest level of contact reported by males was 3-4 times per month (15.3%). Females had the most contact overall, reporting daily (14.2%) and weekly (24.9%) contact with individuals with ASD. See Table 4

Table 4. *Percentage of contact of participants with individuals with ASD*

Level of Contact	Males *n* = 13	Females *n* = 28
No contact	38.4%	35.7%
Less Often	38.4%	17.8%
3-4 times/month	15.3%	7.1%
2-3 times/week	0%	3.5%
3-5 times/week	0%	21.4%
Daily basis	0%	14.2%

Results Summary

Overall the results showed that participants had a significant pro-Normal bias on both the Normal-Positive and Normal-Negative trial-types; and a significant pro-Autism bias on the Autism-Positive trial-type. While participants were reported to have positive attitudes toward both "normal student" and "autism student" pairwise analysis revealed that participants were significantly more positive toward "normal student" compared to "autism student". There were no significant differences between males and females, and no significant interaction between gender and trial-type. Analysis of explicit measures showed that overall, participants had high mean ratings for the KAQ, OAS, and AAS, indicating high levels of knowledge and openness to autism, and positive attitudes. Females had slightly more positive attitudes to autism than males but these differences were not significant. Correlational

analysis revealed a significant positive correlation between KAQ scores and the Autism-Positive trial-type, indicating that higher explicit ratings of knowledge of autism was related to a more positive implicit bias towards individuals with autism. A strong positive relationship was also reported between OAS scores and level of contact with ASD, indicated that greater openness toward ASD was related to greater levels of contact with ASD.

Discussion

The current research aimed to investigate adults' attitudes toward ASD using both implicit and explicit measures. The research examined differences between implicit versus explicit biases in relation to ASD; and conducted a gender analysis to determine whether responses differed across males and females. Attitudes towards students with ASD were assessed using the IRAP and explicit measures including the KOA, OAS and AAS. Demographic information was also gathered to examine the profile of participants and to determine if certain participant characteristics were related to attitudes. Correlational analysis investigated any relationships between implicit and explicit measures. Overall result indicated that participants showed significant pro-Normal Student and pro-Autism Student biases. Pro-Autism biases were also demonstrated on the explicit measures. This finding supports existing research literature related to adults' explicit attitudes towards individuals with ASD (Harnum, Duffy, & Ferguson, 2007; Nevill & White, 2011). The findings in Study 1 however contradict prior IRAP research that found negative biases towards ASD (Barnes-Holmes et al., 2006; Kelly & Barnes-Holmes, 2013). However, the current study had a notably diverse participant sample in relation to occupation whereas past IRAP studies have recruited substantially more comparable groups in terms of occupation. For example, the previous IRAP studies investigated differences among

individuals in teaching professions. Kelly and Barnes-Holmes, (2013) investigated ABA tutors' attitudes' toward ASD compared to primary school teachers' attitudes. It should be noted that while participants in the current study were reported to have positive attitudes toward both "normal student" and "autism student" pairwise analysis revealed that participants were significantly more positive toward "normal student" compared to "autism student". This suggests that there may still be a slight negative bias toward ASD and that typically developing individuals might not be as inclined to engage in social interactions with individuals with ASD compared to typically developing individuals. As previously mentioned it may not be feasible to compare the results from the current study to previous IRAP research as a result of differences in participant characteristics (Kelly & Barnes-Holmes, 2013). However, while the participant sample within the current study may be considered more comparable to other IRAP studies (Barnes-Holmes et al., 2006) the duration of time that has passed since this study was conducted should be considered when comparing results. For example, as stated previously the number of children entering the mainstream education system is increasing each year. This increased number of students with ASD in mainstream education settings may have resulted in increased contact with ASD which in turn, may have resulted in fostering more positive attitudes among typically developing individuals within society today.

When comparing the results to additional IRAP studies (Barnes-Holmes et al., 2006) it should also be considered that given the number of years that have passed the lapse in time since this study was conducted may have resulted in the contrasting findings. Gender analysis revealed no significant differences between male and female attitudes toward ASD across each of the four trial-types. There were also no gender differences in participants attitudes toward ASD reported for the

explicit measures. Although this is consistent with some previous research (Nevill &
White, 2011), it also contradicts studies which have reported females to have
significantly more positive attitudes towards vulnerable groups compared to males
(Gardiner, & Iarocci, 2011; Gray & Rodrigue, 2001; Rosenbaum et al., 1998;
Slininger, Sherrill & Jankowski, 2000). It should be noted that the current study
recruited a disproportionate gender sample of females to males (28:13). This is the
first IRAP study to examine attitudes towards ASD that included a gender analysis
(e.g.Barnes-Holmes, et al., Kelly, & Barnes-Holmes, 2013). Although no differences
resulting from gender were reported, the research was preliminary in nature, and
notably had unequal numbers of males and females. Future IRAP studies should aim
to manipulate a gender balanced sample before firm conclusions can be drawn
regarding gender effects.

Correlational analysis revealed a significant positive relationship between
KAQ scores and Autism-Positive trial-type. This suggests that individuals who had a
higher degree of knowledge regarding autism also had more implicit positive biases.
This supports the literature reporting knowledge to be an important factor related to
ASD (Campbell, & Barger, 2011) A positive relationship was also reported between
OAS scores and AAS scores, suggesting that those who have higher levels of
acceptance of individuals with autism have more positive biases toward ASD.
Results from correlational analysis also revealed a significant positive relationship
between OAS scores and level of contact. This suggests that participants with a
greater openness toward ASD also report a strong level of contact with ASD. Nevill
and White (2011) found that participants who reported having a family member with
ASD were significantly more positive toward ASD. Finally, a positive relationship
was also found between Normal-Positive trial-type and Autism-Positive trial-type.

Interestingly this would suggest that individuals who have significantly positive attitudes to "Normal" individuals may also demonstrate positive attitudes toward ASD populations and likewise other vulnerable populations.

The overall positive attitudes towards students with ASD reported in this study is a somewhat surprising but promising result. The findings may indicate that typical stereotype "Autism Students are Negative" might not be as prevalent as previously suggested. Campbell, (2006) reported that attitudes toward individuals with ASD improve with age therefore, it would be important to determine whether mainstream secondary school students hold similar positive attitudes, particularly considering that the integration of ASD students into mainstream schools in Ireland is becoming more prevalent (IAA, 2015). The second study aims to address this question by investigating secondary school students explicit and implicit attitudes. Previous research has highlighted the difficulties students with ASD can experience in an inclusive mainstream setting (Jones, & Frederickson, 2010), similarly it has been reported that the attitudes of typically developing peers toward ASD may have a significant impact regarding the inclusion of students with ASD (Tonnsen, & Hahn, 2016). Therefore study 2 will also investigate secondary school students' implicit and explicit attitudes toward their peers with ASD and examine the impact of an educational intervention on students' attitudes. Additionally Study 2 will aim to meaningfully contribute to the current literature regarding secondary school students' implicit attitudes toward peers with ASD. Regarding attitudes to ASD Study 2 will be the first IRAP study to investigate gender differences across secondary school students' attitudes.

Chapter 3 Study 2

An investigation into secondary school students implicit and explicit attitudes toward their peers with ASD

An investigation into secondary school students implicit and explicit attitudes toward their peers with ASD

The findings from Study 1 indicated that typically developing community dwelling adults had positive implicit and explicit attitudes towards typically developing students and students with ASD. Based on the findings of prior IRAP studies examining ASD biases (Barnes-Holmes et al., 2006; Kelly & Barnes-Holmes, 2013), it was somewhat unexpected to find that participants would show a significant positive bias towards ASD, when previous IRAP studies reported adults to have significantly negative attitudes toward ASD. It has been reported however that adults are better able to understand alterative perspectives resulting in increased openness to diversity, (Balswich, King, & Reimer, 2005). In a study comparing adults' attitudes toward ASD and children's attitudes toward ASD, adults were reported to have significantly more positive attitudes toward ASD compared to children (Harnum et al., 2007). Therefore, research regarding adolescents' implicit attitudes may not report consistent results with the findings from the current study. Similarly, research suggests that adolescents may be less inclined to interact with peers with ASD as they have entered a stage in their development where they are better able to differentiate the behavioural differences between themselves and others (Rotheram-Fuller, Kasari, Chamberlain & Locke, 2010). In a study investigating attitudes toward inclusion of students with SEN middle school students reported not wanting to interact with students with SEN (Siperstein, Parker, Bardon and Widaman, 2007). These findings suggest that adolescents may hold quite negative attitudes toward their peers with ASD. Considering the significant lack of research regarding adolescents implicit and explicit attitudes toward ASD within the Irish context and the previous research to

suggest that adolescents may hold negative attitudes toward ASD this highlights the necessity to continue research in this area.

Interestingly, a key factor pertaining to successful inclusion for students with SEN is the role of the typically developing peer (Joanes & Frederickson, 2010). Tonnsen and Hahn, (2016) reported that perceived attitudes of typically developing peers' attitudes toward peers with ASD significantly impacted self-reported attitudes among adolescents. Essentially if participants perceived their typically developing peers' attitudes to be positive then they would self-report more positive attitudes. However, if students perceive their peers to have negative attitudes toward peers with ASD then this could lead to significantly negative attitudes among secondary school students which may in turn result in significantly negative experiences for students with ASD. Therefore, it is essential to gain an accurate understanding of secondary school students attitudes toward ASD.

Unfortunately, there is a significant lack of research regarding adolescents' implicit attitudes toward ASD. Previous research has focused on university students and teachers' attitudes (Barnes-Holmes et al., 2006; Kelly, & Barnes-Holmes, 2013). To date research regarding adolescents' attitudes has depended largely on the use of explicit measures. As previously mentioned these measures may be subject to socially desirable responding and therefore may not provide the most accurate assessment of adolescents' attitudes. For this reason, research is required to examine implicit biases to determine a more comprehensive understanding of adolescents' attitudes. For this reason, the current research will examine secondary school students implicit and explicit attitudes toward their peers with ASD using the IRAP and explicit measures.

Meaningful relationships are considered to be one of the important elements related to a attaining a good quality of life for individuals with ASD (Bishop-Fitzpatrick, Hong, Smith, Makuch, Greenberg & Mailick, 2016). Researchers have found that attitudes of typically developing peers play an important role in fostering meaningful relationships, and promoting positive social and academic outcomes for students with ASD (Lynch, Lerner & Leventhal, 2013). Importantly, research suggests that peer interventions significantly promoted social interactions with peers for students with ASD (Owen-DeSchryver, Carr, Cale & BlakeleySmith, 2008). This indicates that interventions aimed at school-aged peers may produce positive outcomes for students with ASD. The current study will investigate the effectiveness of an educational intervention targeted at positively altering secondary school students' attitudes towards students with ASD.

Research is limited regarding what constitutes an effective intervention to address adolescent biases towards ASD populations. However prior studies have indicated that in general, interventions should include information that focuses on abilities as opposed to disabilities (Frese & Yun, 2007). The current study utilized a descriptive information only i.e. a number of similarities will be highlighted between typically developing individuals and individuals with ASD, educational intervention as previous interventions employing explanatory information (Swaim, & Morgan, 2001), failed to significantly alter students' attitudes. In addition, as adolescents have been reported to be significantly influenced by their peers (Rosenbaum et al., 1988; Tonnsen, & Hahn, 2016) the source of the intervention message will be delivered by an adolescent.

Study 2 will assess the effectiveness of the intervention using the IRAP and explicit measures at both baseline and post-intervention. Explicit measures will

include measures of attitudes toward ASD and measures of knowledge regarding ASD. Accurate knowledge has been reported as being directly related to attitudes (Fabrigar, Petty, Smith & Crites, 2006), similarly knowledge has been reported as factor directly related to attitudes toward ASD, therefore knowledge will be assessed both pre-and post the educational intervention. To date there are a number of inconsistencies regarding gender and attitudes toward ASD. Study 1 was the first IRAP study to examine gender regarding attitudes toward ASD. Overall findings reported that there were no significant differences within gender and attitudes overall were significantly positive. While these are very positive findings they are also inconsistent with previous explicit attitude literature (Campbell, 2006; Harnum et al., 2007) therefore study 2 will also employ a gender analysis. Overall the current research aims to investigate secondary school students attitudes toward their peers with ASD in relation to a number of factors.

The following research questions and hypotheses were proposed;

(1) Do typically developing, secondary school students show implicit and/or explicit negative bias toward students with ASD? (2) Does participant gender or previous contact with individuals with ASD influence attitudes toward ASD? (3) Can an educational intervention positively alter secondary school students' attitudes toward ASD? (4) Are there differences between the results found when using implicit versus explicit measures? (1) Will Students attitudes toward typically developing students will be significantly differ compared to attitudes toward students with autism spectrum disorder? (2) Will students' attitudes' toward ASD will significantly differ across gender? (3) Will previous contact with ASD have a significant impact on students attitudes toward ASD. (4) Will an educational intervention significantly alter

students attitudes toward ASD? (5) Will results will reveal significant differences for

implicit attitude scores compared to explicit attitude scores.

Matters arising in Study 2

In the current study, 15 participants failed to reach the IRAP criterion of >80% correct in <2000ms (Barnes-Holmes et al., 2010) in the test blocks of the pre-intervention IRAP. As participants received the educational intervention and post-intervention IRAP in quick succession to the pre-intervention IRAP, it was not feasible to monitor performance criteria and re-present practice blocks, as suggested by Vahey et al (2009). Traditionally in IRAP research when participants fail to meet criteria their data are excluded from the analysis (Bast, Barnes-Holmes & Barnes-Homes, 2015; Power, 2010). This often leads to high attrition rates in IRAP studies. According to Nicholson, Hopkins-Doyle, Barnes-Holmes and Roche, (2014) a review of the IRAP literature indicated that on average 15-22% of participants are excluded from data analysis through failure of participants to meet IRAP criteria. This review also revealed that a number of studies have reported exclusion of up to 50% of participants (Nicholson et al., 2014).

Hussey (2012) acknowledged that high attrition rates are common in IRAP research, and proposed a specific set of instructions in an attempt to deal with this limitation, provided in the IRAP manual (Version 1.6 Ian Hussey). Attrition rates were found to be high with particular populations e.g. elderly populations (Kane, 2016). Similarly, Barnes-Holmes, Barnes-Holmes, Stewart and Boles (2010) reported that IRAP criteria may be adjusted if necessary to facilitate a particular participant sample. Vahey, Barnes-Holmes, Barnes-Holme and Stewart, (2009) also reported participants experienced difficulties attaining the strict IRAP criterion. In an attempt to avoid high attrition rates Kane (2016) altered IRAP inclusion criteria for an older population. However, adjusting IRAP criteria notably reduced the IRAP effect. The current study recruited a notably under studied population within the IRAP literature.

