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Investigating the effects of perceived student gender on primary school teachers' recognition of autism

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Abstract

Recent research indicates that autism is under-recognized in girls and women. The current study investigated whether the gender-based assumptions of teaching staff impact the identification of autism. A survey was completed by 249 primary school teaching staff. After reading a vignette describing the behavior of a hypothetical child whose gender was randomly assigned, participants answered questions regarding possible reasons for the behavior described, including mental health and disability diagnoses and their confidence in their chosen answers. The gender of the described child was not found to have an impact on the likelihood of choosing autism as a potential diagnosis, suggesting that the participants did not make gender-based assumptions about autism characteristics. Higher qualified teachers were less confident in their answers than those with lower or no qualifications. Teachers may have more nuanced understandings of the complexities of autism than had been expected. Further research into the effect of gender on autism identification is needed.

KEYWORDS
autism, gender bias, identification

1 | INTRODUCTION

Autism is a neurodevelopmental difference that is present in approximately 1%–2% of the world's population (Baird et al., 2006; Christensen et al., 2016; Fombonne, 2003; Myers et al., 2018). It is estimated that there are approximately 40,000 people with autism in New Zealand, the country in which the present study was conducted (Ministries of Health and Education, 2016). A recent study of autism in children and young people in New Zealand identified a rate of 1 in 174 in ages 0–24 years, and specifically 1 in 102 in 8 years old, with a male to female ratio of 3.6:1 (Bowden et al., 2020). The authors did highlight, however, that the figure was likely to be under representative of the true rates of autism in New Zealand due to difficulties with case identification. It is also suggested that prevalence figures in autism can be underestimated as many autistic adults may remain undiagnosed (Lehnhardt et al., 2013). The Diagnostic and Statistical Manual of Mental Disorders, 5th edition, (DSM-5), describes autism spectrum disorder (ASD) as a life-long neurodevelopmental condition. It is characterized by impairments in social communication, social interaction, restricted and repetitive behavior as well as differences in sensory experiences, and is diagnosed in levels of severity based on the expected support needs of the individual (American Psychiatric Association, 2013).

Throughout this article, we use person-first language, "person with autism," as our target audience are professionals and teachers working with children with autism who tend to prefer this terminology. We do recognize, however, that many autistic adults prefer the use of identity-first language (Kenny et al., 2016; Sinclair, 2013). Additionally, we use the term autism instead of ASD to depart from the use of the term "disorder" which is considered negative within the neurodiverse community (Kenny et al., 2016).

Autism is thought to be more prevalent in males than in females, with suggested male-to-female ratios ranging from as low as 2:1 (Fombonne et al., 1997) to as high as 16:1 (Fombonne, 2009), with the most commonly reported ratio being 4:1 (Loomes et al., 2017). Following a meta-analysis of research regarding the prevalence of autism in males and females, Loomes et al. (2017) argue that the male-to-female ratio is more likely to be lower than 3.5:1. Although the average age of diagnosis of autism is 7.5 years (Crane et al., 2016), girls are typically diagnosed with autism later than boys and tend to experience a longer delay between initial concerns and final diagnosis (Begeer et al., 2013). These findings are consistent with a growing body of evidence that suggests that autism in females is often left undiagnosed, or misdiagnosed compared to males (Gould & Ashton-Smith, 2011). These gender disparities have been indicated by the autism community as key issues needing to be addressed within research (Pellicano et al., 2014).

