

Investigating the implicit and explicit attitudes of primary school educators in Scotland towards autistic children

Running title: Attitudes towards autism in Scottish educators

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Abstract

Autistic children are frequently taught in mainstream schools, and in Scotland, policy aims for inclusion. This study investigated Scottish educators' implicit and explicit attitudes towards autistic children and aimed to understand the relationships between attitudes, knowledge and experience. Seventy primary school educators working in Scotland took part. Participants completed a Single-Category Implicit Association Test (SC-IAT) to assess implicit attitudes. They also completed two explicit attitude measures (openness to autism and cognitive attitudes), and measures of knowledge and level of contact. Overall, participants held positive attitudes in explicit attitude measures. Around half had positive implicit attitudes, but a quarter had either neutral or negative implicit attitudes. There were correlations between explicit attitudes, age and years of experience, with older, more experienced staff having more negative attitudes. Younger educators with less experience may have more positive attitudes, perhaps reflecting societal changes in perceptions of autism. In regression analyses, greater autism knowledge predicted more positive cognitive attitudes towards autistic children, suggesting that targeting knowledge may improve attitudes. Scotland's policies may have the potential to support the effective inclusion of autistic pupils in schools.

Keywords: Autism; Inclusion; Primary School; Attitudes

Autism is a neurodevelopmental condition characterised by difficulties and differences in social communication and social interaction, along with repetitive patterns of behaviour and focused interests (American Psychiatric Association, 2013). The inclusion of autistic¹ children in schools is vital, to ensure the same educational opportunities as others (Pellicano et al., 2018). However, autistic pupils often have negative experiences at school, including bullying (Sterzing et al., 2012), rejection (Rotheram-Fuller et al., 2010) and exclusions (Brede et al., 2017; Children in Scotland et al., 2018). The current study focused on the Scottish context of inclusion for autistic pupils. In 2021, there were almost 24,000 autistic pupils recorded within Scottish schools, approximately 3% of all pupils (Scottish Government, 2022). The number of autistic pupils doubled between 2012 and 2018, despite cuts in specialist staff and spending per pupil (Scottish Children's Services Coalition, 2019). This increase is likely due to better recognition, recording and changes in diagnostic criteria (Hansen et al., 2015; McConkey, 2020). Within this context, the Scottish Government have attempted to ensure inclusion for autistic pupils.

Scottish educational policy adopts a presumption of mainstreaming (Standards in Scotland's Schools Etc. Act, 2000). Accordingly, most autistic pupils (84%) in Scotland are mainstream educated (Scottish Government, 2022). The "Autism Toolbox", a resource for Scottish educators, was developed to provide information on including autistic pupils (Scottish Government & Education Scotland, 2019). However, local authorities are responsible for promoting this resource and more could be done to ensure all educators receive training (Children in Scotland et al., 2018). Further, there have been few empirical

¹ In this paper, we use identity-first language to respect the preferences of the autistic community (Kenny et al., 2016) and to avoid ableist discourse (Bottema-Beutel et al., 2020).

studies investigating the knowledge and attitudes of educators in Scotland. In a mixed-methods questionnaire completed by Scottish teachers, half expressed concerns about including autistic pupils, although greater experience related to more positive attitudes and confidence (McGregor & Campbell, 2001). A qualitative study of those on a Scottish teacher education course noted “basic” autism awareness and little understanding of how to teach autistic pupils effectively – and students only received a one-hour lecture about autism in their four-year course (Ravet, 2018). Teachers in Scotland have reported feeling a lack of knowledge about autism and not having the support needed to work with autistic pupils (Glashan et al., 2004).

Outside of Scotland, the international literature supports the need to investigate educators’ knowledge and attitudes. In a systematic review of barriers and facilitators to the inclusion of autistic pupils, educators’ knowledge was a substantial barrier (Roberts & Simpson, 2016). Another systematic review noted that while educator’s attitudes towards the inclusion of autistic children are often positive, they report lacking training (Russell et al., 2022). Some studies report negative attitudes – 54% of an Irish sample of teachers were categorised as having negative attitudes (Leonard & Smyth, 2022) and 85% of Icelandic teachers believed that having an autistic child in the classroom would negatively affect the education of other children (Bjornsson et al., 2019). Neutral attitudes have been reported in countries including China (Lu et al., 2020), Malaysia (Low et al., 2020) and Greece (Cassimos et al., 2015). Given these mixed attitudes, it is important to understand the role of educators in influencing the inclusion of autistic children in mainstream settings (Park & Chitiyo, 2011), and to appreciate these attitudes within their socio-cultural-political contexts.