It is possible adolescents would require adjusted IRAP inclusion criteria. To avoid adjusting IRAP criteria and therefore avoiding reducing the IRAP effect, the researcher exposed participants in Study 2 to additional IRAP training prior to commencing experimental procedures. This was in addition to following the proposed experimenters script, provided in the IRAP manual (Version 1.6 Ian Hussey).

Study 2 aimed to investigate the effect of an educational intervention on secondary school students' attitudes toward ASD. To assess the effect of this intervention participants were required to complete an IRAP pre-and post the educational intervention. However, given the number of participants who failed to meet pre-intervention IRAP criteria ($n = 15$) it was noted that this would majorly impact on the results of the study. For example, Vahey, Nicholson and Barnes-Holmes (2015) recommend a sample size of 29 to achieve statistical power. Considering the participants who failed to reach pre-intervention IRAP criteria successfully achieved post-intervention criteria it was decided to consider alternative methods of data analysis opposed to following a PP approach to avoid excluding these participants (Barnes-Holmes et al., 2010). Employing alternative data analysis procedures with existing participants was also desirable as it limited additional confounding variables related to participant characteristics. For example, participants recruited from further secondary schools may have notable differences regarding experiences or exposure to ASD as a results of differing school policies. In the current study two methods of intention to treat (ITT) analysis were employed; Available case analysis (ACA) and treatment mean imputation.

As a result of the missing data for the pre-intervention IRAP alternative methods of data analysis were taken into consideration. Within the literature there is

much debate regarding the use of ITT analysis versus per protocol (PP) analysis. PP analysis or completecase analysis is a frequently used in cases of missing data, it involves carrying out the statistical analysis as previous planned with only the data included from participants who did not commit any violations regarding the data (Higgins, White & Wood, 2008). However, this type of analysis can present a number of issues. Participants in groups, for example pre-and post-groups are no longer comparable if some participants are excluded from analysis (Ranganathan, Pramesh & Aggarwal 2016). Similarly, a reduction in sample size can lead to a reduction in power (Ranganathan et al., 2016). To address these issues alternative methods of data analysis have been suggested. Higgins et al. (2008) discuss the importance of employing a systematic approach to data analysis when dealing with missing data. According to Higgins et al. (2008) when considering methods for data analysis regarding missing data, potential reasons for the missing data need to be examined. In the current study while there was missing data for the pre-intervention IRAP, post intervention IRAP data was available for all participants. In instances where participants were unable to partake in an intervention or assessment, for reasons including failure to meet criteria, the use of ITT analysis is recommended (Ranganathan et al., 2016). Within this analysis participant data from all experiments are included regardless of meeting criteria. While ITT analysis is predominantly documented within the randomised control trial literature (Crowe at al., 2010; Gupta, 2011; Higgins et al., 2008; Ranganathan et al., 2016), high attrition rates within IRAP studies highlight a need for additional methods of analysis within other fields of research.

While statistical analysis can still be conducted on participants who successfully reached inclusion criteria for both IRAPs, analysing a smaller sample

size would result in a reduction in statistical power (Gupta, 2011; Ranganathan et al., 2016). The use of ITT analysis ensures the comparability across groups is not compromised and maintains group sample sizes (Gupta 2011; Ranganathan et al., 2016). Similarly, it has been reported that missing baseline data warrants alternative imputation methods for the available data (Crowe, Lipkovich & Wang, 2010). Researchers have suggested a number of methods to deal with missing data in ITT analysis. These include last observation carried forward (LOCF), imputed case analysis (ICA), available case analysis (ACA), treated mean imputation, multiple imputation (MI) and complete case analysis. Gupta (2011) discusses the use of last observation carried forward (LOCF) method for missing data. This involves using a participants most recent data prior to withdrawal. Similarly, Higgins et al. (2008) discuss the use of imputed case analysis (ICA) for instances of missing data. Where data is missing, values are filled in based on assumptions as to the why the missing values occurred. If these assumptions regarding the missing data are rational then employing ICA will produce unbiased estimates (Higgins et al., 2008). With ICA, there are two commonly used procedures for imputing the missing data, it should either be assumed that all participants experienced the event where missing data occurred or all participants did not experience the event where missing data occurred (Gould, 1980). In the case of Study 2 it is not necessary to assume why missing data occurred, participants experienced the pre-intervention IRAP and the missing data occurred as a result of failure to reach IRAP inclusion criteria. Similar to ICA is treatment mean imputation (Crowe, et al., 2010). This involves imputing scores for instances where missing data have occurred. Imputed scores are calculated based on the available scores for that variable. ACA involves carrying out the analysis as planned but only excluding data that violated assumptions. For example, if ACA

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were to be used with the current study only the preintervention IRAP scores that failed to meet criterion would be excluded from the analysis, all other data would be included.

Crowe et al. (2010) compared the use of treatment mean imputation to various procedures of multiple imputation (MI) and to a complete case analysis. Treatment mean imputation involves replacing the missing value with the mean of remaining data within the treatment group (Crowe et al., 2010). Rubin (1978) first proposed the method of MI to deal with missing data in survey research. This analysis involves generating several complete data sets where missing values have been imputed using a statistical model (Crowe et al., 2010). To generate the data participants were assigned to one of two treatment groups (treated and untreated) and participants were also assigned to either experience an adverse event or not. The MI analysis included imputations where missing values and non-missing values were included but treated and untreated participants were excluded and adverse event participants were excluded, analysis where treated and un-treated participants were included with the missing and non-missing values and participants exposed to an adverse event, or not were excluded, finally analysis was conducted to include all variables. Results from the study indicated that in cases where MI was not appropriate, mean imputation was found to be a successful alternative.

In the current study the use of treatment mean imputation analysis enabled gender analysis to be conducted across an even sample size. Similarly, the sample size remained unchanged as a result of employing treatment mean imputation analysis. As ITT analysis can be considered a conservative method of data analysis (Ranganathan et al., 2016) additional elements of analysis can be conducted in an attempt to balance this effect. For example, if participant numbers would not violate

the IRAP effect then future IRAP studies could employ both PP analysis and a method of ITT analysis and compare results. As it was not feasible to conduct a PP analysis the current study employed two methods of ITT analysis. As the usefulness of ITT analysis is unknown in IRAP literature, the implementation of both methods (ACA and treatment mean imputation) enabled a comparison across the two methods of ITT. The current study greatly contributes to the current IRAP literature and knowledge regarding procedures to undertake in instances of attrition rates and missing IRAP data. This is the first research of its kind to examine whether an ITT analysis could be used with IRAP data. Considering the availability of post-intervention scores the most appropriate method an data analysis may be an ITT as opposed to a PP analysis. Per-protocol (PP) analysis involves analysing the data solely of participants who did not commit any protocol violations, for example failing to meet experimental criteria (Gupta, 2011). In Study 2 this involved separately analysing the data of participants who achieved criteria in both the preintervention and post-intervention IRAP. Data was first analysed using a treatment mean imputation, this was followed by a PP analysis and finally the two methods of data analysis were compared. Such analysis may potentially avoid undermining the plausibility of the overall research.

Participants/ Setting

Thirty-four secondary school students were recruited to take part in the experiment. Participants recruited were from different schools in the Dublin area. A number of participants were recruited through means of convenience sampling. For example, a number of participants were not recruited directly through the secondary school of which they were currently attending and therefore completed the experimental procedures in the home setting. It should be noted that in these instances all ethical procedures and guidelines regarding participants under the age of eighteen years were still strictly adhered to. Convenience sampling was employed in these instances as a result of time constraints related to the design of the study i.e. the study employed a pre- and post-design. Data from four participants were excluded as they failed to meet predetermined inclusion criteria on the IRAP programme for both pre-intervention and post intervention assessments. The final sample consisted of 31 participants, $n = 18$ males and $n = 13$ females (M age $= 15.83$, age range: 13-18). Of these 30 participants, 15 participants failed to achieve criterion for the pre-intervention IRAP but passed the post-intervention IRAP. Since it was not possible to get participants to repeat the pre-intervention IRAP, data analysis employed two methods of ITT analysis; ACA followed by treatment mean imputation. ITT analysis allows for the inclusion of participants who failed to meet all criteria of experimental procedures (Gupta, 2011). As per ITT protocol, participants' pre-intervention IRAP scores were imputed from the post-intervention IRAP scores.

Participants were recruited from a secondary school in the Dublin area by means of convenience sampling. Experimental procedures were conducted in the secondary school's computer room with the door closed to ensure minimal noise distraction, a teacher was present always during all experimental procedures for all

participants. For all participants, the IRAP was completed on a standard Dell PC. A small number of participants (*n*= 17) completed the experimental procedures in a quiet room convenient to the participant i.e. the home. In such cases a parent/guardian was present for the total duration of all experimental procedures. During these instances the IRAP was completed on the same standard Lenovo laptop as in Study 1.

Design

The research was conceptualised as a mixed between-within participant repeated measures design. The between participant independent variable (IV) was gender (male and female) and time (scores pre-and post the educational intervention); and the within participant IV was IRAP trial-type (Normal Student-Positive, Normal Student-Negative, Autism Student-Positive, Autism Student-Negative). The dependent variable was participant responses (*D*-scores and responses on explicit measures).

Apparatus/Materials

Demographic questionnaire. This questionnaire required participants to provide information such as age, gender, occupation, if they knew someone diagnosed with Autism Spectrum Disorder and to state the level of contact if applicable (see Appendix 1). As detailed in study 1 The KAQ (Campbell & Barger, 2010) was also utilised in the current study and The OAS (Nevill and White, 2011), the un amended version of this scale was used in the current study (see Appendices 3-4). All participants were required to complete these explicit questionnaires pre-and post an educational intervention. A brief video clip detailing the similarities between a typically developing individual and an individual with ASD was presented (see

Appendix 10). As with study 1 the IRAP was employed for experimental procedures. The stimuli presented in the current study were the same stimuli as per study 1.

Ethical considerations

As with study 1 to ensure the constant safety and well-being of all participants, the researcher followed a number of ethical practices. The current study was consisted of participants within a vulnerable population (individuals under the age of eighteen) therefor additional procedures were followed in accordance with ethics protocols. Any participant under the age of eighteen was required to provided written consent from a parent or guardian. Similarly, these participants were also required to provide assent. For all stages of the research (recruitment, data collection and debriefing) the researcher ensured that a staff member or parent/guardian where necessary, were present for the duration of these procedures., participants were never on their own with the researcher

Procedure

The school principal was first approached regarding student involvement prior to any interaction with the students themselves. Once the research aims and procedures had been discussed with the school principals then the researcher presented the current study and the aims and procedures to the secondary school students. Students were approached in a classroom setting with a teacher present for the duration of the meeting. Upon gaining all relevant forms of consent i.e. parent/guardian consent forms (see Appendix 6), participant assent forms (if under the age of 18 and to be accompanied with parent/guardian consent form) or participant consent forms (if aged 18 years or older), for each participant data collection commenced. Where participants were not approached in the school setting parents/guardians were approached prior to participant recruitment.

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The procedure for the current study was virtually the same as Study 1, with some additional elements. Prior to conducting experimental procedures, participants were directed to the researcher's laptop or the school projector, depending on where data collection took place, i.e. in a quiet room in the participants home or the computer room of the secondary school. The researcher informed participants that they would view the researcher complete the IRAP experiment and participants were instructed to inform the researcher of the correct responses for all IRAP trials as the researcher completed them. Participants who conducted the research in the home setting received this exposure to the IRAP in the presence of the researcher and parent/guardian only. However, due to time constraints participants who completed the experimental procedures in the school setting received this exposure in the presence of the researcher, school teacher and all participants within this setting. In the current study upon completing the IRAP participants were asked if they would like a brief break before commencing with the next stage of the research. This stage was commenced within 15 minutes of completing the IRAP. Upon starting the next stage in the study participants were asked to view an online video clip (approximately 3.23 minutes). Participants viewed this video clip on the same laptop or PC that they used to complete the IRAP. Following the video clip participants were again required to complete the two explicit questionnaires (KAQ and OAS). Upon completing the questionnaires participants were requested to complete the IRAP program for a second time. The IRAP procedure was followed precisely as detailed in Study 1 with the same stimuli employed. Following the completion of the IRAP participants were fully debriefed (see Appendix 7) and thanked for their participation in the research. Following data collection procedures IOA was calculated for the KOA and OAS. This procedure was as per study 1.

Data Analysis Method

Available Case Analysis. As mentioned above this method of data analysis only included scores that were available to the researcher, therefore the participants who failed to reach pre-intervention IRAP inclusion criteria, data was input as "missing" for this method of analysis. To facilitate this analysis the following steps were carried out in IBM SPSS. Elwell, (2012, see Appendix 11), (1) When you initially enter data into SPSS, leave all missing values as blank cells; (2) At the top of the SPSS file click "Transform" followed by "Recode into Same Variables"; (3) A box with all the variables on the left hand side will appear, move all the variables to right hand side of the box, click "Old and New Values"; (4) A new box will appear, on the left hand side select "System-or user missing", on the right hand side, under "New Value" enter a value that will not otherwise occur in the data set (e.g. -9999). Then select "Add" followed by "Continue" and finally "OK"; (5) To exclude these values from calculations select "Variable View" at the bottom of the SPSS file, in the column labelled "Missing" click on the first cell under this column, a blue box will appear, click this box; (6) Select "Discrete missing values" and enter the number chosen in Step 4 (-9999) and click "OK"; (7) Repeat Step 5 and 6 for every row in the variable view (See appendix 11) **Treatment Mean Imputation**. As mentioned above this method of data analysis imputes scores for missing values. This score is imputed based on available mean data for all observed scores within that variable. For example, all the missing scores within the preintervention trial-type Normal-Positive are calculated based on the means of all the observed scores within that trial-type. For example, each participant score that was generated as a result of achieving IRAP criteria. This is achieved by getting the sum of all the observed DIRAP scores within each specific trial-type and then dividing it by the total number

of observed scores. The final figure calculated is then imputed into the first cell of missing data. To calculate the next imputed score, the imputed mean is then added to sum of the observed *D*-IRAP scores and is divided by the total number of scores. Doing this will produce the same figure as produced previously, this is as a result of a necessity to protect the strength of the mean of the observed pre-intervention values, therefore this figure can be input into all cases of missing cells within each individual trial-type. Essentially, the missing values within the pre-intervention Normal-Positive trial-type were calculated by adding the sum of all the observed D-IRAP scores and dividing this by the total number of participants who achieved pre-intervention D-IRAP scores (sum of the observed scores was divided by 16). This process was repeated for the missing scores observed within the pre-intervention Autism-Positive trial-type, Norma-Negative trial-type and Autism-Negative trial-type.

