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Post-primary school teachers' knowledge and understanding of autism spectrum disorders

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Current national policy in the Republic of Ireland advocates for the inclusion of students with learning difficulties in mainstream schools. With Asperger's syndrome (AS) specifically, it is essential that teachers understand the syndrome and are well versed in appropriate approaches to effectively create an inclusive environment for these students in the mainstream classroom. This paper explores teacher knowledge and understanding of AS while also exploring what affects their confidence in educating students diagnosed with the syndrome. Data collection pre-dated changes to the DSM-V and as such AS is used throughout this paper. A survey was distributed nationally to a random sample of qualified post-primary school teachers. The findings revealed that teachers did not appear to possess an adequate level of knowledge and understanding in relation to the syndrome. Continued professional development programmes in the area appeared to have minimal effect, with those completing programmes scoring only marginally better than those who did not (2.85%). These findings are of concern if these teachers are then expected to foster an inclusive environment, particularly when a high proportion of teachers have previously taught a student diagnosed with the syndrome and their knowledge remains limited.

Keywords: special educational needs; teacher knowledge; Asperger's syndrome; autism spectrum disorders; pedagogy

Introduction

Asperger's syndrome (AS) was a pervasive developmental disorder on the autism spectrum of disorders as defined by the DSM-IV-TR (American Psychiatric Association [APA] 2000) and the ICD-10 (WHO 1992). In May of 2013 with the publication of the DSM-V (APA 2013a, 2013b), AS, autistic disorder, childhood disintegrative disorder and pervasive developmental disorder not otherwise specified were removed as individual diagnostic classifications and replaced with the generic Autism Spectrum Disorder (ASD). This move proved to be controversial with some experts highlighting a variety of issues and/or changes, that they recommend be made to the DSM-V (Worley and Matson 2012; Wing, Gould, and Gillberg 2011). Now, those diagnosed with any of the four pervasive development disorders not specifically listed in the DSM-V should still meet the criteria for ASD (APA 2013a, 2013b). Due to data

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collection for this paper pre-dating this change, the term AS is being used within this paper. Although the terminology is changing, the characteristics and traits of those previously diagnosed with AS remain unchanged. Thus, the core challenges continue for teachers and these include the inclusion of students with high functioning autism in mainstream schools, specifically in post-primary settings.

The nature of AS is 'characterized by abnormalities in reciprocal social interaction and in patterns of communication, and by a restricted, stereotyped, repetitive repertoire of interests and activities' (WHO 1992). AS itself is described as having the same qualitative abnormalities as autism, differing in the fact that there is no general delay or difficulty in language or cognitive development. Due to its nature, those diagnosed with AS can have a variety of characteristics which ultimately lead to adverse educational outcomes in school (Attwood 2008). These include, but are not limited to: interests being limited to specific topics, difficulty learning in large groups, poor concentration skills, poor organizational skills, difficulty with abstract concepts, sensory problems and poor problem-solving skills (Darretxe and Sepúlveda 2011).

Prevalence rates for AS are not well established, with Ehlers and Gillberg (1993) suggesting a minimum of 3.6/1000 and Fombonne (2003) suggesting a self-described conservative figure of 2.5/10,000. Prevalence rates for ASD more generally are better established. Research carried out by the Centre for Disease Control (2014) states that the prevalence rates of autism have changed from 1 in 88 children to 1 in 68 in the United States. Specifically in Ireland, The Report of the Task Force on Autism (Department of Education and Skills [DES] 2001) estimated prevalence rates to lie at 56/10,000 in Ireland (36/10,000 for AS). While no official statistics are as of yet available, a total of 18.09% of students allocated special needs assistant (SNA) support and 6.22% of students allocated additional teaching hours in Irish mainstream post-primary schools are diagnosed with ASD (Banks and McCoy 2011).

The characteristics and traits of AS, while not present in all cases, can create difficulties in the learning environment for the student, in particular due to: large class sizes, the independence granted to students to continue on with their work, lack of interest in subject matter, noise/touch sensitivity in practical subjects and the complex tasks/problems that students are expected to complete. Tobias (2009) highlights that in order for teachers to understand and interpret their students' behaviour correctly, they require knowledge of ASD. Attwood (2012), identifies how teachers who lack understanding of the syndrome can potentially misinterpret behaviour and perceive students with AS as 'defiant, wilfully disobedient or emotionally disturbed, and conventional discipline assumed to be effective'. Situations where this may arise are deeply problematic as they may further marginalise these students. It is essential that teachers possess specialised knowledge and understanding of ASD (Parsons et al. 2009), so that these situations can be avoided.

This includes appropriate methodologies and interventions that can be used to facilitate the educational attainment of the student. A wealth of literature provides insight into effective pedagogies for students with AS (Attwood 2008; Darretxe and Sepúlveda 2011; Mintz 2008; Myles and Simpson 2003; Parsons et al. 2009; Simpson 2005). In a significant number of cases this literature relates to specific classroom strategies that teachers may adopt and have been shown to be effective. Examples of these strategies include the use of clear concise language, breaking complex tasks into step by step instructions, the use of visual aids/demonstrations,

avoiding sensory sensitivities (loud noises, smell/feel of certain objects/classrooms), the establishment of routine and coping strategies for when routine changes. A number of specialised interventions also exist, with the most popular evidence-based interventions including, but not limited to, applied behaviour analysis (ABA) and the treatment and education of autistic and related communication-handicapped children (TEACCH) (Ryan et al. 2011). The TEACCH intervention, focusing on maximizing the independent functioning of the child is quite commonly used with students diagnosed with AS. It has garnered much support (Pittman 2007; Simpson 2005), however the programme lacks social skills training (Hume, Bellini, and Pratt 2005; Matson, Matson, and Rivet 2007) which is integral for students with AS in creating successful and positive interactions with their peers. The National Council for Special Education (NCSE) research report 2 (Parsons et al. 2009) concluded in an international review of best practice provision for students with ASD that due to the diversity of needs of those with ASD more research is needed to establish the effectiveness of various types of provision. The report's authors more recently reiterated this conclusion (Parsons et al. 2011).

The Education for Persons with Special Education Needs act (EPSEN 2004) provides for inclusion in schools, with children with special education needs being taught in the same classroom as those without. DES (2007) post-primary guidelines on inclusion advocate a whole-school community approach, recognising the role all stakeholders have to play (e.g. SNA's, school leaders, parents, teachers) in order to ensure successful implementation. In these guidelines teachers are recognised as having a key role in ensuring the successful inclusion of students with SEN.