It is important to note that attitudes can be understood in several ways. An attitude may be stigmatising: discrediting a group or behaviours, in relation to stereotypes and centred

around “*an undesired differentness*” (Goffman, 1990, p.15). Stigmatising attitudes can influence behavioural intentions - whereby one wants to maintain distance between themselves and the stigmatised individual (Gillespie-Lynch et al., 2015) or is not open to interacting with them (Nevill & White, 2011). Further, cognitive attitudes comprise thoughts and beliefs – for example, educators might believe it is difficult to teach autistic children or endorse harmful stereotypes (Lindsay et al., 2013). It is imperative to consider different components of attitudes to gain a fuller understanding of potential barriers to inclusion.

Additionally, educators may hold negative implicit attitudes. While explicit attitudes consist of conscious thoughts that are easy to report and affected by social desirability (Kelly & Barnes-Holmes, 2013), implicit attitudes occur subconsciously, and are potentially more accurate by being less influenced by social desirability (Echabe, 2013). The Implicit Association Test (IAT) can be used to measure implicit attitudes, assuming that response times will be faster for categories that the participant holds the strongest association (Greenwald et al., 1998). The Single-Category IAT (SC-IAT; Karpinski & Steinman, 2006) measures associations with a single attitude object – and in the current study the SC-IAT examined implicit attitudes towards “autism”. Some studies have previously looked at implicit attitudes towards autism. In Ireland, Kelly & Barnes-Holmes (2013) found negative implicit biases towards autistic children amongst educators. Dickter et al. (2020) also found negative implicit attitudes in non-autistic adults (recruited via Amazon’s Mechanical Turk) in the USA. Obeid et al. (2020) compared implicit attitudes towards autistic children and children with conduct disorder, in undergraduate students in the USA. Their participants associated conduct disorder with more negative terms and autism with more positive terms. Wilson et al. (2019) assessed implicit attitudes of Scottish teachers towards children with intellectual disability, finding neutral implicit attitudes towards this group (although autism is not an intellectual disability, they often co-occur; Kinnear et al., 2020).

It is vital not only to understand the attitudes educators possess, but the variables which may relate to these attitudes. Two such variables are knowledge and experience. With greater knowledge, educators may better understand an autistic child's needs (Barnhill, 2016; Vincent & Ralston, 2020). Segall & Campbell (2012) found many US educators did not know the answers to knowledge questions and had not heard of different support strategies for autistic pupils. Able et al. (2015) found US teachers needed to obtain more knowledge about autism to create an inclusive classroom with individualised approaches. In other contexts, knowledge has been found to relate to better attitudes (Gillespie-Lynch et al., 2015, 2019; Obeid et al., 2015). Prior research also indicates that experience with autistic individuals relates to improved attitudes and knowledge: this relationship has been noted in teachers in mainstream schools (Segall & Campbell, 2012) and in studies investigating the general population's attitudes (Gardiner & Iarocci, 2014; Nevill & White, 2011). These findings fit with the assumptions of the contact hypothesis (Allport, 1954) – whereby contact with a stigmatised group can reduce stigma. It is therefore important to consider the role of experience in educators' attitudes.

Overall, the aim of this study was to examine levels of explicit and implicit attitudes amongst educators in Scotland towards autistic children. Our second aim was to understand relationships between attitudes, knowledge and experience. We hypothesised that self-reported explicit attitudes towards autistic children will be positive, but given mixed literature on implicit attitudes, we predicted neutral implicit attitudes. We also hypothesised that those with more knowledge and experience will have more positive attitudes.

Methods

Participants

Seventy participants (Mean age=42.9 ($SD=11.89$; range 20-66) took part. We recruited participants using adverts on social media and personal contacts within primary schools. Most were female ($n=64$), had an average 12 years' experience in schools and worked in 19 different council areas across Scotland. Most were teachers (54.3%), but a range of educational roles were represented (Table 1). Further demographic information such as ethnicity and level of education is presented in Table 1. Ethical approval was obtained from the University of Stirling and all participants gave informed consent.

[Insert Table 1 here]

Materials and procedure

The study was presented online using the Gorilla platform (www.gorilla.cc; Anwyl-Irvine et al., 2020), with data collected in April and May 2020. The study took 20 minutes to complete. Participants first completed demographic questions (including questions about experience and roles), the SC-IAT, then measures of openness, level of contact, autism knowledge and cognitive attitudes.