Results

For the purpose of data analysis ACA, as discussed above was first carried out. This involved carrying out data analysis on all the available data. Following this an intention to treat analysis, as discussed above was employed. Imputed scores were generated from available mean score data, as described above. This data was then imputed for all missing pre-intervention IRAP scores. Finally results from both forms of data analysis were compared. IRAP analysis, both ACA and treatment mean imputation will be presented first, this will be followed by explicit measures analysis and correlational analysis, this will present both ACA analysis and treatment mean imputation analysis.

Implicit Relational Assessment Procedure Analysis

Available case analysis (ACA)

The IRAP data were transformed into four *D*-IRAP scores using the same transformation steps employed in Study 1. The data from 31 participants were included (males *n* = 18, females *n* = 13), male participants data for pre-intervention IRAP was input into SPSS as missing data (*n* = 15) and 4 participants data were excluded from data analysis as they failed to meet predetermined criteria for pre-intervention and post-intervention IRAP as outlined previously. It should be noted that all 31 participants were included in the ACA analysis except the 2x2x4 ANOVA (time; scores pre-and post the intervention, was one of the variables for the ANOVA). As a result of these missing pre-intervention scores the 2x2x4 ANOVA consisted of 16 IRAP scores (males' *n* = 3, females' *n* = 13). See Figure 3. Mean *D*-IRAP scores and standard deviations
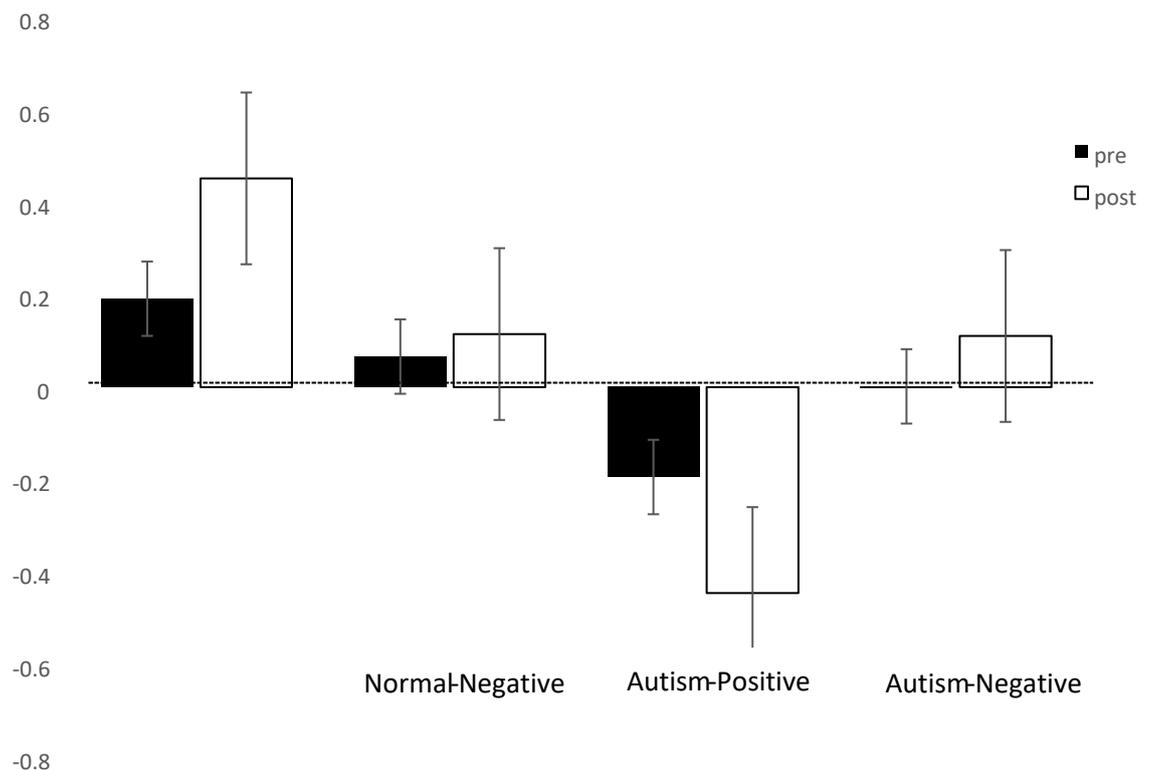

Figure 3. Graph shows Mean *D*-IRAP scores with standard error bars representing participants' responses on the four IRAP trial-types in ACA. Positive *D*-scores (above the xaxis) represent Normal-Positive/Autism-Negative responses; negative *D*-scores (below the xaxis) represent Normal-Negative/ Autism-Positive responses.

One sample *t*-tests were conducted to determine the strength of the IRAP effect across trial-types. Results indicated a significant effect for Autism-Positive pre-intervention, $t(15) = 32.269$, $p = 0.038$. A significant effect was also reported for Normal-Positive postintervention, $t(15) = 6.859$, $p <0.001$. No significant effects were reported across remaining trial-types.

The four *D*-IRAP scores for each participant were input into a 2x2x4 mixed within between analysis of variance ANOVA. The within subjects' factors were the four IRAP trial-types and time (pre-and post-educational intervention). The between participants' variable was gender (males and females). See Table 5 below for descriptive statistics. There was a significant main effect for trial-type, $F(3, 12) = 7.095$, $p=0.005$, Wilks' Lambda = .361.

Pairwise comparisons revealed a significant difference between Normal-Positive trial-type versus Autism-Negative trial-type ($p=.003$). There was no significant main effect for time, $F(1, 14) = 1.047$, $p = .324$, Wilks' Lambda = .930; and no significant main effect for gender, $F(1, 14) = .196$, $p=.664$. There was no significant two-way interactions between trial-type and gender, $F(3, 12) = .481$, $p = .702$, Wilks' Lambda = .893; There was no significant two-way interactions between time and gender, $F(1, 14) = .050$, $p = .827$, Wilks' Lambda = .996; there was no significant two-way interaction between trial-type and time, $F(3, 12) = .273$, $p = .774$, Wilks' Lambda = .915; There was no significant three-way interaction between trial-type, time and gender, $F(3, 12) = .668$, $p = .588$, Wilks' Lambda = .857. Overall results revealed that participants Normal-Positive scores differed significantly from their Autism-Negative scores. Gender was not found to have a significant effect on participants attitudes toward ASD. The educational intervention was also reported to have a non-significant impact on participants attitudes toward ASD.

Table 5. *Descriptive Statistics of IRAP scores pre-and post-educational intervention in ACA analysis*

D-IRAP Scores	Males (*n*=3)				Females (*n*=13)			
	Pre Mean	*Pre SD*	*Post Mean*	*Post SD*	*Pre Mean*	*Pre SD*	*Post Mean*	*Post SD*
Normal/ Positive	.409	.234	.566	.506	.141	.486	.495	.257
Normal/ Negative	.101	.85	.089	.336	.057	.434	.088	.382
Autism/ Positive	.112	.252	.115	.462	.214	.367	.698	1.353
Autism/ Negative	-.256	.446	.029	.323	.056	.361	-.142	.365

Treatment Mean Imputation Analysis

The IRAP data were transformed into four *D*-IRAP scores using the same transformation steps employed in Study 1. The data from 31 participants were included (males *n* = 18, females *n* = 13), missing participants data for pre-intervention IRAP was input into SPSS using the treatment mean imputation method as discussed above. Data from 4 participants were excluded from data analysis as they failed to meet predetermined criteria for both pre-intervention and post-intervention IRAP as outlined previously. See Figure 4. Mean D-IRPA scores and standard deviations.

0.8
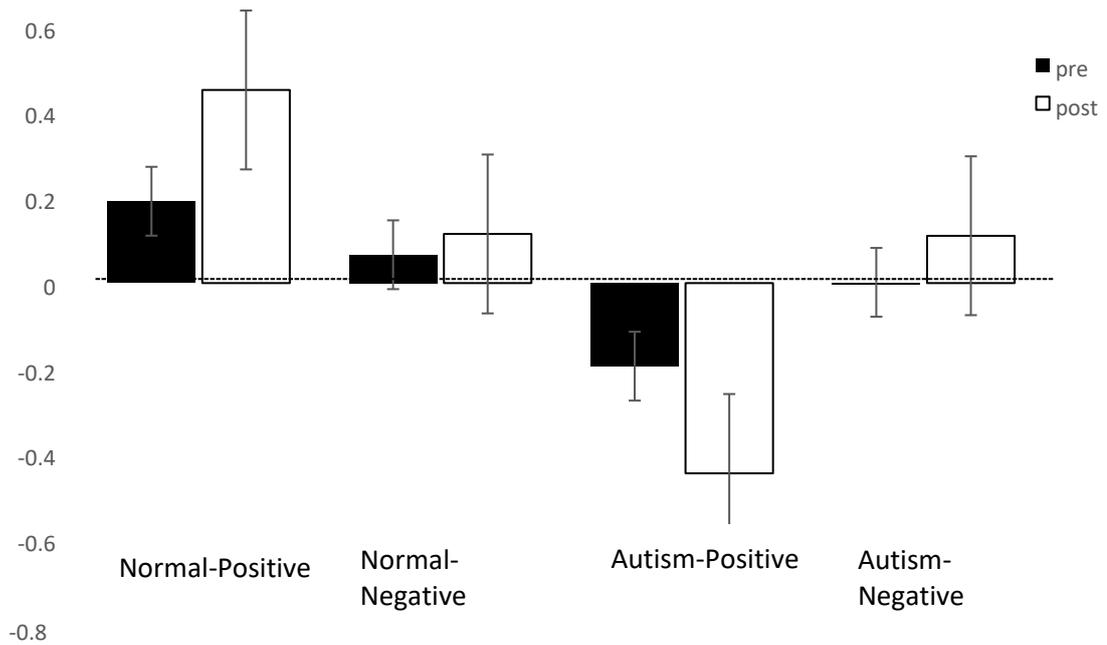
Figure 4. Graph shows Mean *D*-IRAP scores with standard error bars representing participants' responses on the four IRAP trial-types in treatment mean imputation analysis. Positive *D*-scores (above the x-axis) represent Normal-Positive/Autism-Negative responses; negative *D*-scores (below the x-axis) represent Normal-Negative/ Autism-Positive responses.

One sample *t*-tests were conducted to determine the strength of the IRAP effect across trial-types. Results indicated a significant effect for Normal-Positive pre-intervention, $t(30) = 3.299$, $p = 0.003$; Autism-Positive pre-intervention, $t(30) = 4.467$, $p < 0.001$; Normal-Positive post-intervention, $t(30) = 6.683$, $p < 0.001$ and Autism-Positive post-intervention, $t(30) = 2.633$, $p = 0,013$.

The four D-IRAP scores for each participant were put into a 2x2x4 mixed within between analysis of variance ANOVA. The within subjects' factors were the four IRAP trial-types and time (pre-and post-educational intervention). The between subjects' factor was gender (males and females). See Table 6 below for descriptive statistics. There was a significant main effect for trial type, $F(3, 27) = 17.487$, $p < 0.001$, Wilks Lambda = .340. Pairwise comparisons revealed significant differences between Normal-Positive versus Normal-Negative ($p = .003$), Normal-

Positive versus Autism-Negative ($p < .001$) and a significant difference between Autism-Positive and Autism-Negative ($p = .004$). There was a significant main effect for time, $F(1, 29) = 4.222$, $p = .049$, Wilks' Lambda = .873. Paired sample t-tests were conducted to evaluate the impact of the intervention on trial-type scores. There was a significant difference in Normal-Positive pre-intervention trial-type scores ($M = .191$, $SD = .322$) compared to Normal-Positive post-intervention trial-type scores ($M = .451$, $SD = .376$), $t(30) = -2.73$, $p = .011$. The mean increase in Normal-Positive trial-type scores was -.26. There was no significant difference in Normal-Negative pre-intervention trial type scores ($M = .066$, $SD = .352$) compared to Normal-Negative post-intervention trial-type scores ($M = .114$, $SD = .399$), $t(30) = -.537$, $p = .595$. There was no significant difference in Autism-Positive pre-intervention trial type scores ($M = .194$, $SD = .243$) compared to Autism-Positive post-intervention trial-type scores ($M = .446$, $SD = .943$), $t(30) = -1.594$, $p = .122$. There was no significant difference in Autism-Negative pre-intervention trial-type scores ($M = -.001$, $SD = .27$) compared to Autism-Negative post-intervention ($M = -.11$, $SD = .409$), $t(30) = 1.197$, $p = .241$. There was no significant main effect for gender, $F(1, 29) = 1.013$, $p = .323$. There was a significant two-way interaction between trial-type and time, $F(3, 27) = 3.194$, $p = .039$, Wilks' Lambda = .738. There was no significant two-way interaction between trial-type and gender, $F(3, 27) = .437$, $p = .729$, Wilks' Lambda = .954, and no significant two-way interaction between time and gender, $F(1, 29) = .658$, $p = .424$, Wilks' Lambda = .978. There was no significant three-way interaction between trial-type, time and gender, $F(3, 27) = 1.035$, $p = .393$, Wilks' Lambda = .897.

Results from pairwise comparisons revealed that participants Normal-Positive scores differed significantly from their Normal-Negative scores, participants

Normal-Positive scores also differed significantly from their Autism Negative scores and finally participants Autism-Positive scores differed significantly from their Autism negative scores. Results revealed that the educational intervention had a significantly positive impact on participants scores, further analysis revealed a significant difference in participants Normal-Positive scores following the intervention, participants attitudes toward "Normal Student" were significantly more positive following the intervention. Participants attitudes were reported to not differ significantly across gender.