The development of inclusive policy and practice in Ireland resulted in a need for additional staff to support these students, thus it was recommended that SNA posts be created in mainstream schools (DES 2011). This scheme aids teachers in providing vital supports to students diagnosed with a variety of learning difficulties while they are in school. However, the Value for Money Review on the special needs assistance scheme, commissioned by the DES (2011), concluded that the role of the SNA in Ireland has been influenced unduly by schools, with some teachers abdicating their role of teaching children with disabilities to the SNA's, providing them with an educational remit. It is possible that this is indicative of teachers feeling there are others better equipped to work with students with SEN, identifying a lack of confidence or competency in the area.

While current national policy in the Republic of Ireland advocates for the inclusion of students with learning difficulties in mainstream schools (DES 2011) this requires teachers to have the necessary skills to effectively engage these students in partnership with all stakeholders, where school leaders, teachers, parents and SNA's all play a part. The Task Force on Autism (2001) noted that a 'high percentage of teachers being employed had little or no knowledge of ASDs'. Research carried out by Cheevers (2010) on behalf of the Asperger's syndrome Association of Ireland identified a significant gap in teacher training. The study concluded that teachers are ill-equipped to face the challenges presented by a child with the syndrome and advocated that more training is essential for sustainable and appropriate interventions. However, as participants of the study were parents it is not possible to extrapolate a measure of teacher competency, but the voices of parents do prompt the need for further investigation. Teachers interviewed by McGillicuddy and O'Donnell (2014) regarded teacher education programmes as insufficient in preparing them to work with students with ASD. While they

varied in their perceived expertise, they unanimously agreed that experience rather than training gave them the necessary skills. There is little available literature examining teachers' level of knowledge and/or understanding of AS itself, or their pedagogical knowledge specific to the syndrome. Nicol (2008) examined this area by developing a scale to measure knowledge of AS. Sourcing 117 participants from a school district in California she concluded that a majority of teachers had a low level of knowledge, scoring less than 60% correct. She noted that teachers who knew/taught a child with AS had more knowledge, on average, than their counterparts who had not. However, as no reliability scores were provided and no independent check of validity was presented these results may not hold up to scrutiny. Nicol's scale was later adapted used by Cornelius (2010) in her investigation of special educators knowledge of AS, yielding similar result, though similar limitations regarding reliability and validity.

While the importance of continued professional development (CPD) in helping teachers to improve or change their practice is widely acknowledged, there is a mixed reaction over the effectiveness of programmes. Some studies have found positive elements of CPD programmes (Lydon and King 2009; Van Den Burgh, Ros, and Beijaard 2014), while others have been critical, either deeming them to be ineffective or in some cases highlighting teachers conceptions of irrelevance (Lieberman and Pointer Mace 2008; Opfer and Pedder 2011). Increased confidence levels have been associated with CPD for teachers (Brown, Edmonds, and Lee 2001; Powell et al. 2003). Features of effective professional development programmes are also well documented (Ingvarson, Meiers, and Beavis 2005; Van Veen, Zwart, and Meirink 2012). Those that facilitate effectiveness include: being driven by identified learning needs, collaborative in nature and related to personal classroom experience/practice. Ingvarson, Meiers, and Beavis (2005) found that provision of feedback to teachers on their practice is rarely built into such programmes, which limits their effectiveness. Van Den Burgh, Ros, and Beijaard (2015) later identifies teacher feedback as being a critical factor in effective professional development.

The Professional Development Service for Teachers is Ireland's largest support service offering learning opportunities to teachers and school leaders; however they do not offer professional development in SEN. The Special Education Support Service offers a range of professional development in SEN, including but not limited to ASD. It had previously operated under the remit of the Teacher Education Section of the DES but is now in a transition phase and will form part of the newly configured Inclusion Support Service. In examining uptake in these programmes in the Irish context, though related to primary rather than post-primary school, Banks and Smyth (2011) identified higher participation rates among female teachers. They also concluded that geographical location has no effect on CPD uptake; however it does increase with the level of teaching experience or career stage of the teacher, which is in line with international literature (Richter et al. 2011). While these services are available, Shevlin, Kenny, and Loxley (2008) reported a shortfall in opportunities being available to teachers to take part, describing the current short courses and in-services made available as inadequate for teacher needs, with teachers reporting that 'hands-on' training is required.

It is clear that teachers hold a pivotal role for the successful inclusion of students with SEN. This research endeavoured to identify the needs of Irish post-primary school teachers, focusing on their knowledge and understanding of AS and the factors that influence them. This will help determine the areas that would require

the greatest focus in development of teachers’ knowledge and skill so that they can meet the complex needs of their students. Meeting these complex needs demands more than simply pedagogical expertise; it also requires the capacity to address the affective dimensions of the students’ development, specifically their social and emotional well-being.

Methodology

Design

A mixed methods research design was adopted for the study. This was developed from research conducted by Cornelius (2010), who created the Knowledge of Asperger’s Scale (KASP) Revised to assess special education teachers’ knowledge of AS. The KASP-Revised was adapted from Nicol’s (2008) original KASP.

Research instrument

Cornelius’ scale was revised and adapted to more suitably address the needs of the present study. The original scale consisted of 33 items relating to AS which participants had to respond either ‘True’, ‘False’ or ‘Don’t Know’ to. This was revised to participants rating a total of 34 items on a 10 point likert scale, with 1 = ‘strongly disagree’ and 10 = ‘strongly agree’. These 34 items were divided into three distinct areas of query; general information; interventions and diagnostics. Some items were removed as there was a general similarity between them and in order to balance and develop the three sub-scales we wished to include more specific items without increasing the total number significantly (Table 1).

The diagnostic items were developed based on the diagnostic criteria from the DSM-IV-TR (2000), the general information items from both the DSM-IV-TR and

Table 1. Scale item changes.

Removed items	New items
A student must have a significant delay in language development to meet the criteria for AS.	Research suggests that students with AS have improved organisational and planning abilities.
Children diagnosed with Asperger’s also have been diagnosed with Autism Disorder.	Students with AS could have difficulty controlling their impulses.
Children diagnosed with Autism is the same as a child with Pervasive Developmental Disorder.	Students with AS accept when they are wrong and welcome constructive feedback.
Children diagnosed with Asperger’s also has been diagnosed with Autism.	Students with AS should be provided with verbal instructions only.
Children with AS usually have no regard for rules.	Students with AS should be provided with a breakdown of the steps required for classroom tasks.
Children with Asperger’s have difficulty reading social cues.	Relevant information should be highlighted to student’s with AS. Children with AS always have hyper sensitivity issues.

relevant literature (Attwood 2008; Myles and Simpson 2003; Pyles 2001; Wing 1981) and finally the intervention items from the literature on suggested interventions from experts in the field (Darretxe and Sepúlveda 2011; Frith 2003; Plimley and Bowen 2006; Ryan et al. 2011). A 10-point scale was used to provide more reliable data (Dawes 2008) and to remove the middle ground option for participants. A total of 19 statements related to general information, 9 to interventions and 6 to diagnostics.