Implicit attitudes: Single-Category IAT (SC-IAT).

Karpinski and Steinman's (2006) SC-IAT was used to evaluate implicit attitudes towards 'autism'. Words appeared in the centre of the screen and participants had to categorise each word. First, participants completed 16 practice trials where they learned to associate words with the categories of 'good' and 'bad' with key presses (Figure 1), specifically 'good' words with the letter 'e' and 'bad' with the letter 'i'. The words were from Karpinski and Steinman (2006; positive words: *wonderful, excellent, friendly, likeable, happy, triumphant, cheerful,*

pleasure; negative words: *tragic, dislike, angry, humiliate, horrible, nasty, terrible, unpleasant*). Participants used the keyboard to respond as quickly as possible to categorise words into the ‘good’ or ‘bad’ categories. ‘Good’ always appeared on the left and ‘bad’ on the right.

[Insert Figure 1 here]

Participants completed 24 practice and 72 experimental trials where they learned to associate the same key presses (‘i’ or ‘e’, depending on block) with words associated with ‘autism’. The words were *autistic, Asperger’s, spectrum, ASD, neurodiverse*, based on Dickter et al. (2020). We randomised whether the ‘autism’ category appeared on the left or right, therefore appearing either next to ‘good’ or ‘bad’. If ‘autism’ was associated with ‘good’, this was the positive block, if associated with ‘bad’, this was the negative block (Figure 1). To avoid response bias, autism, good and bad words were presented in a 7:7:10 (autism: good: bad) ratio so that 58% of correct responses were on the ‘e’ key in the positive block. In the negative block, autism words, good words and bad words were presented in a 7:10:7 ratio so 58% of responses were on the ‘i’ key. After completing 72 experimental trials in one block, they completed 24 practice and 72 experimental trials where associations were switched (e.g., associating ‘autism’ with the opposite key press). Whether participants completed the positive or negative block first was counterbalanced.

Following Karpinski and Steinman (2006), non-responses were eliminated and error responses replaced with a penalty (mean RT plus 400msec). Two participants’ SC-IAT scores were excluded as they had error rates or non-response rates in over 20% of trials. The average error rate was 5.11% (in line with Karpinski and Steinman’s (2006) error rates). D scores (the IAT effect) were calculated by subtracting the mean positive block RT from the mean negative block RT, and dividing by the standard deviation of total correct RTs. Following Wilson et al.

(2019), positive implicit attitudes were indicated by D scores in the range of .16 to 2.00, neutral attitudes between -.15 to .15, and negative attitudes between -.16 to -2.00.

Explicit attitudes: Openness towards autism.

This measure examined openness towards interacting with autistic children, adapted from Nevill and White (2011). Participants read a vignette describing a child ‘Jamie’ (see supplemental material). They then rated seven statements on a 5-point Likert scale (‘strongly disagree’ (1) to ‘strongly agree’(5)), such as ‘I would feel comfortable teaching this child’. A total summed score was calculated (possible range 7 to 35); higher scores indicated more openness. Internal reliability was very good in the current study (Cronbach’s $\alpha=.86$). Nevill and White (2011) reported acceptable internal consistency (.77) and a one component model; other studies have also reported acceptable to good internal consistency (e.g. .71, Gardiner & Iarocci, 2014; .73, Kim, 2022; .86, Nah et al., 2022).

Explicit attitudes: Cognitive attitudes.

Barnes-Holmes et al.'s (2006) 10-item measure examined cognitive attitudes (thoughts and beliefs) about autistic children. Participants rated items on a 5-point Likert scale (strongly disagree (1) to strongly agree (5)), such as ‘typically-developing children are calmer and more flexible than autistic children’. Scores were summed, ranging from 10 to 50. Barnes-Holmes et al. (2006) reported scores between 10 to 24 indicated negative attitudes, 25 to 35 neutral, and 36 to 50 positive attitudes. Internal reliability was good ($\alpha=.79$), which is comparable to prior studies using this measure (e.g. .74, Bast et al., 2020). Although there are no studies investigating the measure’s validity, it has been shown to correlate with other explicit attitude measures (Bast et al., 2020).

Autism knowledge.

