



MACQUARIE
University

Macquarie University PURE Research Management System

This is the author version of an article published as:

Kim, J. H., Davies, B., & Xu Rattanasone, N. (2023). Have you heard of developmental language disorder? An online survey. *Communication Disorders Quarterly*, 48(4), 228–238

Access to the published version:

<https://doi.org/10.1177/15257401221115822>

Copyright Hammill Institute on Disabilities 2022. Version archived for private and non-commercial, non-derivative use with the permission of the author/s. For further rights please contact the author/s or copyright owner.

Abstract

Purpose: Developmental language disorder (DLD) is a common neurodevelopmental disorder. It had been suggested that public awareness is low for DLD, especially in comparison to autism spectrum disorder (ASD), attention deficit hyperactivity disorder (ADHD) and dyslexia. This study investigated awareness of DLD, ASD, ADHD and dyslexia, as well as specific language impairment (SLI) in Australia.

Method: An online survey about awareness and knowledge of DLD, SLI, ASD, ADHD and dyslexia was completed by 272 people in Australia.

Result: People had low awareness of DLD (19.9%), compared to ASD (97.4%), ADHD (97.7%) and dyslexia (98.5%). The former label for the disorder, SLI, had an even lower level of awareness (9.4%). People have heard about DLD from a wide range of sources and were likely to have incorrect knowledge about DLD as well as believing ASD or ADHD to be the most prevalent disorders.

Conclusion: Awareness and knowledge of DLD appear to be low. More targeted approaches to increasing public awareness of DLD is needed.

Keywords: public awareness, developmental language disorder, autism spectrum disorder, attention deficit hyperactivity disorder, dyslexia

Introduction

Developmental language disorder (DLD) is a prevalent neurodevelopmental condition which can restrict participation in everyday life (Bishop, Snowling, Thompson, Greenhalgh, & the CATALISE-2 consortium, 2017). DLD is associated with persistent language difficulties in the absence of a biomedical aetiology. Symptoms appear primarily as a spoken language impairment during early childhood, often leading to reading and academic difficulties (Del Tufo & Earle, 2020; Young et al., 2002), emotional-behavioural difficulties (Conti-Ramsden & Botting, 2008; Yew & O'Kearney, 2013) and difficulties attaining employment later in life (Dubois, St-Pierre, Desmarais, & Guay, 2020). The prevalence of DLD is estimated to be about 7.5% (Law, Boyle, Harris, Harkness, & Nye, 2000; Norbury et al., 2016) which is higher than that of other well-known neurodevelopmental disorders such as autism spectrum disorder (ASD; 0.7%), attention deficit hyperactivity disorder (ADHD; 5.0%) and dyslexia (6.0%) (Bishop, 2010). Yet, despite its high prevalence and serious consequences, DLD remains under-studied, under-funded and under-served (Bishop, 2010; McGregor, 2020).

A lack of research about DLD and the disparity in service provision for individuals with the disorder may be correlated with its low public awareness relative to other neurodevelopmental conditions (Bishop, 2010; McGregor, 2020). There are high levels of awareness of ASD, ADHD and dyslexia. Previous research has found 82%-88% of the general public were aware of ASD (Alsehemi, Abousaadah, Sairafi, & Jan, 2017 in Saudi Arabia; Dillenburger, Jordan, McKerr, Devine, & Keenan, 2013 in Ireland), 64% were aware of ADHD (McLeod, Fettes, Jensen, Pescosolido, & Martin, 2007 in the US) and 93% were aware of dyslexia (Duranović, Georgieva, Lenček, Novović, & Kačka, 2018 in the Balkan countries; Kovač, 2019 in Croatia). On the other hand, anecdotal evidence had suggested that public awareness of DLD was lower than ASD, ADHD and dyslexia (Hampshire, 2018; Hobson &

Bird, 2019; Norbury, 2017) and public awareness of DLD has only started receiving attention in empirical research. In a recent UK survey study, de Lemos et al. (2022) investigated awareness of DLD in 77 workplace managers from a wide range of organisations. They found that 29.9% of workplace managers had heard of DLD, while 100% had heard of ASD, ADHD and dyslexia. In addition, Thordardottir, Topbaş, and Working Group 3 of COST Action IS1406 (2021) surveyed 1519 people from 18 European countries and found that around 60% of people had heard of “childhood language impairment” (corresponding to the concept of DLD in the European countries) with a wide range between 13% and 93% across the 18 countries, while the public awareness of ASD was consistently 90% across the countries.