The survey also included several demographical items to aid in data analysis and queried whether participants had any previous experience with AS. Participants were also asked to rate their confidence in working with a student diagnosed with AS on a five point likert scale and were also asked several items related to continuous professional development. Two open-ended items were placed at the end of the survey to further explore their needs in relation to teaching students with AS, though these form no part of the analysis in this paper.

Piloting

For validity purposes the survey was reviewed by three experts independent of this study in the fields of psychology (clinical psychologist), education (academic) and special education needs (academic) to determine that the 'instrument in fact measures what it purports to measure' (Cohen, Manion, and Morrison 2011). They were chosen for their expertise in their areas, each possessing an in-depth knowledge of AS and were asked to review the scale in order to verify the scale was an accurate measure of knowledge of AS. This ensured that the scale included all aspects that it should and did not include anything considered to be irrelevant (Litwin 1995).

The survey was piloted with five post-primary school teachers to reduce the risk of errors in the main study (Gudmundsdottir and Brock-Utne 2010). Participants were asked to complete a feedback sheet according to Bell's (2010) seven question framework which sought to establish if: the instructions were clear; any questions were ambiguous; participants objected to answering any questions; any major topic had been omitted; the layout of the questionnaire was clear/attractive. Participants were also asked how long it took them to complete and provided an opportunity for them to offer any additional comments. Changes were made to the survey from the feedback ahead of sampling. For validity purposes, analysis procedures were also tested at this point to ensure the analysis of results would address the objectives of the research.

For reliability purposes eight participants formed part of a test/re-test group. These participants were given the survey to complete and were re-tested a week later. The survey was deemed reliable having produced a statistically significant Pearson correlation value of $\rho = .912^*$. To establish internal reliability of the survey the Kuder Richardson Coefficient (K-R 20) was employed after participants responses were coded into correct and incorrect responses. Very weak values were observed here in each of the three sub-scales. General information had a value of .279, interventions -.142 and diagnostics .163. Due to the validity of the measurement tool being established, low K-R 20 values can be typically associated with the test being too difficult for participants and evidence that they are in fact guessing with their responses (Frisbie 1988; Wells and Wollack 2003). In this instance guessing is being defined as concluding something without sufficient information to be sure it's correct.

Sampling

The survey was distributed nationally to a random sample of qualified post-primary school teachers. SNA's and student teachers were excluded from the study. A sample size of 225 was achieved with a response rate of 56% equating to 126 respondents. A random stratified sampling process was adopted. This divided the population into homogeneous subgroups prior to sampling ensuring (Cohen, Manion, and Morrison 2011) a balanced sample was obtained from each of the four types of post-primary schools in the Republic of Ireland. This was done by establishing the percentage total of teachers that worked in each type of school and proportionately sampling from these schools accordingly (Table 2).

Participants

Participants were identified by using a random number generator on an excel database of schools, identifying individual schools for contact. School principals were sent a letter requesting their permission to send surveys to their teachers. Once permission was granted the surveys were sent, along with information sheets and pre-stamped return envelopes. Only qualified post-primary school teachers were asked to complete surveys.

Ethics

Ethical approval was granted by the Faculty of Education and Health Sciences Research Ethics Committee at the University of Limerick. Participation in the study was entirely voluntary. Participants provided their consent to participate when they completed and returned the survey. This was explained on information sheets provided to each participant. To protect the anonymity of the participants they were not asked to provide any personal information which could be used to identify them.

Analysis

Descriptive and inferential data analysis was conducted using IBM SPSS Statistics 20. This allowed for the relationship between different variables to be explored so that an understanding of the needs of post-primary school teachers could be developed. The standard descriptive analysis procedures of frequencies, percentages, cross tabulations and correlations were followed (as outlined by Cohen, Manion, and Morrison 2011). Inferential analysis procedures (Anova and *T*-Tests) were used to explore the variance between groups in the study and to determine if any of these were statistically significant.

Table 2. Stratified sample breakdown.

School type	Number of teachers	% of total	% Respondents
Secondary	13,373	51	28.6
Vocational	8538	33	38.1
Community	3599	14	28.6
Comprehensive	675	2	4.7

Results

Demographical data

A total of 126 participants returned the surveys. Of these participants 75% were female and 25% were male. The majority of participants, 60% were under the age of 39. [Table 3](#) illustrates this and additional demographical data together with participant experience's with AS.

Teacher knowledge and understanding

For the purposes of measuring knowledge and understanding of the syndrome, participants completed the KASP-Revised portion of the survey. Participants rated 34 items from 1–10, with 1 representing 'strongly disagree' and 10 representing 'strongly agree'. Each item was a statement related to AS and was in fact either true or false.

Depending on where participants scored their response on the scale, it also represented the level of certainty they had with their response. As a scale of 1–10 was used, specific levels of certainty were awarded to each of the points on the scale. Three levels of certainty were utilised, being 'very certain', 'relatively certain' and 'uncertain'. This can be seen in [Figure 1](#).

Overall scores

The overall scores for the KASP-Revised portion of the survey for each participant were distributed normally as [Figures 2](#) and [3](#) demonstrate. For inferential analysis procedures, carried out using parametric techniques, it is important that the scores are normally distributed.

Of the 34 items in the survey, participants scored on average 71.18% correctly. 24.23% of questions were answered correctly, but with participants being uncertain with their answers. This combined with the number of incorrect responses results in participants on average scoring 53.05% of their responses as either 'incorrect' or 'correct' and 'uncertain'.

Participants' scores in each of the sub-scales were varied ([Table 4](#)) and have been summarised below:

- General information – 75.94% correct (23.55% uncertain), 24.06% incorrect.
- Interventions – 72.44% correct (26.42% uncertain), 27.56% incorrect.
- Diagnostics – 54.25% correct (23.09% uncertain), 45.75% incorrect.