Gillespie-Lynch et al.'s (2015) measure of autism knowledge was used, with thirteen items rated on a 5-point Likert scale ('strongly disagree' (-2) to 'strongly agree' (2)), for example 'autism is more frequently diagnosed in males than females'. Knowledge was calculated by summing items, with scores ranging from -26 to 26. Higher scores indicated more accurate knowledge. Internal reliability was good ($\alpha=.72$). This measure has been rated as having modest psychometric reliability and validity (Harrison et al., 2017).

Level of contact report.

Holmes et al.'s (1999) level of contact report measured experience with autistic individuals (previously adapted e.g. by Gardiner & Iarocci, 2014; Morrison et al., 2019). Twelve items, for example 'I provide services for autistic people', were presented and participants selected all that applied to them. Participants scores were the highest level of contact selected, providing an ordinal ranked variable. The highest score was 12 ('I am autistic') and the lowest 1 ('I have never observed an autistic person'). No participants reported that they were autistic.

Design and data analysis

Descriptive statistics are presented to examine educators' explicit and implicit attitudes.

Explicit attitudes were considered in terms of openness to autism and cognitive attitudes, and implicit attitudes as SC-IAT D scores. To examine relationships between attitudes, knowledge and experience, three multiple regression analyses were conducted. Within each, attitudes were the outcome: openness to autism (behavioural intentions), cognitive attitudes or SC-IAT scores (implicit attitudes). Knowledge and experience (level of contact and years working in schools) were entered as predictors. Age was controlled for following indicative correlations between age and other variables. Other attitude variables were included due to shared variance between attitude measures. Assumptions for regression models were met (no multicollinearity, homoscedasticity, no influential outliers, errors independent).

Results

Attitudes towards autism

Mean openness was 29.07 ($SD=3.74$; range 11-35). For cognitive attitudes, the mean was 37.34 ($SD=5.06$, range 26-48). This mean indicates positive explicit attitudes, with 58.6% ($n=41$) categorised as having positive attitudes, 41.4% ($n=29$) with neutral attitudes, and no participants with negative attitudes. For the SC-IAT, the mean D score was 0.10 ($SD=0.41$), indicating overall neutral implicit attitudes. However, scores ranged between $-.73$ and $.93$, with a median D score of $.17$ (indicative of a positive implicit attitude), and inspection of the box plot (Figure 2) suggested most participants had positive implicit attitudes. Specifically, 51.5% ($n=35$) had a D score categorised as positive, 25% ($n=17$) neutral and 23.5% ($n=16$) negative.

[Insert Figure 2 here]

For correlations between explicit and implicit attitude measures, only a significant correlation between the two explicit attitudes was noted, with no significant correlations between the implicit and explicit measures (see Table 2).

[Insert Table 2 here]

Relationships between attitudes, knowledge and experience

Mean autism knowledge was 15.89 ($SD=4.49$, range 5-24), out of a possible maximum score of 26 – indicating good autism knowledge. On average 82.5% of the knowledge questions were answered correctly ($SD=13.85$, range 38.46%-100%). For level of contact, the most reported level of contact was having an autistic relative (24.3%, $n=17$, rank=10), followed by providing services for autistic people (21.4%, $n=15$, rank=8). The lowest level of contact reported was “frequently observing autistic individuals” ($n=1$, 1.4%, rank=5). Mean years of

experience working in schools was 12.16 years ($SD=9.44$, range 1-37, median=9.50 years).

Pearson's correlations (Table 2) indicated significant positive relationships between knowledge and explicit attitude measures, such that greater knowledge related to more positive attitudes. Years of experience and age negatively correlated with cognitive attitudes, such that with more experience and older age, attitudes were more negative. Age negatively correlated with knowledge, such that older age related to less accurate knowledge.

Multiple regression with openness as the outcome variable, and cognitive attitudes, implicit attitudes, knowledge, level of contact, years' experience and age as predictors, was conducted. This model was not significant ($F(6,67)=2.19$, $p=.057$) nor were any predictors significant ($ps>.074$). Regression with implicit attitudes (D scores) and the same predictors was also not significant ($F(6,67)=.87$, $p=.53$) with no significant predictors ($ps>.16$). Regression with cognitive attitudes as the outcome was a significant model ($F(6,67)=3.84$, $p=.003$). Autism knowledge was the only significant predictor (Table 3), such that with increasing knowledge, there were more positive cognitive attitudes (Figure 3).