The significant gender-based disparities in the recognition and diagnosis of autism have been linked to stereotypical social expectations. Girls are camouflaged by their social environment due to the tendency of female social groups to be more fluid, allowing girls with autism to conceal their social challenges by moving between groups of peers (Dean et al., 2017). Although these girls were found to spend more time engaging in solitary activities, it was more difficult for untrained playground attendants to identify that the girls were not joining in due to their close proximity to female peer groups. In addition, parents report that girls with autism actively mask their autism characteristics (Sutherland et al., 2017). Other studies have found gender-specific differences in social reciprocity, with girls with autism achieving higher social reciprocity than boys with autism (Backer van Ommeren et al., 2017); restrictive and repetitive behavior as less likely to predict a diagnosis of autism in girls (Beggiato et al., 2017; Duvekot et al., 2017); imaginative play, being more commonly engaged in by girls compared to boys (Knickmeyer et al., 2008); and special interests which generally align with typical gender norms (Sutherland et al., 2017). A preponderance toward a male stereotype of autism has dominated historical understandings of autism (Goldman, 2013) and girls seem to require additional or more severe indicators of autism, intellectual disability or mental health concerns to receive an autism diagnosis (Jamison et al., 2017). For example, reports have shown that girls who present externalizing behaviors such as aggression and enforcing rules during play are more likely to be cause for concern as they challenged caregivers' expectations of gendered behavior (Dworzynski et al., 2012; Hiller et al., 2016). This concern was even more commonly expressed by teachers, as externalizing behaviors, deemed as disruptive, are more obvious in the classroom environment (Azad & Mandell, 2016). Thus, girls who present with

internalizing behavior may be overlooked, particularly at school and thus are less likely to be referred to clinicians by teachers (Bargiela et al., 2016). This is particularly important as teachers have been found to voice initial concerns leading to autism diagnoses in 25% of cases past the age of 4 (Rast et al., 2016).

The male preponderance of autism diagnosis may also be attributed to the biases and assumptions of clinicians (Bargiela et al., 2016). Tversky and Kahneman (1974) suggest that individuals make decisions about the categorization of information based upon principles of similarity. Individuals such as clinicians and referrers may make judgments based on how similar an instance is to a mental model (O'Neill, 1995), and thus diagnoses may be overlooked due to the individual not "fitting" the clinician's or potential referrer's model of autism. This was demonstrated by Bruchmüller et al. (2012) with regard to attention deficit (hyperactivity) disorder (ADHD). In a similarly designed study where participants were invited to respond to a written vignette depicting characteristics of ADHD, Bruchmüller et al. (2012) concluded that the participants were influenced by gender biases when diagnosing ADHD, rather than basing their judgments solely on the criteria outlined in accepted diagnostic guidelines. As yet, similar research regarding autism diagnoses has not been published. However it could be assumed that similar findings could be reproduced, as historical understandings of autism have been based on a male phenotype and both diagnostic criteria and screening instruments for autism have previously been based on masculine characteristics (Haney, 2015).

The present study sought to adapt the research methods of Bruchmüller et al. (2012) to explore whether primary school teachers are influenced by biases when identifying possible autism characteristics in primary school students. Teachers represent a significant proportion of referrers or those who express first concern leading to an autism diagnosis (Rast et al., 2016). However, research that examines whether gender biases are present in perceptions of autism is scarce, particularly research that specifically examines such understandings among teachers. We hypothesized that primary school teachers would demonstrate the use of gender biases based on existing expectations, in particular, a bias toward identifying autism more commonly in males.

2 | METHOD

2.1 | Participants

A total of 250 New Zealand-based primary school staff were recruited through the distribution of recruitment emails to 1866 New Zealand primary schools (US equivalent elementary schools), however one survey was discarded due to being incomplete. As was representative of the sex ratio of teaching staff in New Zealand (Education Counts, 2018), just over 85% of the respondents were female. The sample ranged in age from 18 to 74 ($M = 44.76$; $SD = 11.56$). The majority of the sample identified as NZ European (77.11%), with the rest identifying as either NZ Maori, European, or other ethnic groups. Over two thirds of the sample were classroom teachers however, deputy principals, principals, support staff, and teacher's aides were also present in the sample and of those who selected "Other," five specified that they were special education needs coordinators (SENCo). Most of the participants indicated that they did not teach a single specific year level (72.69%) but noted multiple year levels between New Entrants/Year 1 and Year 8 (US equivalent K-7). Just under half of the participants had completed some form of mental health and disability training (43.78%), including training through their teaching qualifications, as well as courses offered by the New Zealand Ministry of Education, positive behavior courses, and seminars on a variety of mental health and disability diagnoses. An extended summary of the demographic characteristics of the sample are presented in Table 1.