Effect of continued professional development on scores

When examining the effect of CPD on AS on scores within the KASP portion of the survey, it can be seen that on average those who had completed CPD on AS scored 2.85% better than those who had not ([Table 4](#)). They scored a total 72.75% correctly; with 21.71% of this being 'uncertain' correct responses, in comparison with a score of 69.90% correct with 26.47% being 'uncertain' correct responses for those who had not. An independent samples *t*-test was conducted to determine whether any statistical significance existed between the scores of those who had completed CPD on AS and those who had not. There was no significant difference in scores for those who had

Table 3. Demographics and experience with AS.

Name	Categories	n	Taught a student with AS			Ever read article/ paper		Done CPD on AS		Confidence working with AS				
			Yes n%	No n%	Don't know n%	Yes n%	No n%	Yes n%	No n%	Not confident n%	Not very confident n%	Somewhat confident n%	Very confident n%	Extremely confident n%
Gender	Male	31	80.6	12.9	6.5	67.7	32.3	38.7	61.3	3.2	16.1	58.1	16.1	6.5
	Female	95	78.9	15.8	5.3	82.1	17.9	47.4	52.6	4.2	23.2	51.6	17.9	3.1
Age	20–28	23	69.6	26.1	4.3	65.2	34.8	30.4	69.6	8.7	26.1	52.2	13.0	0.0
	29–38	52	80.8	17.3	1.9	76.9	23.1	61.5	38.5	1.9	17.4	51.9	26.9	1.9
	39–48	26	77.0	11.5	11.5	88.5	11.5	26.9	73.1	3.8	30.8	50.0	7.7	7.7
	49–58	18	88.8	5.6	5.6	83.3	16.7	44.4	55.6	0.0	22.2	55.6	11.1	11.1
	58+	5	80.0	0.0	20.0	80.0	20.0	40.0	60.0	20.0	0.0	80.0	0.0	0.0
Years teaching	1–5	32	65.6	25.0	9.4	75.0	25.0	40.6	59.4	3.1	25.0	50.0	21.9	0.0
	5–10	27	88.9	7.4	3.7	81.5	18.5	51.9	48.1	3.7	18.5	51.9	22.2	3.7
	10–15	27	85.2	14.8	0.0	74.1	25.9	51.9	48.1	3.7	22.3	48.1	25.9	0.0
	15–20	14	64.3	28.6	7.1	78.6	21.4	28.6	71.4	0.0	28.7	57.1	7.1	7.1
	20+	26	88.5	3.8	7.7	84.6	15.4	46.2	53.8	7.7	15.5	61.5	3.8	11.5
School type	Vocational/ Community College	48	87.5	8.3	4.2	79.2	20.8	39.6	60.4	4.2	18.8	68.7	6.2	2.1
	Comprehensive School	6	83.3	16.7	0.0	66.7	33.3	50.0	50.0	0.0	16.7	33.3	50.0	0.0
	Community School	36	80.5	16.7	2.8	86.1	13.9	75.0	25.0	2.8	16.7	41.7	36.1	2.7

(Continued)

Table 3. Continued.

Name	Categories	<i>n</i>	Taught a student with AS				Ever read article/ paper				Done CPD on AS					Confidence working with AS				
			Yes		No		Yes		No		Yes		No			Somewhat confident		Very confident		Extremely confident
			<i>n</i> %	<i>n</i> %	<i>n</i> %	<i>n</i> %	<i>n</i> %	<i>n</i> %	<i>n</i> %	<i>n</i> %	<i>n</i> %	<i>n</i> %	<i>n</i> %	<i>n</i> %	<i>n</i> %	<i>n</i> %	<i>n</i> %	<i>n</i> %	<i>n</i> %	<i>n</i> %
School location	Single Sex Secondary School (Boys)	12	75.0	16.7	8.3	58.3	41.7	41.7	58.3	0.0	16.7	41.7	25.0	16.6						
	Single Sex Secondary School (Girls)	21	57.1	28.6	14.3	81.0	19.0	14.3	85.7	9.5	38.1	47.6	0.0	4.8						
	Co-educational Secondary School	3	100.0	0.0	0.0	66.7	33.3	0.0	100.0	0.0	33.3	66.7	0.0	0.0						
	Urban	47	76.6	19.1	4.3	83.0	17.0	40.4	59.6	6.4	23.4	51.1	17.0	2.1						
	Suburban	53	84.9	13.2	1.9	73.6	26.4	43.4	56.6	1.9	20.8	52.8	18.8	5.7						
	Rural	26	73.1	11.5	15.4	80.8	19.2	57.7	42.3	3.8	19.2	57.8	15.4	3.8						

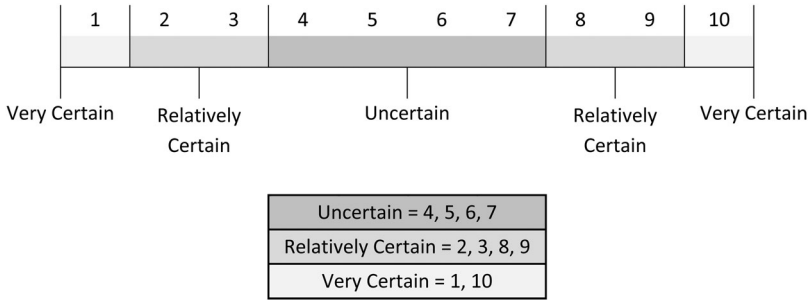


Figure 1. Scale certainty breakdown.