Previous research has suggested that increasing awareness of health conditions in the general public (i.e. ordinary people in the community) can have positive impacts, such as reducing the disparity in healthcare (Keppel, Bilheimer, & Gurley, 2007), improving social acceptance of those with the condition (Dumesnil & Verger, 2009) and bringing about a positive behaviour change in the public (Anker, Feeley, McCracken, & Lagoe, 2016). Furthermore, Thordardottir et al. (2021) suggested that public awareness of DLD can influence clinical services from the perspectives of clients. Improved awareness of DLD in the public can mean that clients are better equipped to find relevant information to enable them to more effectively navigate through the complex healthcare and education systems (Thordardottir et al., 2021). Improved public awareness of DLD can also decrease the chances that symptoms of DLD will go unrecognised, which can facilitate early identification and intervention, and contribute to improving service access for those with DLD and their families (McGregor, 2020; Thordardottir et al., 2021).

Current Study

Efforts to improve public awareness of DLD are already underway in many English-speaking countries, including *the DLD Project* in Australia (<https://thedldproject.com/>), *DLD and Me* in the US (<https://dldandme.org/>), and *Raising Awareness of Developmental Language Disorders (RADLD)* in the UK (<https://radld.org/>). RADLD has also been organising an international “*Developmental Language Disorder Awareness Day*” since 2017 to improve public awareness and knowledge of DLD. A description of the current level of understanding of DLD in the public is therefore likely to be helpful for developing more targeted strategies to increase its public profile.

Previous research investigating awareness of DLD had focussed on a group of workplace managers in the UK (de Lemos et al., 2022) or “childhood language impairment” in numerous European languages (Thordardottir et al., 2021). No studies in any country thus far have focussed on describing levels of awareness of DLD in the general public (i.e., in the broader, unspecified, ordinary groups of people in the community, rather than in a specific professional group). In this article, we will report on an online survey study targeting a sample of broad, unspecified, ordinary Australian users of a popular social media platform, as a proxy for estimating the awareness and knowledge of DLD in a broader Australian society. An online survey was used because it allows for public access and participation, while allowing the respondents to remain anonymous. Previous studies have also reported that the validity and reliability of data obtained from online surveys can be comparable to those obtained from offline, in-person, paper-and-pencil surveys (see Eysenbach & Wyatt, 2002 for a review). Using an online survey, we aimed to determine the levels of awareness of DLD, in the context of other common neurodevelopmental disorders with high public profiles: ASD, ADHD and dyslexia. Using a survey design based on previous research (Code et al., 2016; Code et al., 2001), we asked the respondents:

- Whether they had heard of DLD (*awareness*)
- To define the disorder in their own words (*basic knowledge*)
- Where they heard about DLD (*sources of awareness*)
- Prevalence of DLD compared to the other disorders (*perceived prevalence*).

We also included specific language impairment (SLI) in our survey. SLI had been used, for about three decades since the 1980s in both research and practice, to refer to persistent language difficulties in the absence of an impairment in cognitive abilities and without any identifiable medical or developmental reason for their language difficulties (Reilly et al., 2014). In Australia, promotion of DLD as a diagnostic label (and a move away from SLI) has gained prominence since the consensus-based proposal was put forward by the Criteria and Terminology Applied to Language Impairments: Synthesising the Evidence (CATALISE)-2 Consortium (Bishop et al., 2017), which also led to the advocacy efforts to raise awareness of DLD, as described in the introduction. Following the recommendations by the CATALISE, the Australian professional association and governing body of speech-language pathologists, Speech Pathology Australia, officially endorsed the use of DLD in 2017 as a diagnostic label to describe children with language difficulties with no known differentiating condition (Lyons, 2017). Given that the endorsement of the use of DLD was only officiated five years before the online survey took place, we also included SLI in our study.

Methods

This research was approved by the ethics committee of the institution affiliated with the authors (reference number: 5201950989938).

Survey Design

The survey comprised of three sections. The first section collected demographic information, including questions regarding education, ethnicity, language(s) spoken, occupation and residence. Responses to this section were optional.

The second section consisted of a set of questions about awareness, basic knowledge, and sources of awareness about DLD, SLI, ASD, ADHD and dyslexia. This section was based on previous studies investigating public awareness of aphasia (Code et al., 2016; Code et al., 2001; McCann, Tunnicliffe, & Anderson, 2012; Simmons Mackie, Code, Armstrong, Stiegler, & Elman, 2002). Since the first study in 2001, public awareness of aphasia has been investigated in multiple countries including Australia, Canada, New Zealand, the US and the UK. We designed the survey questions based on this well-established line of research. The first question was *“Have you heard of [diagnostic label]?” (awareness)*. Three response options were provided: “Yes”, “Not sure” and “No”. If “No” was chosen for the awareness question, the survey skipped to the next awareness question about another disorder. If “Yes” or “Not sure” were chosen, respondents were then asked *“What is [diagnostic label]? Tell me in your own words” (basic knowledge)*. This was an open-ended question. They were also asked *“Where did you hear about [diagnostic label]?” (sources of awareness)*. A total of eight options were provided for this question. Four options related to personal connections: (1) a family member, (2) a friend, (3) a work colleague, and (4) someone else. Three options related to three types of media: (5) print media (including newspaper, magazine, books), (6) broadcast media (including television, radio, movies) and (7) social media (including Facebook, Instagram, Twitter). The last option was (8) “Other” and, if this option was chosen, participants could type in their response. Participants could choose more than one option for this question. These questions were presented in the order of ASD, ADHD, dyslexia, DLD and SLI. In this section, only the awareness questions (*“Have you heard of...?”*)

was mandatory, while responses to the basic knowledge questions (“*What is...?*”) and the sources of awareness questions (“*Where did you hear about...?*”) were optional.