[Insert Table 3 here]

[Insert Figure 3 here]

Discussion

This study investigated Scottish educators' implicit and explicit attitudes towards autistic children. The results indicated positive explicit attitudes overall, but variability within implicit attitudes. A minority expressed negative implicit attitudes – indicating socially desirable answers were given within explicit measures. We also found relationships between age, years' experience, and attitudes, such that younger participants with fewer years' experience had more positive cognitive attitudes. In regression analyses, only greater autism knowledge significantly predicted more positive cognitive attitudes. Together, these findings indicate some promising positive attitudes, but with potential for improvement and continued efforts needed to increase inclusive attitudes.

There was a high level of openness and positive thoughts and beliefs towards autistic children. Indeed, for cognitive attitudes no participants were categorised with negative attitudes. These findings align with prior research which notes often positive attitudes towards the inclusion of autistic pupils amongst educators internationally (Russell et al., 2022). For educators, this implies that many are open towards autistic pupils and hold positive beliefs about them, which theoretically could mean they act inclusively. However, many may have expressed socially desirable answers, and we were not able to measure if these positive attitudes translate into real-world inclusion. Further, recent research suggests that inclusion in itself is still narrowly understood, with a lack of research identifying the most effective approach to inclusion (Olsson & Nilholm, 2022).

Further, despite positive explicit attitudes, approximately a quarter expressed neutral or negative implicit attitudes, although around half showed positive implicit attitudes. This finding contrasts studies investigating implicit attitudes in the general population (Dickter et al., 2020), but supports Obeid et al. (2020) who noted positive implicit associations amongst

students. Kelly and Barnes-Holmes' (2013) study, which included a small sample of applied behaviour analysis (ABA) tutors and mainstream teachers, found negative implicit attitudes, and they speculated that negative attitudes may relate to their sample working with autistic children with high support needs. However, in their study, negative characteristics such as 'difficult' and 'unpleasant' were reported as being consistent with being autistic, and non-autistic children were framed as 'normally-developing' (as opposed to neutral terminology such as typically-developing or non-autistic). This approach could inadvertently have endorsed ableism and stigma (Bottema-Beutel et al., 2020). Since some of our sample did express negative implicit attitudes, further research aiming to understand how and why these negative attitudes develop would be beneficial.

Further, it would be worth considering whether endorsement of neurodiversity – arguably a less stigmatising concept that appreciates differences and shifts away from deficit-based views (Pellicano & den Houting, 2021) – influences attitudes towards autistic pupils. Pellicano and den Houting (2021) argue that a paradigm shift is needed within autism science away from traditional medical views towards neurodiversity. We argue that this shift should also extend to education, and some researchers have recently developed neurodiversity-based educator resources (Alcorn et al., 2022). Of concern is that educators appear to receive little training about autism and even when they do, it may not be applied to their practice (Hsiao & Sorensen Petersen, 2019), therefore when suggesting a paradigm shift we must also bear in mind the practicalities of implementing this into the everyday work of educators around the world.

Our second aim was to examine relationships between attitudes, knowledge and experience. There were significant correlations between cognitive attitudes, years teaching experience and participant's age (as well as knowledge, explored below). With increasing

years of experience and age, attitudes were more negative. This finding contrasts with McGregor and Campbell (2001), who found Scottish teachers with more experience reported more positive attitudes towards autism. At the time of their study, McGregor and Campbell (2001) report only 780 autistic children recorded in Scottish schools – in comparison to almost 24,000 in 2021 (Scottish Government, 2022). Today, younger educators with fewer years' experience may have an appreciation of autism influenced by different socio-cultural contexts. For example, an analysis of British newspapers in the early 2000s highlighted often negative, misleading and inaccurate portrayals of autistic people (Huws & Jones, 2011). An analysis of US newspapers noted stigmatising descriptions reduced between 1998 and 2013 (Yu & Farrell, 2020). In a study of university students tested five years apart, White et al. (2019) noted the more recent cohort had more positive attitudes and better knowledge. Up-to-date training would likely benefit educators at *all* career stages. A recent international study found that training designed through a neurodiversity lens with autistic scholars was effective at improving knowledge and reducing stigma amongst higher education staff (Waisman et al., 2022). Further research extending such training to school educators would be beneficial.