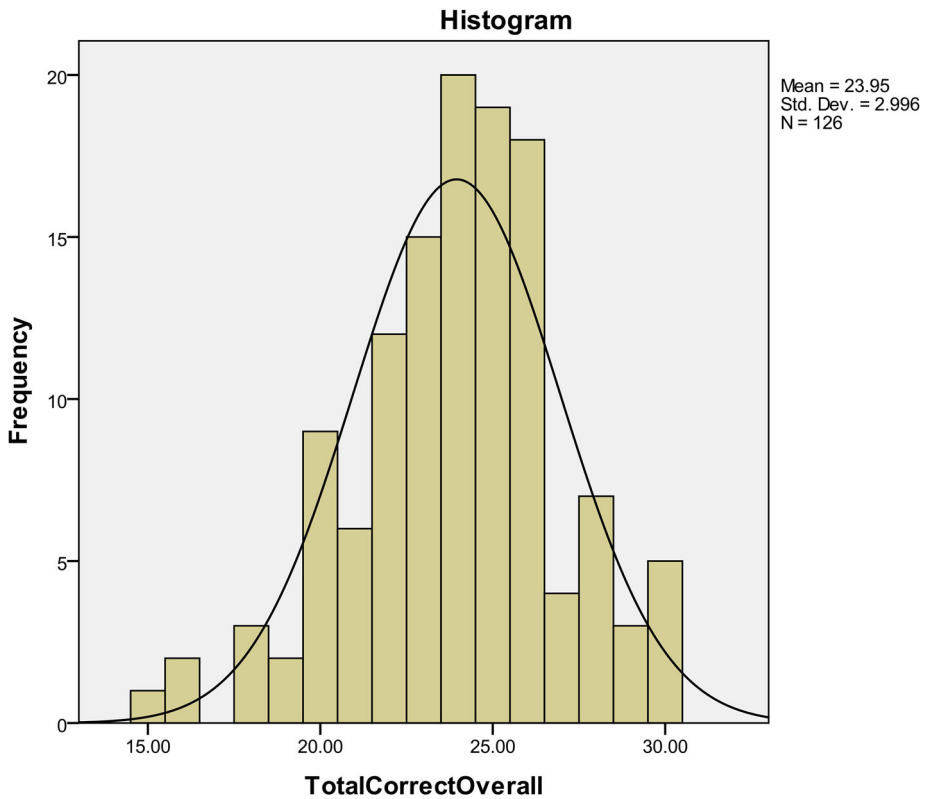


Figure 2. Histogram of participants overall scores.

($M = 24.46$, $SD = 2.91$) and those who had not ($M = 23.54$, $SD = 3.02$; $t(124) = 1.73$, $p = .09$, two-tailed).

The percentage of certainty ratings saw a decrease of ‘uncertain’ and increase of ‘relatively/very certain’ correct responses when participants had completed CPD on AS. An independent samples *t*-test was again conducted to explore variance between the certainties of responses. There was a statistically significant difference in ‘uncertain’ responses for who had done CPD on AS ($M = 11.77$, $SD = 6.61$) and

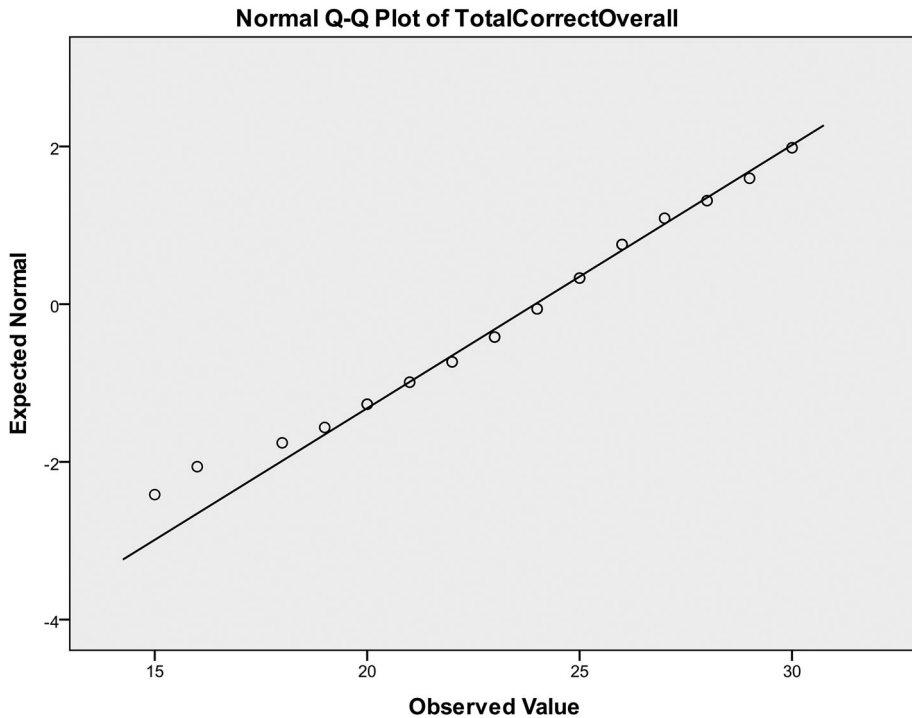


Figure 3. Normal Q-Q plot of participants overall scores.

those who had not ($M = 14.67$, $SD = 7.82$; $t(124) = -2.14$, $p = .029$, two-tailed). The magnitude of the differences in the means (mean difference -2.89 , 95% CI: -5.48 to $-.30$) was small (eta squared = $.038$). Similarly, there was a statistically significant difference in ‘relatively certain’ responses for who had done CPD on AS ($M = 13.93$, $SD = 5.20$) and those who had not ($M = 11.78$, $SD = 5.97$; $t(124) = 2.12$, $p = .035$, two-tailed). The magnitude of the differences in the means (mean difference 2.15 , 95% CI: $.15$ – 4.14) was small (eta squared = $.035$). There was no significant difference in ‘very certain’ responses for those who had ($M = 7.85$, $SD = 6.39$) and those who had not ($M = 7.17$, $SD = 7.14$; $t(124) = .562$, $p = .58$, two-tailed).

Effect of teaching / literature experience on scores

When examining the effect of having read an article/paper on AS and having taught a student with the syndrome, on scores within the KASP-Revised portion of the survey, it can be seen that on average those who had answered ‘yes’ to both of those criteria scored 5.88% better than those who had not (Table 4). They ($n = 88$) scored a total 73.02% correctly; with 21.96% of this being ‘uncertain’ correct responses, in comparison with a score of 67.14% correct with 32.86% being ‘uncertain’ correct responses for those who had not ($n = 15$). Similar to the effect of CPD the % of certainty ratings saw a decrease of ‘uncertain’ and increase of ‘relatively/very certain’ correct responses when participants had read an article/paper and taught a student with AS.

Table 4. KASP-scores – all cases and select cases.

	<i>n</i>	Incorrect				Correct			
		Very certain <i>n</i> %	Relatively certain <i>n</i> %	Uncertain <i>n</i> %	Total <i>n</i> %	Uncertain <i>n</i> %	Relatively certain <i>n</i> %	Very certain <i>n</i> %	Total <i>n</i> %
KASP Overall (all cases)	126	2.61	8.13	18.08	28.82	24.23	29.38	17.57	71.18
General	126	1.89	7.64	14.53	24.06	23.55	30.82	21.57	75.94
Interventions	126	1.70	5.22	20.64	27.56	26.42	31.03	14.99	72.44
Diagnostic	126	6.27	14.02	25.46	45.75	23.09	22.37	8.79	54.25
CPD on AS = YES	57	2.39	7.58	17.28	27.25	21.71	32.37	18.67	72.75
CPD on AS = NO	69	2.79	8.12	19.19	30.10	26.47	26.84	16.59	69.90
Article/Taught AS = YES	88	2.94	8.06	15.98	26.98	21.96	31.08	19.98	73.02
Article/Taught AS = NO	15	2.69	4.99	21.76	29.44	32.86	26.28	8.00	67.14

Demographical analysis on scores

No statistical significance was found to exist between the scores of males ($M = 23.10$, $SD = 3.03$) and females ($M = 23.10$, $SD = 3.03$; $t(124) = -1.85$, $p = .07$, two-tailed) when an independent samples t -test was conducted.