The participants were randomly assigned to each condition with 30.40% ($n = 76$) being assigned to the female gender condition, 32.40% ($n = 81$) being assigned to the male gender condition, and 37.20% ($n = 92$) being assigned to the gender-neutral condition.

TABLE 1 Demographic characteristics of the participants (N = 249)

	N (%) or M (SD) ± range
Sex	
Male	34 (13.65%)
Female	215 (86.35%)
Age range	44.76 (11.56) ± 18–74
18–24	13 (5.22%)
25–34	36 (14.46%)
35–44	66 (26.51%)
45–54	85 (34.14%)
55–64	41 (16.47%)
65–74	8 (3.21%)
Ethnicity	
Single	
New Zealand European	192 (77.11%)
Māori	11 (4.42%)
European	10 (4.02%)
Other	7 (2.81%)
Multiple	
New Zealand European and Māori	17 (6.83%)
Other combination	12 (4.82%)
Current teaching position	
Principal	23 (9.24%)
Deputy principal	25 (10.04%)
Classroom teacher	170 (68.27%)
Teacher's aide	2 (0.80%)
Support staff	1 (0.40%)
Other	28 (11.24%)
Years practiced as qualified teacher	15.88 (10.02) ± 0–42
Highest level of teaching qualification	
Bachelor of Education	92 (36.95%)
Bachelor of Teaching	44 (17.67%)
Graduate Diploma	45 (18.07%)
Postgraduate Diploma	36 (14.46%)
Master of Teaching	19 (7.63%)
None	3 (1.20%)
Other	8 (3.21%)
Missing	2 (0.80%)

TABLE 1 (Continued)

	N (%) or M (SD) ± range
Current school decile level	5.87 (2.82) ± 1–10
School type	
Full primary	158 (63.45%)
Contributing	82 (32.93%)
Composite (Years 1–15)	2 (0.80%)
Other	5 (2.01%)
Missing	2 (0.80%)
School year level taught	
New entrants/Year 1	27 (10.84%)
Year 2	13 (5.22%)
Year 3	6 (2.41%)
Year 4	6 (2.41%)
Year 5	6 (2.41%)
Year 6	9 (3.61%)
Other	1 (0.40%)
No specific year taught	181 (72.69%)
Not specified	26 (14.36%)
Multiple years	4.23 (2.04) ± 1–8
School area type	
Rural	77 (30.92%)
Urban	171 (68.67%)
Missing	1 (0.80%)
Formal behavioral/mental health/disability training	
Yes	109 (43.78%)
No	138 (55.42%)
Missing	2 (0.80%)

2.2 | Ethical approval

This study was granted approval by the University of Waikato Psychology Research and Ethics Committee in accordance with the University of Waikato Regulations on Ethical Conduct in Human Research and Related Activities 2008, which is consistent with the Code of Ethics of the New Zealand Psychological Society Inc.

2.3 | Procedure

The survey was pilot-tested with two New Zealand-based primary school teachers with knowledge of autism and their feedback was incorporated into the final survey. Data were collected over a period of 2 months during the