Table 5. *Descriptive Statistics of IRAP scores pre-and post-educational intervention in treatment mean imputation analysis*

D-IRAP Scores	Males (*n=18*)				Females (*n=13*)			
	Pre Mean	*Pre SD*	*Post Mean*	*Post SD*	*Pre Mean*	*Pre SD*	*Post Mean*	*Post SD*
Normal/ Positive	.227	.118	.42	.447	.141	.486	.495	.257
Normal/ Negative	.072	.292	.133	.421	.057	.434	.088	.382
Autism/ Positive	.181	.092	.263	.44	.214	.367	.698	1.353
Autism/ Negative	-.043	.181	-.087	.447	.056	.361	-.142	.365

Explicit measures

All participants (*N=31*) completed the KAQ and the OAS pre-and post-intervention. Mean and standard deviation scores are presented in Table 6. A 2x2 within participants' ANOVA was conducted to examine the effects of gender and time (pre-and postintervention) across explicit questionnaires. Analysis on the KAQ revealed no significant main effect for time, $F(1, 29) = .351$, $p = .411$, partial eta squared = .014; or gender, $F(1, 29) = .529$, $p = .473$, partial eta squared = .018. There was also no significant interaction effect between time and gender, $F(1, 29) = 2.877$,

$p = .101$, partial eta squared = .09. Analysis of the OAS revealed a significant main effect for time, $F(1, 29) = 20.133$, $p < .001$, partial eta squared = .41. Paired sample t-tests were conducted to evaluate the impact of the intervention on OAS pre-intervention scores ($M = 26.06$, $SD = 2.966$) compared to OAS post-intervention scores ($M = 28.61$, $SD = 3.273$), $t(30) = -4.535$, $p = <.001$. The mean increase in OAS scores was -2.548. This suggests that participants had a more positive attitude towards autism following the educational intervention video. Similarly there was a significant main effect for gender, $F(1, 29) = 6.223$, $p = .019$. Comparing mean scores across gender for the pre-intervention OAS and the post intervention OAS suggests that females had more positive attitudes towards autism compared to males. There was no significant interaction between time and gender, $F(1, 29) = .197$, $p = .660$, partial eta squared = .007. Explicit measures analysis revealed that the educational intervention had no significant effect on participants KAQ scores, similarly there was no significant differences in males scores compared to females scores. However, the educational intervention was reported to have a significant impact on participants OAS scores. Further analysis revealed that participants were significantly more open toward ASD following the intervention. Similarly, there was a significant difference in participants scores across gender with females reported significantly more openness toward ASD compared to males.

Table 6. *Descriptive Statistics for Explicit Measures Pre and Post Intervention*

| | Pre-Intervention | | Post-Intervention | |
| | | Males | | |
Explicit Measures	*M*	*SD*	*M*	*SD*
Knowledge of Autism	8.89	1.02	9.17	.924
Openness to Autism	25.22	3.35	27.23	3.41

Females

Knowledge of Autism	9.54	.660	8.92	1.49
Openness to Autism	27.23	1.88	30.08	2.49

Correlational Analysis

Available case Analysis

Initial analysis confirmed that data did not violate assumptions of normality, linearity and homoscedasticity. Pearson product-moment correlation coefficient was used to examine relationships between explicit and implicit measures. The four *D*-IRAP scores were entered into a correlation matrix with the scores from the explicit questionnaires. No significant implicit-explicit correlations were found. There was a positive correlation between Autism-Positive pre-intervention scores and Autism-Negative post intervention scores, $r = .661$, $n = 16$, $p = .005$. There was a positive correlation between pre-intervention OAS scores and postintervention OAS scores, $r = .501$, $n = 31$, $p = .004$.

Treatment Mean Imputation

Initial analysis confirmed that data did not violate assumptions of normality, linearity and homoscedasticity. Pearson product-moment correlation coefficient was used to examine relationships between explicit and implicit measures. The four *D*-IRAP scores were entered into a correlation matrix with the scores from the explicit questionnaires. A significant negative implicit-explicit correlation was found between Normal-Positive scores preintervention and KAQ scores post-intervention, $r = -.386$, $n = 31$, $p = .032$; a significant negative correlation was found between Normal-Positive pre-intervention scores and Autism-Positive post intervention scores, $r = -$

.383, n = 31, *p* = .033; a significant positive correlation was found between Autism-Positive pre-intervention scores and Autism-Negative post-intervention scores, *r* = .405, *n* = 31, *p* = .024; a significant positive correlation was found between Autism-Positive pre-intervention scores and Autism-Positive post-intervention scores, *r* = .390, *n* = 31, *p* = .03. As with ACA there was a significant positive correlation between pre-intervention OAS scores and post-intervention OAS scores, *r* = .501, *n* = 31, *p* = .004.

Demographic information

Brief demographic analysis was conducted to explore the impact of contact with an individual with ASD on attitudes. Over half of male participants (58.8%) reported not knowing someone with ASD compared to just 15.4% of females. The highest level of contact both males and females reported having was with someone who was a family member but not in their immediate family. See Table 7 complete demographic statistics

Table 7. *Demographic Statistics*

Level of Contact	Males *n*=17	Females n = 13
None	58.8%	15.4%
Acquaintance	17.6%	46.1%
Friend	11.8%	15.4%
Family member (not immediate)	11.8%	23.1%

Interobserver Agreement

Interobserver agreement (IOA) for the explicit measures was assessed with an independent observer. The KAQ was calculated using the scoring sheet as used by Campbell and Barger (2010) (see Appendix 7). The researcher calculated the total

scores of the KAQ for each participant using the scoring sheet. The scores for each participant were added together to obtain an overall total score for the KAQ. An independent observer also carried out these calculations. To obtain an IOA percentage the researchers total score for the KAQ was divided by the independent observers total score for the KAQ with the outcome multiplied by 100. The OAS was calculated using the scoring sheet as used by Nevill and White (2011) (see Appendix 8). To obtain an IOA score the method was carried out as detailed for the KAQ. IOA was calculated at 100% for all explicit measures. Due to the nature of the IRAP i.e. the IRAP program calculates and provides the *D*-IRAP scores it is not necessary to manually calculate IOA.

Summary of Findings

Overall it was reported that secondary school students had a significant pro-Normal bias for the Normal-Positive trial-type and a significant pro-Autism bias for the Autism-Positive trial-type, both pre-and post the educational intervention. There was no significant effect of the educational intervention on students' implicit attitudes nor were there any significant differences across gender. Explicit analysis revealed students had significantly positive attitudes toward ASD. The educational intervention had a significantly positive impact on students' attitudes. Significant gender differences were reported across scores pre-and post-intervention with female students reporting significantly more positive attitudes in both groups. No significant results were reported for the KOA. There were no implicit-explicit correlations. A significant negative relationship was reported between Normal-Positive trial type pre-and Autism-Positive trial-type post. A significant positive relationship was reported for OAS pre-and post-scores, indicated a significant positive effect of the educational intervention.

Discussion

The current study sought to examine secondary school students' attitudes toward their peers with ASD. The current research investigated attitudes across implicit and explicit measures. Study 2 aimed to examine the effectiveness of an educational intervention to foster significantly positive attitudes toward peers with ASD. Implicit and explicit attitudes were investigated both pre-and post an educational intervention. Pre-and post-attitude assessments included the IRAP and explicit measures; the KAQ and OAS. Gender analysis was also conducted pre-and post the educational intervention. The effect of level of contact with ASD was explored in relation to participants' attitudes. This was achieved by means of gathering demographic information. Relationships between implicit and explicit measures, pre-and post-intervention, were investigated with correlational analysis. Overall results indicated that secondary school students had significantly pro-Normal and pro-Autism biases pre-and post the intervention as measured by the IRAP. This finding is consistent with research examining third-level student' attitudes toward ASD (Matthews et al., 2015). However, the findings contradict previous findings pre-adolescent children (aged 9 – 12 year), significantly negative attitudes were reported toward peers with ASD (Swaim, & Morgan, 2001). While students reported overall positive attitudes implicit attitudes toward ASD, there was no significant effect regarding the educational intervention. This finding is not consistent with previous research (Gillespie, et al., 2015; Morton & Campbell, 2008; Tonnsen, & Hahn, 2016). However, these findings are supported by results of explicit measures analysis in the current study. The educational intervention had a significant impact on students OAS scores with further analysis revealing that students were significantly more open to ASD following the intervention. While these findings report significant

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results for the effect of educational interventions it should be noted that effects were measured using explicit measures and these results were not mirrored within the IRAP analysis. Nonsignificant results in the current study may be as a result of the ability of the IRAP to detect sensitive biases. Similarly Study 2 employed the use of ITT analysis. ITT analysis produces conservative results (Ranganathan et al., 2016), these factors may have significantly contributed to the non-significant results. However, given attrition rates within Study 2 the use of ITT analysis allowed for all participants to be included in the analysis. A reduction in the participant sample may have majorly reduced statistical power (Gupta, 2011).

Implicit results from the current study notably differ to previous IRAP studies (Barnes et al., 2006; Kelly & Barnes-Holmes-2013). Participants characteristics within the current study were also markedly differed to participant characteristics in Kelly and Barnes-Holmes (2013). Participants in the current study were considerable younger and had notably different experiences with individuals with ASD compared to those in Kelly and Barnes-Holmes (2013). Similarly, the current study recruited a gender matched sample whereas the sample in Kelly and Barnes-Holmes (2013) differed considerable regarding gender. While results revealed significantly positive attitudes toward students with ASD, results were not directly related to the intervention. Attitudes to ASD were noted to be significantly positive pre-and post the intervention. These findings are not consistent regarding previous studies results of effectiveness of educational interventions (Matthews et al., 2015). As mentioned previously the current study aimed to investigate gender differences among implicit and explicit measure. Overall there were no significant gender differences in students' implicit measures. As with study 1, results indicated that females displayed slightly more positive attitudes within a number of individual

trial-types, but there was not statistical significance within these differences. To date there are a number of inconsistencies regarding gender and explicit attitudes toward ASD, males have been found to have significantly more positive attitudes (Matthews et al., 2015), females have been found to report more positive attitudes (Gardiner & Iarocci, 2013) and no significant gender differences have been found (Nevill & White, 2011). As this was one of the first studies to employ a gender analysis regarding implicit attitudes future research is required to determine if gender differences are evident in students attitudes toward students with ASD. Similarly, the current study does not support previous findings regarding knowledge of ASD. Students reported significantly high degrees of knowledge, this contrasts with previous studies which have reported that secondary school students have a relatively inadequate knowledge (Campbell, & Barger, 2011; Campbell et al., 2011). Level of knowledge was significantly high prior to the implementation of the intervention. Interestingly, correlational analysis revealed a significant positive relationship between OAS scores pre-intervention and OAS scores post intervention. This suggests that the intervention may have had a minor impact on attitudes. Perhaps those reporting higher attitudes pre-intervention continued to develop more positive attitudes following the intervention. Similarly, a positive correlation was found between Normal-Positive scores preintervention and Normal-Positive scores post intervention. This support the positive correlation between OAS scores. Consistent with these findings a positive relationship was also reported between Autism Positive pre-intervention scores and Autism-positive post intervention scores.

While the current study did not produce a significant impact for the educational intervention, IRAP analysis indicated that students' attitudes toward both "normal-students" and "autism-students" were significantly positive prior to the

intervention. This may indicate that students do not hold negative attitudes toward their peers as previously thought. It may therefore not be necessary to intervene on students' attitudes. A possible suggestion for the current findings may be a relationship between attitudes and contact with ASD. Nevill and White, (2011) reported that students with an immediate family member diagnosed with ASD, reported significantly more positive attitudes toward ASD. Within the current study demographic information revealed a significant number of participants reported some level of contact with ASD.

Chapter 4

General Discussion

General Discussion

The current research aimed to investigate the implicit and explicit attitudes of adults and secondary school students attitudes towards individuals with ASD. Extant research examining attitudes towards individuals with ASD has focused mainly on explicit self-report measurement (Campbell et al., 2011; Matthews et al., 2015; Nevill, & White, 2011), although some studies have employed a behavioural measure of implicit attitudes, the IRAP, to examine the attitudes of University students (Barnes-Holmes, et al., 2006) and teachers (Kelly, & Barnes-Holmes, 2013) toward ASD. IRAP research has yet to consider the attitudes of community dwelling adults who were not employed as teachers, toward ASD, or secondary school students attitudes toward ASD, similarly, IRAP research has yet to examine gender differences in relation to attitudes toward ASD, nor has previous IRAP research attempted to alter attitudes toward ASD using targeted interventions. The current research therefore sought to contribute to the existing literature regarding attitudes towards ASD by employing both implicit and explicit measures and comparing results across both measures. Similarly, the effect of an educational intervention on attitude change was investigated in Study 2. This research was also the first study to examine the impact of gender on implicit attitudes towards individuals with ASD. Gender was examined within adults' attitudes toward ASD and secondary school students' attitudes. Within Study 1, typically developing adults, aged 18-56, living in a Dublin community were recruited; while Secondary School students aged 13 to 18 years were recruited for Study 2.

Summary of Findings

Study 1. This study examined typically developing adults, not working specifically in the education sector, attitudes toward ASD. This study was a notable

contribution to the literature as it was the first IRAP study to examine the impact of gender across attitudes toward ASD. Study 1 also aimed to examine the effect of adults' previous contact with ASD on their attitudes toward ASD. Attitudes were examined across both explicit measures, the Attitudes to Autism Scale (AAS), the Openness to Autism Scale (OAS) and the Knowledge of Autism Questionnaire (KAQ), and implicit measures, the IRAP program. Results from the explicit measures revealed that participants had significantly positive attitudes and accurate knowledge of ASD. No gender differences were reported across explicit measures analysis. Results from IRAP analysis revealed adults to have significantly positive attitudes toward both "normal student" and "autism student". Interestingly adults reported significant differences between their Normal-Positive trial-type scores and their Autism-Positive trial-types scores, essentially participants were significantly more Normal-Positive compared to Autism-Positive. No gender differences were found across adults' attitudes toward ASD. Overall, adults were found to have significantly positive attitudes toward ASD. This finding contradicts previous IRAP findings regarding attitudes toward ASD (Barnes-Holmes et al, 2006; Kelly & Barnes-Holmes, 2013). Similar results were reported on the explicit measures. Participants reported significant positive attitudes across the AAS and the OAS and a significantly accurate knowledge of ASD on the KAQ. These findings are consistent with previous attitude findings Chambers et al., 2008; Harnum & Duffy, 2007).

Correlational analysis revealed that a positive bias toward "normal student" predicted a positive bias toward "autism student". Higher OAS scores were found to predict higher AAS scores. Interestingly high KAQ scores predicted a positive implicit bias toward "autism student", this suggests that knowledge may be an important factor related to positive attitudes toward ASD as previously reported (Campbell & Barger,

2011). Similarly, correlational analysis revealed that previous contact with ASD predicted higher levels of openness toward ASD. This finding supports previous research reporting a significant effect of previous contact on attitudes toward ASD (Nevil, & White, 2011).