One-way between-groups analyses of variance were conducted to explore the impact of age and teaching experience on overall scores. In the first analysis participants were divided into five groups according to their age (group 1: 20–28yrs; group 2: 29–38yrs; group 3: 39–48yrs; group 4: 49–58yrs; group 5: 58yrs and above). There was no statistically significant difference in overall scores for the five age groups: $F(4, 119) = 1.3$, $p = .27$. In the second analysis participants were divided into five groups according to their years' experience teaching (group 1: 1–5yrs; group 2: 5–10yrs; group 3: 10–15yrs; group 4: 15–20yrs; group 5: 20yrs and above). There was no statistically significant difference in overall scores for the five age groups: $F(4, 121) = .96$, $p = .433$.

Correlation of overall score and certainty levels

Table 5 shows the number of participants that scored specific percentage levels of certainty in their correct responses, based on their overall scores. With a mean score of 24 correct responses, it can be seen that the highest number ($n = 20$) of participants scored this. Of these the majority scored under 20% of their correct responses 'very certain'. The next majority scored between 41–60% of their correct responses 'relatively certain' and the final majority scored between 21–40% of their correct responses 'uncertain'. This is true across almost all variants of total scores.

Experience and confidence

Asked if they knew anyone with AS, 81% answered affirmatively while 79.4% said that they had taught a student with AS. A total of 7 teachers equating to 5.6% of the sample did not know if they had taught a student with AS in the past. Table 6 shows the correlation between those who had taught a student with AS and those who had done CPD on AS or read an article or paper on the subject. A total of 50% of those who have taught a student with AS have never completed CPD on the subject.

The majority of participants, 53.2% felt 'somewhat confident' in working with students with AS. A total of 25.4% of participants felt they were 'not very confident' or 'not at all confident' in working with students diagnosed with the syndrome, while 17.5% felt 'very confident' and 4% 'extremely confident'. Table 7 displays the relationship between various experience teachers may have had with AS, be it through CPD, teaching a student, journal articles or simply knowing anyone with the syndrome and their corresponding confidence ratings.

When examining the confidence level of those who had not participated in CPD on AS, a majority of 56.5% would rate themselves as somewhat confident. In this case only 5.8% would rate themselves 'very confident' while a further 31.9% would rate themselves as 'not very confident'. A shift in confidence levels can be observed when looking at those who have completed CPD on AS. A total of 40.3% would rate themselves 'very confident' or better. The majority however would still rate themselves as 'somewhat confident'.

Table 5. KASP-Revised – correlation of overall scores and percentage of response certainty.

		Very certain					Relatively certain					Uncertain					
			21–	41–	61–		21–	41–	61–		21–	41–	61–		21–	41–	61–
		≤20%	40%	60%	80%	≥80%	≤20%	40%	60%	80%	≥80%	≤20%	40%	60%	80%	≥80%	
	<i>n</i>	<i>n</i>	<i>n</i>	<i>n</i>	<i>n</i>	<i>n</i>	<i>n</i>	<i>n</i>	<i>n</i>	<i>n</i>	<i>n</i>	<i>n</i>	<i>n</i>	<i>n</i>	<i>n</i>	<i>n</i>	
Total Correct	15.00	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	1
Overall	16.00	2	0	1	1	0	0	1	0	1	0	0	1	0	1	0	0
	18.00	3	2	1	0	0	0	1	1	1	0	0	0	1	1	0	1
	19.00	2	1	1	0	0	0	0	2	0	0	0	0	0	2	0	0
	20.00	9	8	1	0	0	0	2	5	1	1	0	1	2	3	3	0
	21.00	6	5	0	1	0	0	1	0	2	3	0	2	2	1	0	1
	22.00	12	5	6	1	0	0	1	6	4	1	0	2	6	1	2	1
	23.00	15	8	1	3	2	1	3	5	6	0	1	4	7	2	1	1
	24.00	20	10	6	3	1	0	0	6	7	6	1	8	12	0	0	0
	25.00	19	10	3	3	2	1	6	4	9	0	0	5	8	4	1	1
	26.00	18	8	4	5	1	0	2	7	5	4	0	7	9	2	0	0
27.00	4	3	0	1	0	0	0	0	4	0	0	1	2	1	0	0	
28.00	7	4	0	1	2	0	2	3	1	0	1	4	1	1	1	0	
29.00	3	2	0	1	0	0	0	0	2	1	0	1	1	1	0	0	
30.00	5	0	3	1	0	1	1	0	4	0	0	5	0	0	0	0	

Table 6. Correlation of teachers who taught students with AS that have done CPD or read an article/paper on the subject.

		<i>n</i>	Ever read article/paper		Done CPD on AS	
			Yes <i>n</i> %	No <i>n</i> %	Yes <i>n</i> %	No <i>n</i> %
Taught a student with AS	Yes	100	88.0	12.0	50.0	50.0
	No	19	36.8	63.2	36.8	63.2
	Don't know	7	57.1	42.9	0.0	100.0

Examining previous experience in teaching a student with AS, only those who had previously taught a student diagnosed with the syndrome rated themselves 'very confident' or higher, while 57% of those who have taught a student with AS rated themselves 'somewhat confident'. A total of seven participants (5.5%) of the sample did not know if they had ever taught a student with AS.

Having read an article/paper previously or knowing someone with AS saw increases in the number of participants who felt 'very confident' or higher in working with a student with AS, with 27.3% more in relation to having read an article/paper and 21.3% more for those who knew someone with the syndrome.

Table 8 illustrates the correlation between confidence and experience with AS. Of the small group who had rated themselves 'extremely confident', each of those individuals had known and taught someone with AS, but also had read an article/paper and completed CPD in the area. Similar results can be seen in those who rated themselves 'very confident' with a small proportion having not known someone with AS (4.5%) or having not completed CPD on AS (18.2%).