school term. Participants were asked to use a supplied link to access and read a case vignette about a primary school-aged child and then complete an online survey. The case vignettes were written in collaboration with a New Zealand-based clinical psychologist who specializes in autism diagnosis, and the characteristics described were fitting of an autism diagnosis according to DSM-5 diagnostic criteria (American Psychiatric Association, 2013). In a between-subject design, participants were randomly assigned to one of three conditions. Depending on condition, the student in the vignette was described as male or female or the gender was not explicitly stated (gender-neutral). It was decided that including a condition in which gender was not specified would allow the researchers to investigate whether perceived gender, that is the gender that the participants assumed the student was in the absence of explicit statement of gender, had an effect on whether they identified autism. Gender was differentiated in each vignette by name and use of personal pronouns: In the male vignette, the student was named Oliver and the pronouns he/him were used. In the female vignette, the student was named Olivia and the pronouns she/her were used. In the gender-neutral vignette, the student was named Casey and the pronouns they/them were used. The names Oliver and Olivia were identified as popular baby names in New Zealand (Department of Internal Affairs, 2017) and the name Casey was identified as the most common gender-neutral name in the United States of America (Social Security Administration, n.d.), no New Zealand-specific data could be found regarding the frequency of gender-neutral names. All other details including social abilities, behaviors demonstrated, and special interests were identical across the vignettes and included a range of internalizing and externalizing behaviors to investigate whether solely gender (or perceived gender) would impact whether the described characteristics were associated with autism. Thus, care was taken to ensure that the vignette did not depict obviously gendered special interests or behaviors.

After reading the vignette, participants chose up to three possible causes of the behavior from a selection of DSM-5 diagnoses (such as anxiety, mood disorders, intellectual disability) as well as other factors (including boredom, disruption at home, lack of stimulation) totaling 19 options. Then, using 5-point Likert-type scales, participants indicated how concerned they were regarding the behavior described (1 being *not at all concerned* to 5 being *very concerned*) and identified how confident they were in their choices (1 being *not at all confident* to 5 being *very confident*). Finally, participants provided a ranking of their selected causes in order of most to least likely (1 being *the most likely cause*, 3 being *the least likely cause*). Participants were also asked to identify the gender of the child described in the vignette. This was particularly important for participants within the gender-neutral condition to clarify which gender the participants perceived the child in the vignette to be. Demographic data were collected including age, gender, ethnicity, teaching position, and levels of experience, a summary of which is presented in Table 1. In the introduction of the survey the purpose was stated to be investigating teachers' perceptions of problem behaviors in the classroom to avoid influencing results by mentioning autism. However, at the end of the survey, participants were presented with an explanation of the full purpose of the study to investigate the effect of student gender on the recognition of autism characteristics. On average, participants took approximately 10 min to complete the survey.

3 | RESULTS

3.1 | Preliminary analyses

Autism (stated in the survey as a single option of "Autism Spectrum Disorder [ASD] or Asperger's syndrome" as at the time of this study, there was still interchanging use of the two terms despite Asperger's syndrome becoming part of ASD in the DSM-5) was selected more than any other option available (31.82%), regardless of gender. Anxiety disorder (18.98%) and social communication disorder (11.97%) were the next most selected. As the participants were able to select up to three options as causes of the behavior described in the vignette, it is important to note that the frequency of any one option being selected was unlikely to exceed 33.33%. Most of the participants (80.72%, *n* = 201) selected three options as causes for the behavior described in the vignette, while 13.65%

(n = 34) selected only two options, and 5.62% (n = 14) of the participants selected only one option. Autism was selected as one of the three choices of possible causes of the described behavior by 218 of the 249 participants (87.55%), whereas anxiety was only selected as an option by 130 participants (52.21%), and social communication disorder was only selected as an option by 32.93% of participants. Of the participants who selected only one option, 12 participants selected autism, one selected anxiety and one selected "other" and explained in an open text box that elements of the vignettes related to all of the possible options.

For all gender conditions, the participants who selected autism ranked it, on average, the "most likely (1)" (x = 1.3, on a 3-point scale) out of their chosen reasons for the behavior described in the vignette. The mean levels of confidence in autism as a selected reason were rated between "confident (3)" and "quite confident (4)" (x = 3.72, on a 5-point scale) which was comparable to the indicated confidence of participants who selected anxiety (x = 3.40) as an option or specified a different reason for the behavior (x = 4.00, "quite confident"). Only five participants specified a different reason for the behavior, which included lack of understanding, cultural differences, lack of distress tolerance strategies and low self-esteem. The average level of concern indicated was "quite concerned (4)" (x = 4.06) in the cases in which autism was selected as well as for the overall sample regardless of chosen reasons (x = 4.08).