Study 2. This study aimed to investigate secondary school students implicit and explicit attitudes toward ASD. This study was a notable contribution to the IRAP literature as it was the first study to investigate secondary school students attitudes toward ASD. As with Study 1 the effect of degree of previous contact with ASD and the impact of gender on students' attitudes was also examined. Students attitudes were measured using both explicit measures, the KAQ and the OAS, and implicit measures, the IRAP. Students attitudes were also assessed pre-and post an educational intervention, statistical analysis was carried out to determine the impact of the intervention of students' attitudes. As a number of participants failed to reach the pre-determined IRAP inclusion criteria, and as the recommended PP analysis for dealing with excluded data was not desirable, an alternative method of data analysis was considered. Study 2 aimed to investigated the usefulness of a number of ITT analysis with IRAP data. IRAP data was analysed using ACA and Treatment mean imputation. Results from both analyses were compared to determine usefulness with missing IRAP data. This element was notably exploratory in nature.

Available case analysis IRAP results. Students were found to be significantly Autism-Positive prior to the intervention and significantly Normal-Positive following the intervention. The intervention was found to have no significant effect on students' attitudes, similarly no gender differences were found across students attitudes toward ASD.

Treatment Mean Imputation Analysis IRAP results. One sample t-tests revealed that students had a significant positive bias toward "normal student" and "autism student" pre-and post the intervention. The educational intervention was found to have a significant effect on students' attitudes pre-and post the intervention. Additional analysis revealed that students pro-normal bias was significantly more positive following the intervention. While there no significant differences reported in students' pro-autism bias following the intervention it should be noted that there was a slight increase in scores, similarly students reported significantly positive attitudes toward ASD prior to the implementation of the intervention. As with ACA there was no significant effect for gender across students' attitude. This supports previous findings regarding gender and attitudes toward ASD (Nevil & White, 2011). Finally, a significant interaction between trial type and time was reported. Overall treatment mean imputation analysis reported a number of statistically significant findings in comparison to ACA.

Explicit measures analysis revealed students' knowledge of ASD did not significantly differ across gender, nor was students' knowledge of ASD significantly impacted following the intervention. However, students reported significantly more openness toward ASD following the intervention, and students' openness significantly differed across gender, with females reporting significantly more openness toward ASD compared to males.

Correlation analysis was conducted on ACA data and Treatment mean imputation data. Correlation analysis for ACA revealed no significant implicit-explicit correlations. Pro-autism attitudes pre-intervention predicted anti-negative autism attitudes following the intervention. Explicit measures correlations revealed that high openness scores pre-intervention predicted high openness scores post-

intervention. Correlation analysis for treatment mean imputation data revealed that a lower normal-positive bias predicted more accurate knowledge following the intervention. Students who were less normal-positive inclined predicted a greater autism-positive bias following the intervention, this suggests that the intervention may have had a positive impact on students overall positive attitudes. A pro-autism bias pre-intervention predicted a pro-autism bias following the intervention, suggesting that the intervention may have had a positive impact on students attitudes toward ASD. Finally, as with ACA, high openness pre-intervention predicted high openness following the intervention, this supports the implicit correlation and suggests that the intervention may have had a positive impact on students attitudes toward ASD.

Implicit Relational Assessment Procedure Findings

Study 1 IRAP results revealed that adults were significantly pro positive to "Normal Student" and "Autism Student" and significantly anti negative for "Normal Student" and while it was a non-significant result a weak bias for anti-negative "Autism Student" was reported. These findings contradict previous IRAP research regarding attitudes toward ASD which have reported that individuals generally hold negative implicit attitudes toward ASD (Barnes-Holmes, et al., 2006; Kelly, & Barnes-Holmes, 2013). It should be noted that participant samples in previous IRAP studies investigating attitudes toward ASD differed considerably to the participant sample in the current research. For example, Barnes-Holmes et al, (2006) recruited participants from within the education sector with 64% of participants reporting direct experience with ASD. Similarly, Kelly and Barnes-Holmes (2013) recruited all participants from within the education sector, 50% of participants reported employment in an ABA setting and the other 50% of participants reported being

employed as a primary school teacher. Participants in the current study also reported noticeably less contact with ASD in comparison. Therefore, it may not be appropriate to compare the current study to previous IRAP studies investigating attitudes toward ASD. Participants attitudes in previous IRAP studies may have been impacted on as a result of their differing experiences with ASD compared to the experiences of current participant sample. For example, Kelly and Barnes-Holmes (2013) reported that participants' attitudes' towards ASD was a positive indicator of professional burnout. These findings may explain the contrasting results to the current study. While participants in the current research had some level of contact with ASD, 54% of males reported experiencing previous contact with ASD, this previous contact ranged from "less often" to "3-4 times per month" and 64% of females reported experiencing previous contact with ASD, this contact ranged from "less often" to "daily basis". It could be appropriate to assume that these experiences with ASD would not be as regular or intense compared to that of an individual working with an ASD population on a regular basis. Perhaps individuals in previous IRAP studies had initially positive attitudes toward ASD prior to working with an ASD population, and conceivably the over-exposure to ASD and the challenges that can occur working with this population resulted in participants' attitudes declining over their years of exposure. Future research could examine the attitudes of those working in the ABA field and compare attitudes across time. It should also be noted that there has been notable passage of time since prior IRAP studies investigating attitudes toward ASD have been conducted (Barnes-Holmes et al., 2006) this may explain the contrasting findings. For example, adults may be more positive toward ASD as there is a greater awareness of ASD, resulting from campaigns aimed at raising awareness (Dillenburger et al., 2015).

Results from the current study are consistent with previous findings regarding adults' explicit attitudes toward ASD. Harnum et al. (2007) reported adults to have significantly positive attitudes toward ASD, this finding supports results from Study 1. Chambers at al. (2008) also found adults to have significantly positive attitudes toward children with ASD. Young adults were also found to have significantly positive attitudes toward a peer with ASD (Nevill & White, 2011). Harnum et al. (2007) assessed adults' attitudes adults by presenting adults with three different descriptions, a description of typically developing child, a child with ADHD and a child with ASD. When these descriptions were presented with the accompanying diagnosis label, adults attitudes did not differ across diagnosis type. Interestingly, when adults were presented with these descriptions without the labels then the child with ASD was the only child for which adults reported as being "unlike me". This suggests that while adults initially reported positive attitudes toward the typically developing child and the child with ASD, they may have significantly more positive attitudes toward typically developing children compared to children with ASD. Results from pairwise comparisons on IRAP trial-types in the current study support this. Participants were significantly more pro-Normal compared to pro-Autism. This difference in positive attitudes may be impacting on typically developing individuals' decisions to interact with and form friendships with other typically developing individuals as opposed to individuals with ASD. This may explain the discrepancies between adults' positive attitudes toward ASD and poor outcomes in later life for individuals with ASD (Eaves & Ho 2008). To date, while research has investigated adults' attitudes toward ASD, research has predominantly focused on children's attitudes. Result from study 1 not only support previous findings regarding adults' attitudes toward ASD but it is also a notable contribution to the existing literature.

While results from Study 1 and Study 2 were not directly compared, IRAP analysis from Study 2 support the significantly positive findings regarding attitudes to ASD. Results from ACA of IRAP data revealed that secondary school students reported significantly positive attitudes toward students with ASD pre-intervention. Results from treatment mean imputation analysis revealed that students had significant pro-Autism biases pre-and post the educational intervention. Secondary school students were also found to have significantly positive attitudes toward "normal student" following the intervention. As with Study 1 these findings contradict previous findings regarding implicit attitudes toward ASD (Barnes-Holmes, et al., 2006; Kelly, & Barnes-Holmes, 2013). It should be noted Study 2 was the first IRAP study to investigate secondary school students attitudes toward ASD and while a notable contribution to the literature it is also exploratory in nature. Therefore, it may not be feasible to compare the results to existing IRAP studies investigating attitudes toward ASD. For example, the contrasting findings between the current study and previous IRAP studies (Barnes-Holmes et al., 2006; Kelly & Barnes-Holmes, 2013) could be explained by the differing characteristics between the participant samples. Participants in Study 2 were all secondary school students, Kelly and Barnes-Holmes, (2013) recruited primary school teachers and ABA tutors and Barnes-Holmes et al., (2006) recruited third level undergraduate students and professionals working with an ASD population. Participants in the current study reported an age range of 13-18 years, compared to 20-55 years (Kelly, & Barnes-Holmes, 2013). The current study also employed a gender balanced sample of females to males (13:18) whereas Kelly and Barnes-Holmes did not recruit a gender matched sample of female to males (26:4). Therefore, it may not be appropriate to compare results of Study 2 to previous IRAP research. Similarly, it has been reported

that attitudes toward ASD significantly differed across age (Harnum et al., 2007). As with Study 1 it is possible that the contrasting findings from the current study are a result of the passage of time from when previous studies were conducted. The increased number of students with ASD entering the mainstream system may have resulted in typically developing students experiencing more direct contact with ASD compared to the contact the students in the past may have experienced. Similarly, mainstream settings implementing various interventions or educational programs to ensure successful inclusion for all students. Results from Study 2 support previous findings regarding students attitudes toward ASD (Nevill & White; Tonnsen & Hahn, 2016).

Explicit Measures Findings

Results from Study 1 and Study 2 indicated that both typically developing adults and adolescents reported significantly positive attitudes toward ASD. Study 1 reported adults to have a significantly accurate knowledge of ASD, significant openness toward ASD and significantly positive attitudes regarding ASD. This supports previous findings regarding adults' attitudes toward ASD (Chambers, et al., 2008; Durand-Zaleski, et al., 2012; Harnum, et al., 2008; Matthews, et al., 2015; Nevill, & White, 2011). While adults were also found to have a significantly accurate knowledge regarding ASD, it should be noted that the knowledge measure employed in the current study could be considered relatively simplistic as it only presents ten true or false questions, similarly the measure was originally devised to assess children's knowledge (Campbell & Barger, 2011), therefore it may not accurately represent an adults' knowledge of ASD. To examine the role of specific knowledge, previous studies have presented participants with a scenario depicting a child with characteristics and behaviours typical of ASD (Harnum, et al., 2007; Matthews et al.,

2015), these scenarios were presented with and without the accompanying diagnosis information. When presented with the scenario which did not label the child as having ASD, adults reported the child as significantly "unlike me", these findings were not mirrored when adults were presented with the child's diagnosis of ASD. Matthews et al. (2015) reported similar findings regarding college students attitudes toward ASD. These findings indicate that while individuals may be able to respond accurately to questions regarding ASD, they may struggle to recognise it the natural environment. This finding may be of particular importance regarding successful inclusion for individuals with ASD. If students and adults are unable to recognise ASD without being prompted, then they may as a result display negative attitudes toward their peers/colleagues with ASD. Similarly, it is likely that typically developing students will only come across students with High-Functioning Autism (HFA) in mainstream settings, therefore there are not likely to be any obvious indicators on the student's HFA diagnosis. Supporting this hypothesis, children have been reported to engage in significantly more negative attitudes toward their peers with intellectual disabilities or developmental disabilities compared to their peers with physical disabilities (Nowiki, & Sandieson, 2002).

Regarding secondary school students' attitudes toward ASD, overall findings indicate that secondary school students have significantly positive explicit attitudes toward ASD and a significantly accurate knowledge of ASD. These findings support previous research regarding secondary school students attitudes toward ASD (Campbell & Barger, 2011; Tonnsen, & Hahn, 2016). However, this finding is notably inconsistent with previous research findings regarding children's' attitudes to ASD (Campbell et al., 2005; Campbell et al., 2011; Harnum et al., 2007; Montes & Halterman, 2007; Rotheram-fuller et al., 2010; Swaim, & Morgan, 2001). These

contrasting findings may be a result of the developmental differences between children and adolescents. While the current research investigated students attitudes toward ASD predominantly contradicts previous studies, these studies have primarily focused on the attitudes of primary school aged children, comparisons could therefore be drawn from studies that have recruited students enrolled in a higher level of education. Harnum et al. (2007) reported that attitudes can improve with age, therefore secondary school students' attitudes could be compared to third level students' attitudes. Students within third level education have reported significantly positive attitudes toward their peers with ASD (Gardiner, & Iarocci, 2013; Gillespie-Lynch, et al., 2015; Matthew, Ly, & Goldberg; Nevill & White, 2011). These findings support the current findings. There is a paucity of research regarding secondary school students' attitudes toward ASD, much of the research to date within adolescent populations has focused on knowledge over attitudes (Campbell, & Barger, 2011; Campbell et al., 2011). Future research is required to assist and develop the current research regarding secondary school students' attitudes toward their peers with ASD and enable comparisons of students' attitudes across all stages of education.

Educational Intervention Findings

As previous research has suggested that adolescents may hold negative attitudes toward their peers with ASD (Balswick, et al., 2005), Study 2 therefore examined the impact of an educational intervention on students' attitudes and knowledge toward ASD. Results of ACA revealed an overall non-significant impact of the educational intervention on students' attitudes. This finding is consistent with previous research regarding the impact of educational interventions (Campbell, 2004; Morton & Campbell, 2008). However, this finding also contradicts several studies

which have found educational interventions to have a significant positive impact on attitudes toward ASD (Campbell, 2006; Dachez & Ndobo, 2016; Gillespie-Lynch et al., 2015; Ranson & Byren, 2014; Staniland & Byren, 2013). A possible explanation for these contradictory findings is that students in Study 2 reported significantly positive attitudes toward ASD prior to the implementation of the intervention. This may explain why the intervention failed to produce a significantly positive effect. Gillespie-Lynch et al. (2015) also reported that participants had significantly positive attitudes toward ASD prior to the implementation of the educational intervention. Another explanation for the lack of significant findings could be the use of ACA to interpret the data. This method of data analysis has been reported to produce conservative results as missing data are removed from the analysis (Gupta, 2011). In the current study, ACA excluded data from a number of participants, this in turn may have led to a significant reduction in statistical power (Vahey, et al., 2009).

Results from treatment mean imputation revealed a significant impact of the educational intervention. This finding contradicts ACA results and results from previous studies examining the effect of an educational intervention which have found non-significant result on attitudes toward ASD (Campbell 2004; Morton & Campbell 2008). However, it should be noted that additional analysis revealed that the intervention only had a significant impact on students attitudes toward "Normal Student", while students' attitudes were also more positive toward ASD following the intervention, this was a non-significant increase. As with Study 1 it is possible that significantly positive attitudes toward ASD reported by students prior to the intervention impacted on the potential effectiveness of the intervention. Gillespie-Lynch et al. (2015) also reported students to hold significantly positive attitudes toward ASD prior to the intervention. While no significant change in students'

attitudes was reported in the current study, students were found to maintain their initial pro-Autism biases following the intervention. As students' pro-Normal attitudes were significantly more positive following the intervention, perhaps the intervention succeeded in affecting students' overall attitudes and in turn aided the maintenance of their pro-Autism bias. Perhaps the intervention did not target the correct information to elicit a significant attitude change. Morton and Campbell, (2008) reported that an educational intervention utilising both descriptive and explanatory information failed to produce a significant effect. While Gillespie-Lynch et al. (2015) reported students to have significantly positive attitudes to ASD prior to the intervention, the educational intervention also significantly impacted on their attitudes to ASD following its implementation. These contrasting findings regarding the effectiveness of the intervention could be as a result of the differences in the interventions utilised. For example, Gillespie-Lynch et al. (2015) provided participants with a notably larger amount of information, additionally participants were also required to respond to comprehension checks throughout the intervention. Incorporating such knowledge checks may enable the researcher to be certain that all participants have actively engaged in the intervention, for example participants in the current study may not have actively engaged in the intervention and this may have impacted on the results.