Critically, in regression analyses only autism knowledge predicted more positive cognitive attitudes. This finding supports past research which has noted a relationship between knowledge and attitudes (e.g. Gillespie-Lynch et al., 2015, 2019; Obeid et al., 2015). More accurate knowledge could challenge misconceptions and promote more positive thoughts about autism – thus further supporting the suggestion that training could be useful. However, it should be noted we found no relationship between knowledge and behavioural intentions (openness). Given the relationship between behavioural intentions and stigma, such that lack of openness relates to characteristics of stigma (Cage et al., 2019, p. 201; Gillespie-Lynch et al., 2015; Nevill & White, 2011), it could be that these stigmatising attitudes are more complex and related to other variables, such as empathy and attitudes towards equality

(Gillespie-Lynch et al., 2020). More research is needed in educational contexts to understand how individual characteristics contribute to educators' attitudes, and how educators' behaviour can be positively influenced towards effective inclusion in the classroom.

Limitations & future research

Our sample was biased in several ways: many participants had high levels of contact and most were female and white. Further, the findings are limited to primary school educators, and more research would be useful in secondary school. Here, autistic adolescents may experience more challenges as peer dynamics can be different and difficult (Cresswell et al., 2019). Autistic adolescents have described difficulties with secondary school teachers, including being treated differently and receiving inconsistent support (Humphrey & Lewis, 2008a, 2008b). Thus, research examining secondary school educators' perspectives and attitudes may be beneficial to identify ways of creating more positive secondary school environments.

Another limitation is that the measures used focused broadly on 'autism' and do not capture appreciation of heterogeneity within autistic pupils. For example, participants could be basing their understanding on stereotypical perceptions: Whitlock et al. (2020) presented UK primary school educators with vignettes describing autistic children and found participants less able to recognise autism in girls and were biased against autistic females. Since educators can have a role in recognising and referring autistic children for assessment and support (Whitlock et al., 2020), it is vital more research is conducted to ensure educators are more familiar with and understand autistic heterogeneity.

Although our findings indicated positive attitudes, it is not possible to tell whether this is directly due to Scotland's inclusive policies (e.g. The Scottish Strategy for Autism, Scottish

Government, 2011). While our findings apply in Scotland, it is vital that the social, cultural and political contexts are taken into account when attempting to understand non-autistic peoples' understanding and acceptance of autism. For example, Ballantyne et al. (2019) found more autism knowledge in educator's in the UK compared to China, a country which does not have mandatory inclusion. Further cross-cultural and qualitative research may be beneficial to understand how these contexts influence educators when it comes to the inclusion of autistic pupils. Cross-cultural validation of the measures used in this study would also be beneficial.

Given these limitations, implications are noted with caution. Although explicit attitudes were positive and knowledge reasonable, negative and neutral implicit attitudes were still present. We therefore advocate for compulsory autism-specific training, and training developed in collaboration with autistic people. Particularly, research should test whether focusing on neurodiversity and strengths-based approaches improves attitudes. Such research should examine whether attitudes translate into actual behaviour (Freitag & Dunsmuir, 2015), and directly benefit autistic pupils. While some educators may believe that autism should not be singled out for training compared to other groups (Ravet, 2018), we argue autistic individuals are at higher risk of discrimination – including bullying and victimisation (Schroeder et al., 2014; Sterzing et al., 2012), school exclusions (Brede et al., 2017) and beyond school, autistic adults are less likely to be in employment (Vincent & Fabri, 2020). Efforts are needed to specifically improve equality and inclusion for autistic people across the lifespan.

Conclusion

Overall, we found positive explicit attitudes towards autism in a sample of primary school educators in Scotland. However, some may selectively present explicitly positive attitudes

but have underlying implicit negative attitudes, which could have an impact on inclusion.

Knowledge about autism related to more positive cognitive attitudes, and continued efforts to ensure educators have up-to-date knowledge should be made, ideally through autistic-led training. Educators play an important role in the inclusion of autistic pupils, to support equal opportunities within education and beyond.

Accepted version

Declaration of interest:

The authors have no conflict of interest to declare.

Data availability statement:

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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Table 1. Demographic Information on participants, including school experience details.

	Percentage
Ethnicity	
White British	92.9
Other White Background	4.28
Mixed Ethnicity	1.43
Prefer not to say	1.43
Employment	
Full-time	71.4
Part-time	20.0
Student	7.14
Other	1.43
Level of education	
1-4 Standard Grades/GCSEs or equivalent	7.14
5+ Standard Grades/GCSEs or equivalent	8.57
2+ Scottish Higher/A-levels or equivalent	7.14
Undergraduate degree	41.4
Masters degree	22.9
PhD	2.86
Other qualifications	10.0
Job title	
Primary teacher	54.3
Classroom assistant	20.0
Head teacher	1.43
Deputy head teacher	4.28
Principle teacher	2.86
Educational Psychologist	2.86
Other*	14.3

**Including sports coaches, administrative staff, and outreach workers.*

Table 2. Correlations between variables included in the study.