3.2 | Main analyses

A Pearson's χ^2 analysis was conducted to assess the association of vignette gender (male, female, or gender-neutral) and each of the dependent variables: autism being selected as a reason for the described behavior (Autism Selected), ranked likelihood of autism out of selected reasons (Ranked Likelihood), level of confidence in autism as a selected reason (Confidence Level), and of those who selected autism, the reported level of concern regarding the behavior described (Concern Level). A likelihood ratio χ^2 test (G-test) was then conducted for all tests except the association between vignette gender and Autism Selected, as over 20% of cells had expected counts below 5 and thus a Pearson's χ^2 was not appropriate.

Table 2 presents the results of both the Pearson's χ^2 and likelihood ratio χ^2 tests of association and shows that vignette gender (male, female, or gender-neutral) was not significantly associated with any of the variables measured as p was greater than .05 in all cases. These results suggested that the apparent gender of the child did not significantly influence the selection of autism, nor the participants' likelihood rankings, levels of confidence or levels of concern indicated.

The above tests of association were repeated within the gender-neutral condition with perceived gender as a variable as 35.20% of participants identified the child as female, 26.04% identified the child as male, and 38.50% indicated that they did not know the described child's gender. Within the gender-neutral condition, there was little difference between the average ratings of Ranked Likelihood ("most likely"), Confidence Level (between "confident" and "quite confident") and Concern Level ("quite concerned") with regard to perceived

TABLE 2 Pearson's χ^2 values and likelihood ratio χ^2 values of association of vignette gender related to Autism Selection, Ranked Likelihood, Confidence Level, and Concern Level

Variable	χ^2 or G^2	df	N	p-Value
Autism Selected	0.397	2	249	.820
Ranked Likelihood	3.67*	4	217	.453*
Confidence Level	6.38*	6	218	.383*
Concern Level	2.74*	6	218	.841*

Note: Values marked with (*) were obtained from the likelihood ratio χ^2 test (G-test).

TABLE 3 Likelihood ratio χ² values of association of perceived gender, within gender-neutral condition, related to Autism Selection, Ranked Likelihood, Confidence Level, and Concern Level

Variable	G^2	df	N	p-Value
Autism Selected	2.46	2	91	.292
Ranked Likelihood	5.79	4	78	.216
Confidence Level	6.06	6	78	.417
Concern Level	6.32	6	78	.389

TABLE 4 Likelihood ratio χ² values of association of participants' highest level of teaching qualification related to Autism Selection, Ranked Likelihood, Confidence Level, and Concern Level

Variable	G^2	df	N	p-Value
Autism Selected	4.23	5	247	.645
Ranked Likelihood	15.9	12	215	.194
Confidence Level	29.7	18	216	.040
Concern Level	30.2	18	216	.036

gender. The likelihood ratio χ² test (G-test) was conducted in all cases, as again over 20% of cells had expected counts below 5. Table 3 presents the results of these analyses. Perceived gender within the gender-neutral condition was not found to be significantly associated with any of the measured variables, hence did not appear to significantly influence those participants' selection of autism, nor their ratings of likelihood, levels of confidence or levels of concern.

3.3 | Exploratory analyses

Further analyses aimed to identify whether the dependent variables were associated with demographic data. Participants' teaching positions, level of teaching qualification, and gender, were tested against autism selection, ranked likelihood, level of confidence, and level of concern, using a Pearson's χ² test of association. Again, likelihood ratio χ² tests (G-tests) were conducted in most cases, as over 20% of cells had expected counts below 5. Teaching position and participant gender were not found to be significantly associated with any of the dependent variables at a 5% significance level, nor was the participants' highest level of teaching qualification significantly associated with the selection of autism or the ranked likelihood of autism. However, participants' level of confidence in their selection and level of concern about the behavior when selecting autism were both significantly associated with their highest level of teaching qualification. These results are presented in Table 4. Cramer's V obtained values (Cramer's V = 0.205 in both cases) indicated that these associations, although significant, were weak in strength.