As mentioned previously the intervention may not have presented the correct information to students to elicit a significant attitude change. It is possible the current intervention was lacking specific important information. Previous studies have investigated the effect of labelling a child displaying characteristics and behaviours typically of ASD as having ASD compared to not labelling a child displaying these characteristics and behaviours. When no label was applied to these behaviours

participants were reported to be significantly more negative to the child compared to when the label was provided (Brosnan, & Mills, 2016; Campbell, et al., 2004; Chambers, et al., 2015; Matthews, et al., 2015; Swaim, & Morgan, 2001). These studies differ significantly from the current study in that participants were constantly provided with the labels "Normal Student" and "Autism Student". These findings suggest that educational interventions may need to target aspects of ASD such as potential disruptive or challenging behaviours that students with ASD may experience.

Explicit measures analysis revealed a significant increase in students' openness toward ASD following the educational intervention. This finding reports previous findings regarding students attitudes toward ASD following an educational intervention (Dachez & Ndobo; Tonnsen & Hahn, 2016). While explicit findings from the current research do not support IRAP findings from the current research it is possible that the requirement for participants to respond quickly on the IRAP, a more sensitive bias can be detected compared to explicit measures.

Gender Analysis Results

Surprisingly, there were no significant findings regarding gender differences within adults' attitudes toward ASD. It has previously been reported that gender is considerably important when examining attitudes toward children with disabilities (Rosenbaum et al., 1988), this contradicts findings within the current study. The non-significant impact of gender in the current study supports previous findings regarding young adults' attitudes toward ASD and the impact of gender (Nevill & White, 2011). Results from gender analysis in Study 2 support the findings regarding the nonsignificant impact of gender on implicit attitudes. However, the explicit attitude results regarding gender do not support the findings of Study 1. Explicit measures

analysis revealed significant gender differences within secondary school students OAS scores. Females were reported to have significantly more positive attitudes toward ASD compared to males. This finding supports previous research which has also reported females to have significantly more positive attitudes compared to males (Gray, & Rodrigue, 2001; Rosenbaum et al., 1987; Slininger, et al., 2000). Contradicting research however, has found males to have significantly more positive attitudes toward ASD compared to females' (Matthews, et al., 2015; Nevill, & White, 2011). It should be noted that while Nevill and White, (2011) reported male students to be significantly more positive to female students, these differences were only evident on a number of OAS items and there were no overall gender differences reported on the OSA (Nevill & White, 2011). For example, it was reported that male students expressed a greater desire to "hang out" with the student with ASD compared to female students desire to "hang out" and male students also reported a significantly greater level of comfort around the student with ASD compared to the level of comfort expressed by female students. Nevill and White, (2011) suggested that these gender differences may be a result of males identifying themselves as more similar to students with ASD compared to females. Similarly, Matthews, et al. (2015) reported that males may be better able to tolerate certain characteristics typical of ASD. Greater tolerance would be considered related to a want to "hang out" with a peer with ASD. Chambers, et al. (2008) investigated the effect of providing the label "autism" alongside the description of a child with ASD on participants attitudes to ASD. When the label was provided, there was no significant gender difference regarding attitudes. However, when no label was provided, females reported significantly more positive attitudes to ASD compared to males. This finding may explain the non-significant gender differences in the current study

as all participants were provided with the label "normal student" or "autism student". This finding may be of particular importance as it suggest that females display positive attitudes toward their peers with ASD regardless if they know the peer has been diagnosed with ASD. Future interventions may therefore only need to address males' attitudes toward ASD.

It is interesting to note that while overall, results from Study 1 and Study 2 revealed no significant differences in participants' gender regarding attitudes toward ASD. Trial-type analysis in Study 1 reported minor differences in adults' gender, females tended to respond more positively to "Normal Student" and "Autism Student" across trial-types, compared to males. Study 2 reported similar findings, female students exhibited slightly more positive biases across trial-types compared to males. These findings regarding female attitudes toward ASD are also mirrored within explicit analysis across the current study, while no significant gender differences were reported within knowledge and attitude measures in Study 1, and knowledge measures in Study 2, females tended to respond more positive and more accurately across all these explicit measures compared to males responding. Gardiner and Iarocci, (2013) reported similar results to the current study regarding gender. While no significant result for gender was reported, females tended to report more willingness to volunteer with an ASD population compared to males (Gardiner & Iarocci, 2013). Gardiner and Iarocci (2013), suggested that these non-significant results regarding gender may have been a result of an un-balanced gender sample. Study 1 also reported unequal sample sizes regarding gender. This may have contributed to the lack of significant findings regarding gender. While Study 2 reported equal sample within gender, the implementation of ITT analysis may have

resulted in producing non-significant result for gender as it can produce more conservative results (Gupta, 2011).

It should be noted that although no differences in gender were reported in participants' implicit attitudes toward ASD, the research was exploratory in nature, it was the first IRAP study to employ a gender analysis regarding attitudes toward ASD. Also Study 1 had notably unequal numbers of males and females. The use of ITT in study 2 may also have impacted on the non-significant implicit attitudes regarding gender. Due to time limitations, it was not feasible to recruit equal sample sizes for Study 1 nor was it feasible to recruit additional participants for Study 2 to avoid the use of ITT. Future IRAP studies should continue to employ a gender analysis across participants attitudes toward ASD and should also aim to manipulate a gender balanced sample before firm conclusions can be drawn regarding gender and attitudes toward ASD.

Correlational Findings

Correlational analysis revealed within Study 1 revealed a small number of significant correlations. A positive relationship was reported between adults KAQ scores and Autism-Positive scores. This suggest that a highly accurate level of knowledge can predict a positive attitude toward ASD. This finding is consistent with previous research which reported knowledge of ASD to be significantly related to positive attitudes toward ASD (Chambers, et al. 2008). Interestingly a positive relationship was reported between Normal-Positive trial-type scores and Autism-Positive trial-type scores. This may indicate that significantly positive attitudes toward "Normal Student" will generalise to other populations; specifically, that of vulnerable populations. This finding may be of particular relevance for the literature regarding adolescents. For example, adolescents who perceived their peers' attitudes

toward ASD as significantly positive, self-reported greater positive attitudes (Tonnsen, & Hanh, 2016). Future interventions may examine the use of a "buddy system" with individuals who are significantly pro-Normal-Positive. A positive relationship was found between adults OAS scores and AAS scores. The OAS examines several factors related to positive attitudes toward ASD, for example spending time with, working with, and feelings of comfort toward ASD. These results suggest that individuals who report more tolerance and openness toward ASD, this will translate into more positive attitudes. Similarly, results may indicate that items on the OAS are significantly important regarding attitudes toward ASD. Perhaps future research should examine the individual elements of the OAS.

Finally, a significant positive relationship was reported between participants' previous level of contact with ASD and openness to ASD. This suggests that adults with previous contact with ASD will be more likely to report positive attitudes toward ASD. This finding supports previous research regarding the role of contact with ASD and positive attitudes toward ASD (Gardiner & Iarocci, 2013; Gillespie-Lynch et al., 2015; Nevill & White, 2011). Gillespie-Lynch, et al. (2015) found that participants who reported having an immediate family member with ASD, displayed a trend toward less stigma compared to their peers. While this finding was not significant, it may be as a result of a minor number of participants who reported having an immediate family member with ASD. Consistent with this, Nevill and White, (2011) reported that participants who had a family member with ASD were significantly more open compared to students who didn't. A limitation of this study was that level of contact with this family member was not considered. For example, having a family member with ASD does not necessarily equate to increased contact with this individual. Similarly, participants may have known an individual with ASD

outside of their family with whom they had a significant level of contact with. Had this been included results may have indicated a significant effect for contact. The current study addressed these short comings by requesting participants to rate the amount of time they spent with an individual with ASD in a number of situations, including family, work and social settings. Consistent with this Gardiner and Iarocci, (2013) reported greater contact quantity was associated with greater acceptance toward students with ASD. Within the current study 54% of males reported some level of contact and 64% of females reported some level of contact. These findings indicate that a significant number of individuals are reporting some level of contact with ASD, be it "less often" or on a "daily basis". Findings related to contact may explain the overall significantly positive attitudes reported in the current research.

While the educational intervention in Study 2 did not elicit a significant impact on students' attitudes toward ASD, a significant positive correlation was reported between OAS pre-intervention scores and OAS post interventions scores in both ACA and treatment mean imputation analysis. Higher OAS scores pre-intervention indicated students would have higher scores post intervention. Perhaps high openness scores enabled students to positively engage with the intervention, resulting in more positive attitudes post intervention. Correlational analysis with ACA also revealed a positive relationship between Autism-Positive pre-intervention scores and Autism-Negative post intervention scores. This suggests that students who were significantly Autism-Positive pre-intervention would significantly anti Autism-Negative following the intervention. This result may indicate that the intervention did impact somewhat on students attitudes toward ASD. Similarly, correlational results from treatment mean imputation revealed that Autism-Positive scores pre-intervention predicted Autism-Positive score post-intervention. this

suggests that students who had significantly positive attitudes pre-intervention were inclined to report increases in positive attitudes post intervention. These findings may indicate a minor non-significant impact of the educational intervention. The current study reported a significantly small number of correlations. This lack of findings can be explained in terms of the REC model. According to the REC model individuals respond more quickly to a more probable immediate relational response. For example, within IRAP trial-types it was expected that participants would respond more quickly to pro Normal-Positive block and slower to pro Autism-Positive blocks. However, when participants are responding to explicit questionnaires, they are not under any time pressure as with the IRAP, and as a result have time to think about the relational responses and can produce carefully thought out response compared to immediate automatic response produced by the IRAP.

The use of ACA compared to treatment mean imputation

As the fifteen participants who failed to reach pre-intervention IRAP criteria managed to achieve post-intervention criteria it was decided to implement an Intention to Treat (ITT) analysis to address the issue of data exclusion as opposed to implementing the recommended Per protocol (PP) procedure, which would have meant the exclusion of all data from participants who failed to meet pre-intervention IRAP criteria, this includes participants' explicit data also. Specifically, two distinct types of ITT analysis, ACA and treatment mean imputation, were employed with the utility of each subsequently compared. A number of IRAP studies have reported a large number of participants needed to be excluded from data analysis as a result of failing to reach IRAP criteria, these studies have included analysis where 50% of participants were excluded (Nicholson et al., 2014). Yet, to date there are no alternative means of data analysis for missing data in IRAP research other than the

PP approach which involves excluding all participants who failed to reach IRAP criterion or participants who failed to return for follow-up assessments, in the final analysis. While ACA involves analysing all the available participant data, PP approach involves excluding all data from participants who failed to reach IRAP criterion, this would include also excluding explicit measures data.

Previous IRAP research has examined populations that are relatively easy to recruit, e.g. university students (Campbell, Barnes-Holmes, Barnes-Holmes & Stewart, 2011; Murphy, MacCarthaigh & Barnes-Homes ,2014), yet some researchers have called for more diverse sample populations, these populations may be considerably more difficult to recruit. Murphy, Hussey, Barnes-Holmes and Kelly (2015) employed university students to examine the effects of attractiveness and attributions of successfulness, but recommended that future research include individuals in a management or training setting. It would be notably more difficult to recruit individuals within this population compared to university students. Research has also examined areas where recruiting additional participants may not be a practical option. For example, participant samples have included American citizens (Power, Barnes-Holmes, Barnes-Holmes & Stewart, 2009), an elderly population (Kane, 2016), ABA tutors and primary teachers (Kelly & Banes-Holmes), prisoners (Vahey, et al., 2009) and the current study recruited secondary school students.

Similarly, the design of the study may make it more difficult to recruit additional participants. For example, in the current study participants were required to complete the IRAP, receive an educational intervention and complete a second IRAP in quick succession. As a result of the pre-and post-intervention being carried out in a timely manner it was not possible to monitor pre-IRAP performances, and therefore participants went on to complete the remainder of the experiment. The researcher's,

teacher's and student's time was therefore lost on those participants whose data did not meet IRAP criteria. Similarly, as the IRAPs were employed within quick succession of each other it was not possible to represent the IRAP to participants who initially failed, as suggested by Vahey et al. (2009) as they had already received the educational intervention thus making additional pre-IRAP assessment redundant. Previous IRAP studies that have employed a pre-and post IRAP design have also reported a failure of participants to return for follow-up assessments (Cullen, Barnes-Holmes, Barnes-Holmes & Stewart 2009; Scanlon & Barnes-Holmes, 2013).

While there is clear need for additional data analysis methods to address high attrition rates in the case of failure to reach IRAP criteria, no prior IRAP studies have incorporated any strategy aside from a per-protocol (PP) approach (i.e. exclude all data from participants who fail to meet criteria on two or more test blocks). Barnes-Holmes et al. (2010) recommends the use of PP analysis for instances of missing data or attrition rates. Carrying out this type of analysis can lead to a notable reduction in statistic power (Ranganathan et al., 2016) this in turn can undermine the plausibility of results. Similarly, Vahey et al. (2015) recommended a sample size of 29 to achieve statistical power. If Study 2 only employed a PP analysis then it would not have been feasible to draw strong conclusion from the results as there would have been a reduction in statistical power as a result of fifteen participants being excluded in PP analysis. This in turn would have notably impacted the validity of the study and undermined the research.