	Openness		Attitudes to autism scale		Implicit attitudes		Level of contact		Autism knowledge		Years' experience		Age	
	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>
Attitudes to autism scale	.31	.010**												
Implicit attitudes	.15	.21	.010	.94										
Level of contact	.11	.38	.099	.42	.22	.076								
Autism knowledge	.28	.019*	.43	<.001***	.13	.29	.22	.073						
Years' experience	.064	.60	-.24	.043*	.076	.54	.034	.78	-.15	.20				
Age	-.13	.28	-.32	.007**	.069	.58	.073	.55	-.27	.025*	.66	<.001***		
Gender	.18	.13	.14	.26	.086	.49	.17	.16	.10	.41	.097	.44	-.21	.075

Table 3. Regression model with cognitive attitudes as the outcome.

	B	B CI	SE B	β	<i>p</i>
Openness	.29	[-.029 - .61]	.16	.21	.074
Implicit attitudes	-.69	[-3.54 – 2.17]	1.43	-.054	.63
Knowledge	.36	[.091 - .64]	.14	.32	.010
Level of contact	.11	[-.65 -.87]	.38	.032	.78
Years' experience	-.073	[-.24 - .091]	.082	-.14	.38
Age	-.047	[-.18 - .087]	.067	-.11	.49

Note: B= unstandardised beta coefficient, B CI = 95% confidence intervals, SE B= standard error of B, β = standardised beta coefficient.

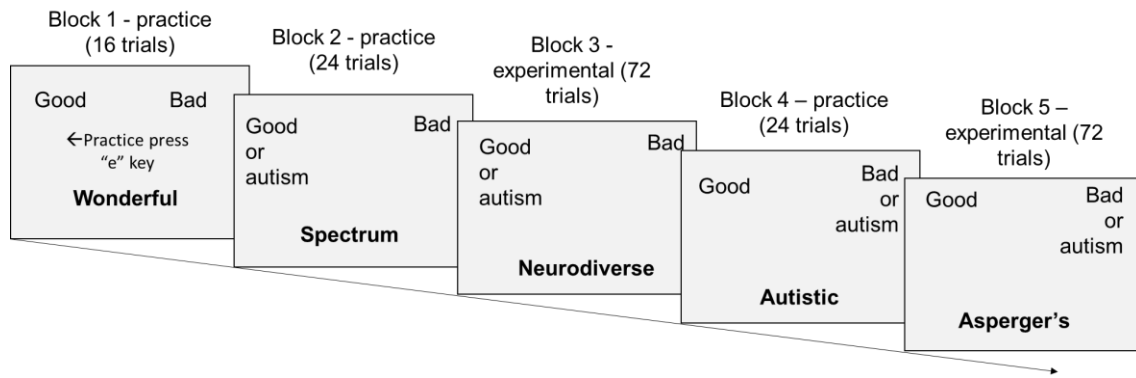


Figure 1. Experimental procedure for the Single Category IAT. The experimental blocks were randomized so that participants either saw the 'good' or 'bad' associations first.