Most participants held at least a Bachelor's degree in either Teaching or Education. Those who had not completed any qualifications were the smallest group of participants (n = 3). The highest level of qualifications obtained were a Master of Teaching. The participants who had not completed teaching qualifications ranked their levels of confidence and levels of concern at the highest possible level ("very confident" and "quite concerned," respectively) whereas there was more variation within levels of confidence and concern for participants who held

teaching-related qualifications. Those who held the highest level of qualification (Master of Teaching), ranked the second-lowest average level of confidence and lowest average level of concern. To test this significance further, similar variables (e.g., Bachelor of Education and Bachelor of Teaching) were collapsed into four categories (No Qualification, Bachelor's Degree, Diploma, Masters). Again, a likelihood ratio χ^2 test (G-test) was conducted due to low expected cell counts. In this analysis, collapsed categories of highest level of teaching qualification were still significantly associated, although less strongly, with level of confidence in choosing autism as a reason for the behavior described, $G^2(9, N = 215) = 23.75$, $p > .05$, Cramer's $V = 0.185$.

4 | DISCUSSION

The present study investigated whether New Zealand-based primary school teachers demonstrated gender biases in the interpretation of behavior fulfilling a diagnosis of autism, by identifying whether student gender was associated with participants' identification of autism. A sample of 249 participants recruited from New Zealand primary schools answered a survey regarding a vignette about a child depicting behavior that would fulfil a diagnosis of autism under the DSM-5 diagnostic criteria. The participants were randomly assigned to one of three conditions where the child was either described as a boy, a girl, or the child's gender was not stated (gender-neutral). The survey included questions that identified the participants' suspected reasons for the behavior described, their rankings of the likelihood of the selected reasons, their level of confidence in their selections and their level of concern regarding the child's behavior. The participants were also required to specify what they believed to be the gender of the child described.

The results did not support the hypothesis that the use of gendered heuristics would be evident in associations between the vignette gender and the selection of autism, the ranked likelihood and rated level of confidence. There was no significant association between the gender of the child described in the vignette and whether autism was selected, its ranked likelihood nor the participants' levels of confidence in their selection. However, a weak but significant association was found between participants' highest level of teaching qualification and their indicated levels of confidence in selecting autism and levels of concern regarding the behavior described.

As neither vignette gender nor perceived gender of the gender-neutral vignette were significantly associated with the dependent variables, it can be suggested that the participants were not influenced by gender biases. Thus, the results indicate that it is unlikely that solely student gender has much of an effect on the first concerns reported by primary school teachers. It is possible that teachers' views may align with dominant academic understandings of autism, particularly with regard to autism being present in males and females in closer rates than historically reported (Loomes et al., 2017). Hence, participants' understandings of autism may rely less on the child's gender and more on models of behavior associated with autism. However, the way that autism characteristics were presented in this study, and therefore the results of this study, are unlikely to be representative of the reality of working with students with autism in everyday teaching settings.

Recent research highlights significant differences in the presentation of autism in males and females, such as differences in social abilities (Backer van Ommeren et al., 2017), restricted and repetitive behavior (Beggiato et al., 2017; Duvekot et al., 2017), imaginative and pretend play (Knickmeyer et al., 2008), and special interests (Sutherland et al., 2017). Dworzynski et al. (2012) and Hiller et al. (2016) reported that girls who presented with behavioral problems such as aggression were more cause for concern than girls who presented with internalizing behavior. The vignettes used in the present study did not vary in descriptions of behavior between conditions of gender as our aim was to investigate whether only student gender would impact whether autism was identified. The inclusion of externalizing behaviors may have resulted in the vignette depicting a more typical male phenotype. If the participants' understandings of autism were based on a male phenotype of autism, this could explain the lack of association between gender and the dependent variables measured. This could similarly be suggested for the inverse: the inclusion of internalizing behaviors may have depicted a female phenotype which could have raised