Other areas of research have however designated alternative methods for data analysis where there is missing data, referred to as ITT analysis (Crowe et al., 2010; Gupta, 2011; Ranganathan et al., 2016). Considering the limitations regarding IRAP criteria and attrition rates, often limited resources to recruit additional participants,

and the regular use of ITT analysis in other areas of research, the examination of two different forms of ITT analysis, ACA and treatment mean imputation, is a notable contribution to the IRAP research literature. The use of treatment mean imputation was of particular benefit to the current study as it allowed for the maintenance of a gender balanced sample across both implicit and explicit measure, whereas the ACA only enabled the maintenance of a gender balanced sample across explicit measures, and the effect of the IRAP was not effected (Vahey et al., 2015). This method of data analysis also avoids overoptimistic effects of any interventions (Gupta, 2011). This is of particular importance for the current study as one of the aims was to assess the effectiveness of an educational intervention on students attitudes to ASD. If an intervention aimed at promoting positive attitudes toward ASD was incorrectly assumed as successful, this could have negative effects for students with ASD as they have previously been reported to experience bullying and isolation, from their typically developing peers (Swaim & Morgan, 2001), students with ASD may continue to experience bullying and isolation from their peers it typically developing students' attitudes are not appropriately intervened on.

Results from ACA and treatment mean imputation reported a number of differences when results were compared. For example, ACA revealed significant effects on the Autism-Positive trial-type pre-intervention and the Normal-Positive trial-type post intervention. However, treatment mean imputation analysis revealed significant effects on the Normal-Positive trial-type pre-and post the intervention, and significant effects on the Autism-Positive trial-type pre-and post the educational intervention. While ITT analysis produces conservative results (Gupta, 2011), that is results will air on the side of caution, results will likely produce a type 1 error compared to a type 2 error. Type 1 error is when an effective treatment or

intervention is reported to have no effect when in fact there was an effect. For example, ACA reported that the intervention had no impact on students' attitudes, however treatment mean imputation reported that the intervention had a significant positive impact on students' attitudes. The ACA produced notably more conservative results than the treatment mean imputation for trial-type analysis. For example, both the ACA and treatment mean imputation analysis revealed a significant main effect for trial type. Further analysis revealed a significant difference between Normal-Positive trial-type and Autism-Negative trial-type for both ACA and treatment mean imputation analysis. However, treatment mean imputation analysis also reported a significant difference between Normal-Positive trial-type and Normal-Negative trial-type and a significant difference between Autism-Positive trial-type and Autism-Negative trial-type, the ACA did not produce these significant trial-type findings. Finally, for treatment mean imputation, a significant main effect for time but not gender was reported, indicating that the educational intervention had a significant impact on students' and that there was no difference in female students attitudes toward ASD compared to male students attitudes toward ASD. The ACA analysis however, did not result in a significant effect for time or gender. Again, the ACA committed a type 1 error in that it reported that there was no significant effect of the intervention to alter students' attitudes, whereas the treatment mean imputation analysis reported the intervention to have a significant impact.

However, further analysis revealed that the intervention had a significant impact on students' pro-Normal biases but no significant impact on their pro-Autism biases, had the intervention produced a significant impact on their pro-Autism biases, the ACA may have failed to pick up on this as it did with the significant effect for on attitudes toward typically developing students. From comparing all instances of both

methods of data analysis in the current study, treatment mean imputation would appear to be the more preferred method as it produced more statistical findings compared to ACA. The ACA could be considered less preferable as it only analysed sixteen pre-intervention IRAP scores compared to thirty-one post-intervention IRAP scores. The use of ACA meant that the missing data was not replaced whereas the treatment mean imputation analysis was more realistic as it imputed scores based on data from available pre-intervention IRAP scores for all instances of missing pre-intervention IRAP data. This method of imputing data should also avoid over-estimated results being produced and as should avoid committing type 1 errors. This is achieved through the method of treatment mean imputation, as the mean of all observed data is protected in the process of imputing data (Crowe et al., 2010).

Correlation analysis was also conducted with ACA and treatment mean imputation analysis. Both methods of analysis revealed a significant correlation between OAS pre-and post-intervention scores and both methods of analysis revealed a significant positive correlation between Autism-Positive trial type pre-intervention and Autism-Negative trial-type post intervention. Treatment mean imputation also reported a number of additional significant correlation findings, for example a significant positive correlation was reported between Autism-Positive trial-type pre-and post the intervention. Again, ACA committed type 1 error within correlation analysis.

It should be noted that while ACA and treatment mean imputation reported contrasting results, it is very likely that the difference between ACA results and treatment mean imputation results is related to the differing sample sizes for pre-intervention scores in ACA compared to treatment mean imputation. Had there been more data available for ACA, as there has been in previous research (Crowe, et al.,

2010) such conservative results may not have been produced. It should also be noted that a number of particularly important findings were found within both analyses. For example, both analyses revealed that students reported significantly positive attitudes toward ASD prior to the implementation. This is a finding that is consistent with previous studies (Gillespie-Lynch et al., 2015). Both analyses also reported that the intervention failed to produce a significant impact on students attitudes toward students with ASD. Therefore, had one of these methods of analyses been employed on their own then similar future research recommendations would have been recommended.

Results from the current study positively contribute to the IRAP literature regarding additional methods of data analysis in cases of missing data. This study was the first IRAP study to employ an ITT analysis instead of a PP approach. Two methods of ITT were employed to facilitate comparison of results. While ACA and treatment mean imputation analysis both reported a number of comparable significant findings, results revealed that treatment mean imputation reported a number of significant findings that ACA did not report. Thus, suggesting the use of treatment mean imputation to be preferable over ACA in this case. Previous research has also reported to use of treatment mean imputation to be preferable over other methods of ITT (Crowe, et al., 2010). Future studies should continue to employ the recommended PP approach in instances of missing IRAP data, however research should also consider additional methods of data analysis, particularly when PP approach violates participant sample size recommendations (Vahey et al., 2009). Similarly, future studies seeking to employ methods of ITT analysis, should take consideration regarding their numbers of missing data, it is possible that the high number of missing pre-intervention scores in the current study impacted on the ability

of ACA to produce significant results. As the current study was the first IRAP study to employ ITT analysis future research will be required to determine the appropriateness of this analysis in IRAP research and to determine the most appropriate method to employ. Results of treatment mean imputation analysis revealed that it was a notable addition to the current study.

Strengths and Limitations

As discussed throughout there are some minor limitations within the current research. For example, the use of the KAQ in Study 1 may not have been an appropriate measure given the age range of participants in Study 1; 18 – 56, the KAQ was developed for children and pre-adolescents (Campbell & Barger, 2011). Study 1 reported unequal participant numbers across gender. However, this is not always possible to control as a result of the IRAP analysis. For example, if a participant fails to meet IRAP inclusion criterion they are to be excluded from IRAP analysis (Vahey, et al., 2009). Such exclusions may impact the comparability of groups (Gupta, 2011). However, Study 1 was still a notable contribution to the IRAP literature as it was the first study to employ a gender analysis regarding attitudes toward ASD. Within Study 2 the use of ACA and treatment mean imputation may have contributed to the non-significant results as ITT analysis has been reported to produce conservative results (Gupta, 2011; Ranganathan et al., 2016). It should be noted that while ITT produces conservative results, ACA is the recommended method of analysis for instances where participants fail to meet IRAP criteria or where attrition rates occur. Yet the use treatment mean imputation in addition to ACA was a notable contribution to the current research. Research has yet to discuss alternative methods of data analysis for instances of excluded data. However, there is an evident need to establish alternative

methods of data analysis as previous IRAP studies have reported exclusion of up to 50% of participants (Nicholson et al., 2014).

Not only was the current study the first IRAP study to investigate the usefulness of alternative methods of data analysis but it was also the first IRAP study to examine secondary school students attitudes toward ASD and the impact of gender of students' implicit attitudes toward ADS. To date previous studies regarding attitudes toward ASD has predominantly focused on children's' attitudes toward ASD (Campbell, 2006; Swaim & Morgan, 2001). The current research attempted to address previous short comings in the literature regarding contact quality with ASD (Nevill, & White, 2011). For example, Nevill and White, (2011) investigated the relationship between contact with ASD and attitudes. Contact was measured based on type of family member but it failed to account for how often or frequently participants spent time with or engaged with their family members with ASD. Not only did the current study require participants to rate their level of contact with the family member but information was also gathered in relation to other areas that participants would be likely to spend a significant amount of time with an individual with ASD, for example, occupational or social environment.

Future directions

Considering the current study was the first IRAP study to examine gender differences related to attitudes toward ASD, future research should continue to investigate gender to enable comparisons to be made across numerous findings and allow significant conclusions to be drawn. Adult outcomes of those with ASD should be reassessed to determine if outcomes regarding employment and relationships have changed as a result of adults overall positive attitudes toward ASD. Future research should continue to investigate secondary school students' implicit attitudes toward

ASD as this was the first study to do so. Future research is required before firm conclusions can be drawn regarding secondary school students attitudes toward ASD. Such research will also help determine if future educational interventions within the mainstream education system will be necessary. As the intervention failed to produce a significant impact on students attitudes toward ASD research should explore interventions that incorporate a significantly more detailed account of the experiences of those with ASD (Gillespie-Lynch, et al., 2015).

While gender differences were investigated in relation to participants, no consideration regarding gender of ASD students was accounted for. While the current study reported overall positive attitudes toward ASD, future research should potentially examine attitudes toward a male student with ASD compared to a female student with ASD. Similarly, future studies could investigate differences in gender between students and adults given the lack of overall gender differences within Study 1 and Study 2. As the use of treatment mean imputation analysis was notably exploratory in nature, future research is required to determine the effectiveness of this method of analysis to deal with missing IRAP data.

Conclusion

Overall findings regarding positive attitudes toward ASD are inconsistent with findings regarding later outcome life for individuals with ASD, perhaps the positive findings in the current study and from recent studies are an indication of a shift in attitudes as a result of increased exposure to ASD. Future research will need to examine if there is a relationship between these latest findings regarding attitudes to ASD and outcomes for individuals with ASD. The current research is a notable contribution to existing attitude literature in that it was the first study to investigate secondary school students' implicit attitudes toward ASD. Similarly, it was the first

IRAP study to employ gender analysis within students and adults' attitudes to ASD. Finally, the current research investigated the use of alternative methods of data analysis for IRAP data where participants are required to be excluded as a result of violating IRAP criteria or where attrition rates occur. These are consistent issues within IRAP research, highlighting the need for alternative methods of data analysis. Results from ACA and treatment mean imputation analysis indicate that treatment mean imputation may be an appropriate addition to data analysis where data is to be excluded.

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Appendix 1: Demographic Questionnaires

Demographic Questionnaire Study 2

Please note that you may refrain from answering any of the questions below if you so wish. For each of the following items, please select the response that is most descriptive of you or fill in the blank space as appropriate.

1. Gender

Male ☐

Female ☐

2. Age

_____

_____

3. Have you ever heard of Autism Spectrum Disorder before?

Yes ☐

No ☐

4. Do you know someone with Autistic Spectrum Disorder?

Yes ☐

No ☐

5. If yes please describe the relationship. For example friend, immediate family member, other family member, through a sports team, through a friend

_____

_____ **Demographic questionnaire study 1**

1. Please indicate your gender

Male/Female

2. What age are you?

   _____

3. What is your occupation? If student please specify

   _____

4. In total how many years of education post secondary do you have?

   _____

5. Do you have a family member diagnosed with Autism Spectrum Disorder?

   _____

6. If yes what is your level of contact with Autism Spectrum Disorder. Circle most applicable to you.

Daily basis / 3-5 days a week / 2 days or less a week / 3-4 times a month / less often

7. Do you know someone with autism spectrum disorder in your occupational/college setting?

   _____

8. If yes please indicated the level of contact. Circle most applicable to you.

Daily basis / 3-5 days a week / 2 days or less a week / 3-4 times a month / less often

9. Do you know someone with Autism Spectrum Disorder outside of your family, work or college setting?

   _____

10. If yes please indicate the level of contact.

Daily basis / 3-5 days a week / 2 days or less a week / 3-4 times a month / less often

11. Do you have a diagnosis of any of the following?

ADHD / Dyslexia / General Learning disability / NA

Appendix 2: Knowledge of Autism Questionnaire

Knowledge of Autism Questionnaire (Campbell and Barger, 2011)

What is Autism?

We would like to know what you know about autism. Please answer the following questions using true or false. If you believe the statement is true, please circle T. If you believe the statement is false, please circle F. Even if you are not sure of the answer, please answer all the questions as best as you can.

1. If someone has autism, it only lasts for about a week.
    T F

2. Students with autism often have a difficult time looking at other people.
    T F

3. Autism does not affect a person's brain.
    T F

4. Students with autism cannot do normal activities that other people can do, even with help from another person.
T F

5. Students with autism sometimes repeat what is said to them.
    T F

6. Students with autism sometimes rock back and forth and wave their hands around.
T F

7. Some students with autism might have trouble talking or expressing themselves.
T F

8. Students with autism do not have difficulty changing activities and can easily move from one activity to another.
T F

9. Sometimes students with autism need extra help to learn how to read and write.
T F

10. You can catch autism by spending time with someone who has it, like you can catch a cold.
T F

Appendix 3: Openness to Autism Scale for study 2

Openness Scale (Harnum, Duffy and Ferguson, 2006) modified for use with college students (Nevill and White, 2011).

Please read the following passage carefully. After the passage has been read, you will be given statements to which you will have to indicate the extent to which you disagree or agree with that statement

Jamie is a new resident in your apartment building. Jamie does not spend time with, or talk with, neighbours and finds it hard to make friends. Jamie is mostly very quiet. When Jamie speaks or does things, they are usually done over and over again. For example, when telling you a joke, Jamie may repeat the punch line over and over again. Jamie does not usually show signs of happiness, sadness, or fear and sometimes has a confused facial expression when walking around campus or talking to people. When in Jamie's room, Jamie usually spends a great deal of time sitting in a chair and rocking back and forth. Jamie also likes to always have a book in-hand and occasionally reads it while walking. Jamie is a good student and is quite generous with time and possessions. Jamie is always willing to help others out with their work when they ask for it.

1. This person makes me feel afraid.

Strongly Disagree   Disagree   Don't Know   Agree   Strongly Agree

2. This person is probably as smart as I am.

Strongly Disagree   Disagree   Don't Know   Agree   Strongly Agree

3. I would not mind Jamie living in my hallway or apartment building.

Strongly Disagree   Disagree   Don't Know   Agree   Strongly Agree

4. I would hang out with Jamie in my free time.

Strongly Disagree   Disagree   Don't Know   Agree   Strongly Agree

5. I would feel comfortable around this person.

Strongly Disagree   Disagree   Don't Know   Agree   Strongly Agree

6. This person is different from me.

Strongly Disagree   Disagree   Don't Know   Agree   Strongly Agree

7. Overall, I think I would like Jamie as a person.

Strongly Disagree   Disagree   Don't Know   Agree   Strongly Agree

Appendix 4: Openness to Autism Scale for Study 1

Openness Scale (Harnum, Duffy and Ferguson, 2006) modified for use with college students (Nevill and White, 2011).