Discussion

Demographical based experience with AS

Due to national policy and focus on inclusion of SEN in schools, ideally all teachers should feel confident in working a student with AS, however the data in this study show that the majority of both male (58.1%) and female (51.6%) participants felt only 'somewhat confident' (Table 3). This is less than optimal, however is somewhat unsurprising due to the limited participation of these teachers in CPD specifically relating to AS. Although it is noteworthy that female teachers did have higher participation rates, which reflects Banks and Smyth's (2011) analysis on primary school teachers. Of further concern is that the vast majority of these participants (Male = 80.6%, Female = 78.9%) have actually taught a student diagnosed with the syndrome in the past. This raises some challenges in terms of availability and access to CPD specific to AS, but also to the insights drawn from the experiences from teaching.

Community schools had the highest proportion (75%) of teachers who had completed CPD on AS, while comprehensive schools had 50%, single sex secondary (boys) had 41.7%, vocational/community colleges had 39.6%, single sex secondary (girls) had 14.3% and co-educational secondary schools had 0%. While similar

Table 7. Correlation of teacher experience with confidence ratings.

		Confidence working with AS					
		Not confident	Not very confident	Somewhat confident	Very confident	Extremely confident	
		<i>n</i>	<i>n</i> %	<i>n</i> %	<i>n</i> %	<i>n</i> %	<i>n</i> %
Know anyone with AS	Yes	102	2.9	15.7	55.9	20.6	4.9
	No	24	8.3	45.8	41.7	4.2	0.0
Ever read article/paper	Yes	99	2.0	13.1	57.6	22.2	5.1
	No	27	11.1	51.9	37.0	0.0	0.0
Taught a student with AS	Yes	100	1.0	15.0	57.0	22.0	5.0
	No	19	10.6	52.6	36.8	0.0	0.0
	Don't know	7	28.6	28.6	42.8	0.0	0.0
Participated in CPD on AS	Yes	57	1.8	8.8	49.1	31.5	8.8
	No	69	5.8	31.9	56.5	5.8	0.0

Table 8. Correlation of confidence ratings with teacher experience.

		<i>n</i>	Know anyone with AS		Ever read article/paper		Taught a student with AS			Done CPD on AS	
			<i>n</i>	<i>n</i> %	<i>n</i> %	<i>n</i> %	<i>n</i> %	<i>n</i> %	<i>n</i> %	<i>n</i> %	<i>n</i> %
Confidence working with AS	Not at all confident	5	60.0	40.0	40.0	60.0	20.0	40.0	40.0	20.0	80.0
	Not very confident	27	59.3	40.7	48.1	51.9	55.6	37.0	7.4	18.5	81.5
	Somewhat confident	67	85.1	14.9	85.1	14.9	85.1	10.4	4.5	41.8	58.2
	Very confident	22	95.5	4.5	100.0	0.0	100.0	0.0	0.0	81.8	18.2
	Extremely confident	5	100.0	0.0	100.0	0.0	100.0	0.0	0.0	100.0	0.0

numbers of participants from both community schools (75%) and vocational/community colleges (39.6%) participated in this study, there is a significant difference between the proportion of teachers from these schools who have completed CPD on AS. This is an interesting finding and is somewhat problematic as it points to the ad hoc nature of participation in CPD specific to AS and suggests it may only be completed when the need arises.

Exploring the location of these schools there is a relatively equal mix between urban, suburban and rural locations. Few differences in CPD participation exist here based on geographical location (Urban = 40.4%; Suburban = 43.4%; Rural = 57.7%). While participants in this study were post-primary school teachers the results reflect the findings of Banks and Smyth (2011) specific to primary school teachers in Ireland.

Their study also suggested that experience/stage in career of teachers can be a contributing factor to CPD uptake. With regard to teaching experience, a significant decrease in participation of CPD on AS for those 15–20 years into their career is evident. The data suggests that as teachers move forward in their careers they are less likely to complete CPD on AS. This contrasts with the literature available both nationally and internationally (Banks and Smyth 2011; Richter et al. 2011). However this requires further investigation due to the relatively low number of teachers sampled from that career stage but also in its specificity of CPD on AS.

Knowledge and understanding – KASP-REVISED

The data yielded interesting insights in relation to teachers' level of knowledge and understanding surrounding AS. Though it is vital for teachers to possess the necessary knowledge and understanding to teach students with AS (Attwood 2012; Parsons et al. 2009; Tobias 2009), this is not the case for all Irish post-primary teachers. On average participants answered 71.18% (approx. 24 out of 34 items) of items correctly. However, 24.23% of these responses were answered correctly in the uncertain range of the 10-point scale (4–7). This combined with the 28.82% of incorrect responses results in a total amount of 53.05% of responses being answered either incorrectly, or correctly but uncertain. While a participant being correct but uncertain in their response is promising in that it is correct, it is inadequate as they are either guessing or not confident in their response which is problematic. It is clear a more solid foundation of knowledge is required. These findings, when taking certainty into account, are similar to those of Nicol (2008), when she examined teacher knowledge and found a majority of participants getting less than 60% correct. Though it is worth noting that excluding certainty, $n = 76$ or 60.3% of participants scored 70% or better. In advocating for inclusion (DES 2011) a key aspect is teacher knowledge and understanding. These findings demonstrate that teachers may not possess these requisites in relation to AS, which potentially impacts any attempts at genuine successful inclusion. Of the three sub-scales participants scored best in the 19 item general information section with 75.94% correct responses, closely followed by 9 item interventions section with 72.44% correct responses with participants scoring least in the 6 item diagnostic section with 54.25% correct responses. Similar to the overall scores, the level of certainty which was attached to correct responses in each of the sub-scales can be seen. Taking this into account it can be seen that in each of the three sub-scales:

- General information – Participants answered 47.61% of statements incorrectly (24.06%) or correct but uncertain (23.55%).
- Interventions – Participants answered 53.98% of statements incorrectly (27.56%) or correct but uncertain (26.42%).
- Diagnostics – Participants answered 68.84% of statements incorrectly (45.75%) or correct but uncertain (23.09%).

It is clear in this instance that any CPD programmes designed should cover information in all three of these areas and be developed with features of effective programmes identified in the literature (Ingvarson, Meiers, and Beavis 2005; Van Veen et al. 2012).

Examining the difference in participants' scores based on whether or not they had completed CPD in the area of AS has shown that on average, those who completed CPD scored 2.85% better than those who had not. Following an independent samples *t*-test of this result it was shown that there was no statistically significant difference between those who had and those who had not. While successful CPD programmes have the potential to affect real change in teacher practice and student learning (Van Den Burgh, Ros, and Beijaard 2014; Lydon and King 2009) this raises the question of the effectiveness of CPD. As the typology and structure of the CPD was not explored it is difficult to draw any meaningful conclusions here. However, the impact and effectiveness of CPD provision in Ireland warrants further investigation. CPD did have a statistically significant effect in the certainty of participants' correct responses, albeit small in terms of magnitude. While this is positive, a more significant increase than 5.53% 'relatively certain' and 2.08% 'very certain' responses would be expected having completed CPD in the area.