more concern for those assigned to the male condition. This is comparable with findings described by Hiller et al. (2016), who highlighted that caregivers report more concern for girls who display externalizing behaviors compared to boys, and that internalizing behaviors caused more concern for caregivers of boys compared to girls. Both instances were related back to caregivers' expectations of typical behavior for boys and girls. Further research is needed to investigate how varying the presence of internalizing and externalizing behavior may affect both the identification of autism and the level of concern raised in depictions of girls and boys. That is, a vignette describing predominantly internalizing behavior may have resulted in higher identification of autism in the female vignette, whereas a vignette describing more externalizing behavior may have resulted in a higher identification of autism in the male vignette. Additionally, as autism is diagnosed in levels of support required, more disruptive or problematic behavior characteristics could have influenced whether they were associated with autism or not. Varying the nature of the behavior described in the vignettes to reflect the significant variation in the presentation of autism was beyond the scope of the present study but this would likely provide an avenue for insight into how severity of autism characteristics, or diagnostic level of autism may affect the recognition of autism in students.

In the research conducted by Bruchmüller et al. (2012), overdiagnosis of ADHD in males was more evident in conditions where the vignettes did not fully meet the criteria for a diagnosis or even included exclusion criteria which would have ruled out a diagnosis of ADHD. They posited that this was indicative of gender biases as well as other possible biases in understanding. As the present study utilized a method adapted from Bruchmüller et al. (2012), we suggest that the vignettes may have depicted too many autism characteristics and thus resulted in participants relying less on their own understandings of autism. If the vignettes had described fewer characteristics of autism, or had included exclusionary criteria, participants may have been more likely to make assumptions about the behavior which could have resulted in gender bias. Replicating the number and variation of vignettes included in Bruchmüller et al. (2012) was beyond the scope of the present study, however this could provide an interesting avenue for future research.

A key finding is the significant association found between the participants' highest level of teaching qualification and both their rated levels of confidence and levels of concern. Further investigating the way in which the variables were associated was beyond the scope of the study but provides a possible avenue for future research. Regarding the association between the participants' highest level of teaching qualification and rated levels of confidence, all participants who indicated that they had not completed any teaching-related qualifications rated their confidence as "very confident" compared to lower average ratings of confidence by all other participants. In addition, teachers with Masters qualifications had significantly lower confidence than those with Bachelors degrees. This could suggest that as formal teaching-related knowledge increased, confidence in selecting autism as a reason for the behavior described decreased. This may have important implications for teacher willingness to take the matter further. However, it is important to note here that there were only three participants who had not completed any teaching-related qualifications, thus further investigation with a larger sample is required. Participants within the present study who had completed teaching-related qualifications may have had more direct experience with autism, and more understanding of the wide range of behavior displayed across the autism spectrum. A lack of knowledge or experience could mean that the participants who did not have formal teaching qualifications had understandings of autism that were unchallenged by experience or formal learning, and therefore felt more confident in their selections. This aligns with the findings of McMahon et al. (2020), which explored the Dunning-Kruger effect in autism knowledge within the general public. They found that participants who had low levels of formal autism knowledge tended to overestimate said knowledge, but participants who scored highly on autism knowledge assessments tended to underestimate their understandings of autism. In the present study, participants with little or no formal teaching experience or qualifications, and therefore potentially less formal training in autism, may have been overconfident despite their actual levels of autism knowledge. McMahon et al. (2020) posited that people with low levels of autism knowledge may be less inclined to seek further training due to their tendency to overestimate their knowledge. This too has important implications for the present study, as autism-specific training for teachers in New Zealand is not mandatory, thus those who may be overconfident in their autism knowledge may

not seek out further training if they are not required to do so. However, as Cramer's *V* indicated that the strength of the association, although significant, was only weak, this highlights that there are likely other variables, or combinations of variables (or in this case, factors such as the size of some groups within the sample), that have a stronger effect on whether autism is recognized in boys and girls at primary school levels. This too would be an interesting direction for further research to explore.