Please read the following passage carefully. After the passage has been read, you will be given statements to which you will have to indicate the extent to which you disagree or agree with that statement

Jamie is a new resident in your apartment building or a new employee at your place of work. Jamie does not spend time with, or talk with, neighbours or colleagues and finds it hard to make friends. Jamie is mostly very quiet. When Jamie speaks or does things, they are usually done over and over again. For example, when telling you a joke, Jamie may repeat the punch line over and over again. Jamie does not usually show signs of happiness, sadness, or fear and sometimes has a confused facial expression when walking around campus or talking to people. When in Jamie's room, Jamie usually spends a great deal of time sitting in a chair and rocking back and forth. Jamie also likes to always have a book in-hand and occasionally reads it while walking. Jamie is a good student or worker and is quite generous with time and possessions. Jamie is always willing to help others out with their work when they ask for it.

1. This person makes me feel afraid.

Strongly Disagree   Disagree   Don't Know   Agree   Strongly Agree

2. This person is probably as smart as I am.

Strongly Disagree   Disagree   Don't Know   Agree   Strongly Agree

3. I would not mind Jamie living in my hallway or apartment building.

Strongly Disagree   Disagree   Don't Know   Agree   Strongly Agree

4. I would not mind Jamie working with me

Strongly Disagree   Disagree   Don't Know   Agree   Strongly Agree

5. I would hang out with Jamie in my free time.

Strongly Disagree   Disagree   Don't Know   Agree   Strongly Agree

6. I would feel comfortable around this person.

Strongly Disagree   Disagree   Don't Know   Agree   Strongly Agree

7. This person is different from me.

Strongly Disagree   Disagree   Don't Know   Agree   Strongly Agree

8. Overall, I think I would like Jamie as a person.

Strongly Disagree   Disagree   Don't Know   Agree   Strongly Agree Appendix 5: Attitudes to Autism Scale

Attitudes to Autism Scale

The following statements are in relation to children with autism or normally developing children. This rating is an attempt to understand teacher attitudes towards the statements. I fully understand the sensitivity surrounding Autism, but I would ask that you would answer questions as honestly as possible. There are no right or wrong answers for these questions. Any information given will be treated with the strictest respect and confidence, and nobody outside the people directly involved with this research will have access to this. Please ensure that you do not divulge any personal details on the form, and that you use the research code that I have allocated to you.

1=Strongly Agree 2= Agree 3= No Opinion 4= Disagree 5= Strongly Disagree

_____ Children with autism are more difficult than normally developing children

_____ Normally developing children are better behaved than children with Autism

_____ Children with Autism are creative

_____ Normal children do not have any deficits

_____ Children with Autism are not sociable

_____ Normally developing children are typically less stressful for parents/teachers

_____ Children with Autism cannot learn

_____ Normally developing children are easier to interact with and entertain

_____ I would be positive if my child were diagnosed with Autism

_____ Normally developing children are calmer and more flexible than children with   autism.

Appendix 6: Information sheet/Consent forms

National University of Ireland Maynooth,

M

aynooth, Co Kildare. Information Sheet

My name is Orla O'Halloran. I am a registered student in the Doctorate in Psychological Science (Behavioural Analysis and Therapy) in the National University of Ireland Maynooth. This research will be conducted under the supervision of Dr. Carol Murphy, lecturer in the Department of Psychology in the National University of Ireland Maynooth.

At any point throughout this research please feel free to contact the researcher or research supervisor with any query you may have regarding any aspect of the study.

Researcher: Orla O'Halloran **Contact**: orla.ohalloran.2015@nuim.ie

Research Supervisor: Dr. Carol Murphy   **Contact**: carol.murphy@nuim.ie

Purpose of the Research:

Autism is a pervasive developmental disorder characterised by persistent deficits in an individual's communication and social interactions. Increased understanding regarding Autism Spectrum Disorder (ASD) has led to improvements regarding treatment. As such an increasing number of children with ASD are now entering mainstream education. However research to date would suggest that these students can be met with negative behavioural intentions and as such these students do not achieve their optimum academic success. Existing research in this area has primarily focused on students at primary level, little is known regarding the educational experience of those with ASD at higher education i.e. secondary level. Therefore the current study proposes;

- To establish a greater understanding of adults and secondary school students attitudes toward students with ASD

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- To explore the effectiveness of an educational intervention on changing students attitudes toward students with ASD
- To investigate if gender can play a role in affecting attitudes

Do I have to take part?

Participation is voluntary. You are free to decide if you wish to take part of not. Please note that by agreeing to take part you are by no means committed to the research. You are free to withdraw from this study at any time. Also by doing so this it will in no way impact upon you or your education negatively.

If I take part what do I have to do?

If you agree to take part you will be asked to complete a number of questionnaires along with a demographic questionnaire which will ask you to provide details such as age, year of education and if you are related to anyone with ASD. **Please note** that if you have a direct family member who has been diagnosed with ASD unfortunately you will be unable to partake in the study. This is due to evidenced based research which has highlighted how having a direct family member with ASD significantly impacts on attitude toward ASD. However if you have any interests regarding this study and would like more information please feel free to contact the researcher after this brief talk or at the contact details provided above.

The second phase of the research will require to you complete an IRAP, this is a computer programme which requires you to agree/disagree with a number of words/statements related to ASD. The researcher will go into further detail and provide detailed instructions at the time of completing this.

When all participants have completed the IRAP you will be divided into 3 groups. This allocation will be completely randomised. Each group will receive a brief educational talk regarding ASD. The only difference between these talks will be through the method of which you receive them i.e. video, from a teacher or from a parent who has a child with ASD.

After receiving this talk all participants will be required to complete the IRAP for a second time. This is to assess if the educational talk had an impact on attitudes toward ASD. All the data collected from the IRAP tests will be coded and analysed at group level

Please note during all data collection a responsible adult i.e. a teacher will be present throughout.

Are there any risks to taking part?

During the IRAP sessions you may experience some feelings of distress or boredom, as such you will be advised at the time at if you experience such feelings you can inform the researcher and you will be allotted a short break. There are no other

known risks to taking part in this study. Prior to commencing this study, a proposal was submitted to.... from which approval was granted. Part of this involved the researcher obtaining Garda Vetting, which the researcher was also granted.

Who will have access to my personal information and results from any tests?

All data will be completely unidentifiable and will be kept on a password protected computer in an encrypted file to which only the researcher and research participant will have access to. For any data recoded on paper this will be immediately transferred onto the computer and the hard copies destroyed. This information will be kept for five years after which time it will be destroyed. **Please note** that there is a possibility that this study may achieve publication or other outputs resulting from the research. As such it is asked that you sign the additional consent form allowing the data to be used in such instances.

What if there is a problem?

Should any concerns or queries arise regarding any aspect of the study you should contact the researcher or researcher supervisor. Please see contact information at the top of the information sheet.

If during your participation in this study you feel the information and guidelines that you were given have been neglected or disregarded in any way, or if you are unhappy about the process, please contact the Chairman of the Research Ethics SubCommittee, Dr Bryan Roche. Tel: 01 7086026 Email: Bryan.T.Roche@nuim.ie. Please be assured that your concerns will be dealt with in a sensitive manner

NUI MAYNOOTH

Ollscoil na hÉireann Má Nuad

Assent Form

Title of Study: An investigation into secondary school students' attitudes toward their peers with Autistic Spectrum Disorder (ASD)

Please tick the box at the bottom of the page if you agree with the following information:

I confirm that I have read and understand all the information in the information sheet provided. I understand that my participation is voluntary and that I may withdraw at any time.

I understand that all data collected will be anonymised.

By ticking this box I agree to take part in the research study ☐

I hereby also give assent for data to be used in any other outputs beyond this study ☐

_____   _____   _____

Researcher   Date   Signature

Consent Form

Title of Study: An investigation into secondary school students attitudes toward their peers with Autistic Spectrum Disorder (ASD)

Please sign below if you agree with the following information:

I confirm that I have read and understand all the information in the information sheet provided. I understand that my childs participation is voluntary and that my child may withdraw at any time. I understand that all data collected will be anonymised.

I hereby give my permission for my child to take part in the research study

_____   _____

Parent/Guardian Signature   Date

I hereby also give consent for my childs data to be used in any other outputs beyond this study

_____ _____

Parent/Guardian Signature   Date

_____   _____   _____

Researcher   Date   Signature

Appendix 7: Debrief sheet

Debrief Form

Thank you for your participation and cooperation throughout this study

The study in which you have participated was designed to investigate secondary school students' attitudes toward students with ASD.

If you have questions about this study or you wish to have your data removed from the study, please contact me at the following e-mail address ORLA.OHALLORAN.2015@nuim.ie

Alternatively you may contact my research supervisor Dr Carol Murpy at the following email address Carol.murphy@nuim.ie

We thank you sincerely for contributing and assure you that your data is confidential and anonymous, and if published the data will not be in any way identifiable as yours.

If you have been affected by the content of this study in any way, the organisations below may be of assistance: http://www.autismireland.ie/ http://www.shineireland.com/ http://autism.ie/

Orla O'Halloran

Appendix 8: KAQ scoring
Scoring for Knowledge of Autism Questionnaire

Scoring: Correct responses are summed to yield a total score.
Correct response to items 1, 3, 4, 8, and 10 is F; correct
response to items 2, 5, 6, 7, and 9 is T

Appendix 9: Scoring for OAS

For items 1 and 7 please apply the following scoreing;

Strongly Agree = 1, Agree = 2, Don't Know = 3, Disagree = 4, Strongly

Disagree = 5 **For all other items please apply reverse scoring**

Strongly Agree = 5, Agree = 4, Don't Know = 3, Disagree = 2, Strongly Disagree = 1

Appendix 10: Link to educational video https://www.youtube.com/watch?v=Akuy-

nNDeHA

Appendix 11: Missing scores in SPSS

How to enter missing data in SPSS

It's likely that your data set will contain some missing values, where participants didn't answer some items on a questionnaire or didn't complete some trails in an experiment.

1. When you initially enter your data, leave any missing values as blank cells.

2. To get SPSS to fill in all the empty cells, go to *Transform – Recode into Same Variables.*

3. Move all your variables into the right hand box and click on *Old and New Values*.
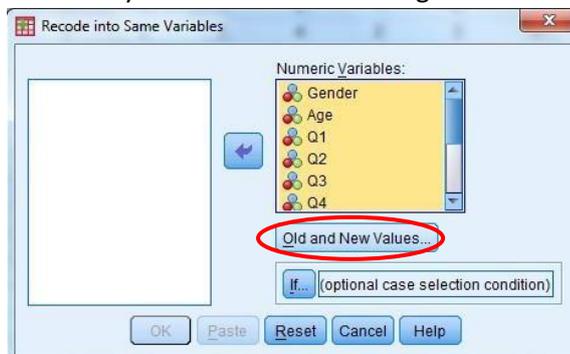
4. On the left select *System- or user-missing* and on the right enter a number that will not otherwise occur in your data set (eg. -9999) in the 'New Value' box. Click on *Add,* then *Continue.* Click on *OK.*

5.
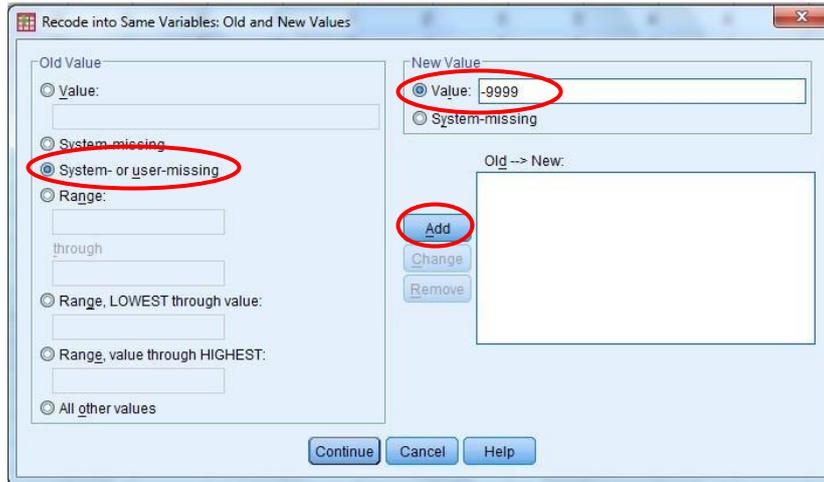
All blank cells will now be replaced with the value you entered in the previous step.


6. So that SPSS doesn't include these numbers in any calculations you must complete one final step. Go to the *Variable View.*

7. The eighth column from the left is called 'Missing'. Click on the first cell under this column, and click on the blue box that appears in the cell.
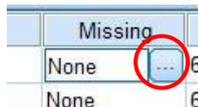
8. Select *Discrete Missing Values* and enter in the box the number that you chose in step 4. Click *OK.*
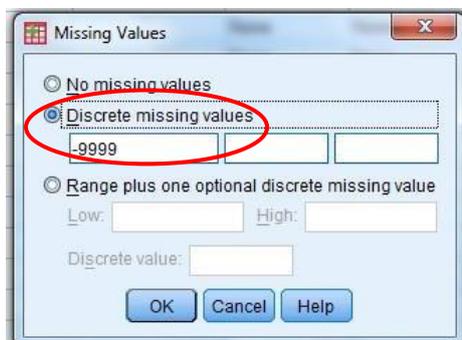
9. Repeat steps 7 and 8 for every row in the variable view (You can copy the first 'Missing' cell and paste into all cells below to save time).

	Name	Type	Width	Decimals	Label	Values	Missing
1	Gender	Numeric	6	0		{1, Male}...	-9999
2	Age	Numeric	11	0		None	-9999
3	Q1	Numeric	11	0		None	-9999
4	Q2	Numeric	11	0		None	-9999
5	Q3	Numeric	11	0		None	-9999
6	Q4	Numeric	11	0		None	-9999
7	Q5	Numeric	11	0		None	-9999
8	Q6	Numeric	11	0		None	-9999
9	Q7	Numeric	11	0		None	-9999
10	Q8	Numeric	11	0		None	-9999
11	Q9	Numeric	11	0		None	-9999
12	Q10	Numeric	11	0		None	-9999

N.B. If you are computing total scores please consider the impact missing values will have on this calculation. It might be more suitable to calculate mean scores instead based on the number of answers you have for each participant. Alternatively, some questionnaire manuals advise replacing missing values with the participants' mean score before calculating a total score.

Charlotte Elwell | 2012
(

SPSS v.18)