McGillicuddy and O'Donnell (2014) noted that teachers unanimously agree that experience rather than training is what gave them the necessary skills to teach students with AS and the data in this study reflects this. An increase (5.88%) in scores was observed when comparing those who had read an article or paper in the area of AS and had previously taught a student with the syndrome. Larger changes in certainty ratings were observed here with a reduction of 10.9% 'uncertain' correct responses, an increase of 4.8% 'relatively certain' correct responses and an increase of 11.98% 'very certain' correct responses. The increase in certainly levels based off various forms of experience is similar to the increased levels of confidence that were seen when individuals had a variety of different forms of experience with the syndrome.

Experience versus confidence

The relationship between the identified forms of experience (reading an article/paper on AS, teaching a student with AS and completing CPD on AS) is worthy of exploration in order to identify any significant influence these forms of experience for have on one another and on the teacher's own perceived confidence. A total of 78.6% of participants indicated that they would be either 'somewhat confident' (53.2%) or 'not very confident/not at all confident' (25.4%) in working with a student with AS. This is worrisome given 79.4% of participants have taught a student diagnosed with the syndrome. The smallest proportion of teachers (21.4%) rated themselves 'very confident' or 'extremely confident'. In order for educators to successfully facilitate the educational attainment of students with AS they require confidence in their

pedagogical capacities in this regard. A greater understanding of the varying factors that can affect this confidence is necessitated.

Of those who have taught a student diagnosed with the syndrome it was heartening to discover that 88% have read an article or paper on the subject, however while significantly less, 50% have never engaged with any CPD in the area. The level of engagement seen from participants with literature in the area is promising, however only 50% engagement with CPD in the area is less than optimal. In order to understand the complexities of the syndrome and the effect that these can have on the classroom it is imperative that educators have the necessary training and knowledge to meet the needs of students diagnosed with the syndrome (Attwood 2012; Laushley 2008). A small proportion of teachers (5.5%) could not identify whether or not they had taught a student with the syndrome in the past, which is problematic.

An increase in confidence ratings was noticeable when correlated with the different forms of experience (Table 5.). In particular, there was a 25.8% increase in those rating themselves 'very confident' if CPD had been completed. A further increase of 8.8% can be seen in those who would rate themselves as 'extremely confident'. Only participants who had taught a student with AS rated themselves above 'somewhat confident', which was a similar result to those who had read a paper or article in the area. Experience of any kind helps to build confidence. Of the small number of participants who rated themselves 'extremely confident' ($n = 5$, 4%) all had experience in each of the four areas which were explored in this study. Working down the confidence levels, it can be seen that of those who rate themselves 'very confident' all have taught a student with AS and read an article/paper in the area, while 95.5% know someone with AS and 81.8% have completed CPD in the area. This reflects McGillicuddy and O'Donnell's (2014) findings from teachers, who unanimously agreed that experience provided them with the skills to work with students diagnosed with AS. It is also further evidence that confidence is positively affected by participation in CPD (Brown, Edmonds, and Lee 2001; Powell et al. 2003). It is clear that a positive trend exists between completing CPD/reading literature and confidence ratings.

Conclusion

This study was conducted as a national survey in an attempt to gather a strategically balanced sample from across the Republic of Ireland that would indicate post-primary school teachers' current level of knowledge and understanding surrounding AS. It has shown that teacher level of knowledge and understanding would not appear to be optimal, suggesting limited development despite the Task Force on Autism identification of this as an important issue as early as 2001. A significant majority of teachers' have previously taught a student with the syndrome though 50% have completed no training. While the diagnosis of AS will no longer be used moving into the future, the primary characteristics and traits of those diagnosed with an ASD will remain. It is these same characteristics and traits that teachers must familiarise with if they are to be successful in educating students' diagnosed with ASD in their own classroom (Parsons et al. 2009; Tobias 2009).

It is clear from the study that a range of experience with AS can help contribute to teacher confidence, whether that includes knowing somebody with AS, reading an article/paper, completing CPD or teaching experience in the field. Exposure to a wide variety of experience has a positive impact on confidence ratings, with those

rating themselves 'extremely confident' having experience in all. What is also clear is that while CPD has a positive impact on confidence ratings, it is not having as significant an impact as was expected. This warrants further investigation as it raises the question of whether or not CPD programmes currently in place and being delivered are meeting the needs of our post-primary school teachers?

This is further evidenced by the effect CPD had on average scores in the KASP-Revised portion of this study. Those who had completed CPD scored 2.85% better than those who did not. Following completion of formal training in any specific area, it would be expected that there would be a more noticeable variance in scores; however, there is no statistically significant difference between these scores. This may be a consequence of ineffective or inadequate CPD programmes (Lieberman and Pointer Mace 2008; Shevlin, Kenny, and Loxley 2008). Ultimately as this study did not explore the point at which this training was completed, its features or the specific type of training it included it could be possible that either:

- (1) The training programme was completed some time ago and teachers' simply have not had a use for it or an opportunity to put it into practice.
- (2) Specific information included in the KASP-Revised portion of the survey was not covered.
- (3) The training programme itself was not effectively designed or delivered.
- (4) Teachers themselves did not engage effectively with the training provided.

Given that no statistically significant difference was observed in test scores across a variety of variables and the low internal reliability scores of the various sub-scales, it is possible that participants were guessing their answers due to the difficulty of the test for them (Frisbie 1988; Wells and Wollack 2003). A score of 53.05% of incorrect and 'uncertain' correct responses would not represent the level of knowledge and understanding many experts believe those educating students with AS should have (Attwood 2012; Cheevers 2010; Laushley 2008). It would appear that while CPD is effective in positively affecting confidence (Brown, Edmonds, and Lee 2001; Powell et al. 2003) it may currently be having little or no effect on knowledge, or indeed the certainty of that knowledge.

This research has identified a need to further develop teachers' competencies in the area of AS. The effectiveness, quality and design of CPD in the Republic of Ireland must be explored further if it is to address the needs of our educators who appear not to possess the necessary skills, knowledge or confidence to work with students diagnosed with AS. Teachers must be provided with an appropriate means by which to develop these areas.

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