Although investigating the association between teacher training and recognition of autism characteristics was beyond the scope of the present study, just under half of the participants did specify that they had received training related to mental health and disability. Teacher training and support has been identified as a critical for the successful inclusion of students with autism in general education settings (Simpson et al., 2003). Although teachers in this study were generally very good at identifying autism this was not always the case and some lacked confidence; therefore, further training opportunities are likely to be beneficial. Additionally, teachers should also be provided access to specialist support to provide effective teaching to students with autism (Ministries of Health and Education, 2016). This teaching and support will often involve learning about autism characteristics, and recent training is likely to also cover gender differences in autism. The participants in the present study may have had a better knowledge of autism than members of the general public who had not completed any autism-specific training. However, to our knowledge, there is no national standard for autism-specific training for teachers in New Zealand, thus completed training may vary significantly due to local resources or opportunities for professional development. This variation in access is likely to have an impact on teachers' recognition of autism characteristics and will be important to consider in future research.

Furthermore, although pairing vignettes with a survey can be a useful method for gathering focused data from a large participant group, real life settings can differ significantly from the limited amount of information provided in a vignette (Hughes & Huby, 2002), and real-world practice often differs to participants' responses to case-study vignettes (Bruchmüller et al., 2012). It would be impossible to capture the wide scope of behavioral difference within the autistic population in a single vignette, and thus the present study is limited by this. Additionally, the working environment in which classroom teachers come into contact with students with autism is not commonly isolated to one student, instead teachers likely work with up to 30 students, including both neurotypical and neurodiverse students. Without direct, focused observation of a single student, teachers may not encounter the same amount or types of behavior that were depicted in the vignette provided. Camouflaging and masking of behavior is also common among girls (Dean et al., 2017) and identification of girls with autism within a school environment may be even harder. In this respect, the findings of the present study are not easily generalizable to the typical classroom and school setting, nor to the significant variability of the autism spectrum. The findings do highlight, however, that if teachers use representativeness heuristics to identify autism characteristics, they are likely based on a range of information including types of behavior typically associated with autism. Lastly, it is important to note that autism in girls and women has gained increasing amounts of media attention in recent years, as well as a general increase in autism awareness, hence more people may be aware of gender differences in autism, and this may have influenced the results of the present study.

5 | CONCLUSION

Autism research continues to highlight differences related to gender in the presentation of autism which may account for the supposed male preponderance in autism diagnosis. However, the present study found that when given a description of behavior that would fulfil all criteria for a formal diagnosis of autism, New Zealand primary school teachers were usually able to identify autism, regardless of the student's gender. This suggests that the teachers involved in the study already had a good understanding of autism characteristics, though there were significant variations in their confidence in their ability to recognize them. Therefore, it is important to ensure that training regarding autism in students continues to cover the wide variety of possible presentations of autism,

including variation in girls and boys. New Zealand primary school teachers would also benefit from ongoing support to keep up-to-date with the latest understandings of autism, as the development of concerns about autism in students may be more influenced by the type of behavior demonstrated than the student's gender. Teachers make up a significant percentage of those who first report concerns leading to an autism diagnosis within school-age children, and thus their perceptions and understandings of autism, and their confidence in these understandings, are important if the male preponderance of autism diagnosis is to be further investigated and challenged.

CONFLICT OF INTERESTS

The authors declare no conflict of interest.

ETHICS STATEMENT

This study was granted approval by the University of Waikato School of Psychology Research and Ethics Committee in accordance with the University of Waikato Regulations on Ethical Conduct in Human Research and Related Activities 2008, which is consistent with the Code of Ethics of the New Zealand Psychologists Board.

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