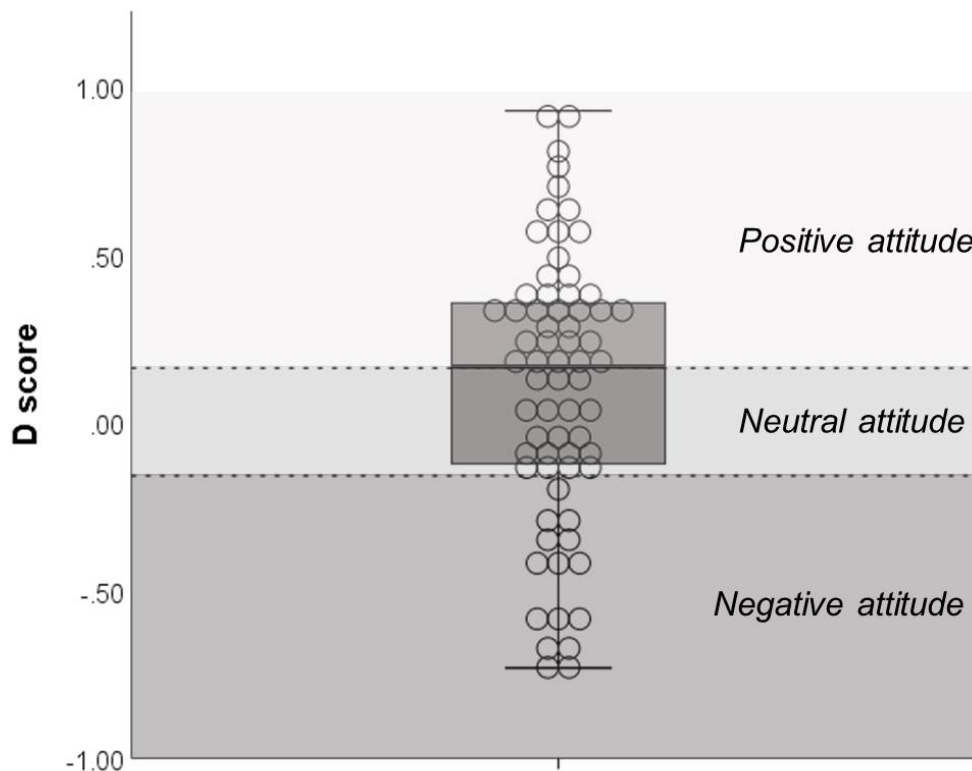


Figure 2. Box plot of D scores from the Single Category Implicit Association Task (SC-IAT). Positive implicit attitudes were indicated by D scores above .16, neutral implicit attitudes by D scores between -.15 and .15, and negative implicit attitudes by D scores less than -.16.

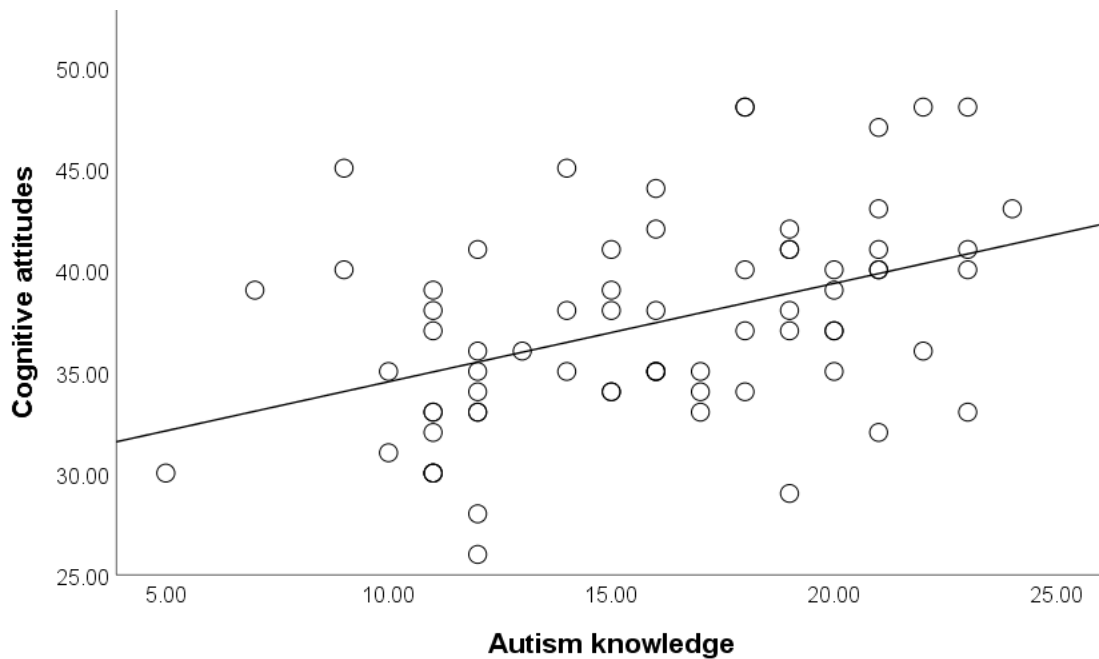


Figure 3. Scatterplot showing the relationship between cognitive attitudes and autism knowledge.

Supplemental material.

Jamie is a new pupil at your school. Jamie does not spend time with, or talk with, other children 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 the playground or talking to people. When in the classroom, 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 pupil and is quite generous with time and possessions. Jamie is always willing to help others out with their work when they ask for it.