The third and the final section (*perceived prevalence*) consisted of a single question “*In your opinion, which of the following neurodevelopmental disorders is most prevalent?*” Five options were provided: ASD, ADHD, dyslexia, DLD and SLI. Only one of the five options could be chosen. All participants were asked this question, regardless of previous responses. This question required a response.

Qualtrics Software XM Platform was used to create the survey. The questions used in this survey can be found in Supplementary Material 1. In the survey, the disorder labels were always presented in full, with their initialisms in parentheses (e.g., *autism spectrum disorder (ASD)*), with the exception of dyslexia.

Data Collection

An anonymous web address generated from Qualtrics was used to collect survey data. The survey was distributed on Facebook using Facebook Ads (paid online advertising), set to reach people aged 18 years or older in Australia (<https://www.facebook.com/business/ads>). The Facebook post only mentioned an online survey about “developmental disorders” without identifying any neurodevelopmental disorders by name to reduce the potential self-selection bias (see Supplementary Material 2 for the Facebook post). The Facebook post containing the survey link reached a total of 10,238 users. The number of reaches, generated by Facebook, does not mean that a total of 10,238 Facebook users were invited to the survey or even saw the post. It indicates that the post simply appeared on the newsfeed of 10,238 Facebook users. By reaching 10,238 users, the post attracted 340 engagements, which included the number of interactions Facebook users had with the post, such as link clicks, shares and comments (see Supplementary Material 2 for more detail).

However, the reach of the online survey link outside Facebook (e.g., forwarded by respondents to others) is not captured in the statistics presented in Supplementary Material 2. The online survey was open for three weeks from 17 March 2021 to 9 April 2021.

Data analysis

Descriptive and inferential statistics were used to analyse the survey responses. The text responses for the “Other” option in the *sources of awareness* question were manually coded to identify any salient patterns of responses which may have been missed from the predetermined options. The text responses to the *basic knowledge* question were scored, according to the pre-determined criteria outlined in Supplementary Material 3, as either having basic knowledge or not having basic knowledge. The text responses were independently coded by two researchers and any disagreements were resolved with discussion. When consensus could not be reached, a third independent researcher was consulted to reach a majority decision.

Results

Respondents

A total of 384 people aged 18 years or older participated in the survey, 272 people (70.8%) responded to all required questions, of these, six were excluded from analysis for providing no demographic information (5) and providing invalid responses (1). Table 1 summarises the demographic information of 266 people whose responses were analysed for this study with the last column presenting a comparison from the Australian population census data. While all categories were represented by our sample, compared to the census data, the youngest age group, those who identified as female, those with tertiary education and those living in New South Wales were overrepresented in our sample.

Table 1. Demographic information of respondents (N=266)

	n	%	Census
Age			
18-24	68	25.6%	9.2%
25-34	58	21.8%	14.4%
35-44	53	19.9%	13.5%
45-54	39	14.7%	13.3%
55-64	27	9.8%	11.8%
65-74	20	7.5%	7.5%
75+	2	0.8%	6.9%
Gender			
Female	201	75.6%	50.7%
Male	44	16.5%	49.3%
Non-binary	19	7.1%	-
Not disclosed	2	0.8%	-
Birth country			
Born in Australia	211	79.3%	66.7%
Born overseas*	55	20.7%	26.3%
Additional language(s) spoken			
Speak English only	205	77.1%	72.7%
Speak additional language(s)	61	22.9%	20.8%
Highest level of education			
Graduated from primary school	8	3.0%	
Graduated from high school	74	27.8%	39.9%^
Graduated from vocational college	39	14.7%	18.8%
Graduated with university undergraduate degree	84	31.6%	22.0%~
Graduated with university postgraduate degree	61	22.9%	
Occupation			
Student	52	19.5%	6.8%
Education-related	34	12.8%	8.7%
Health-related	22	8.3%	12.6%
Unemployed	4	1.5%	6.9%
Other	154	57.9%	-
State/Territory			
New South Wales	118	44.4%	31.8%
Queensland	46	17.3%	20.3%
Victoria	38	14.3%	25.9%
South Australia	22	8.3%	6.9%
Western Australia	11	4.1%	10.4%
Tasmania	14	5.3%	2.1%
Australian Capital Territory	14	5.3%	1.7%
Northern Territory	2	1.1%	1.7%

*People born overseas had lived in Australia for 21.0 years on average (SD = 14.8) at the time of this survey ^Census data for no qualification ~Census data for bachelor or higher degree (All census data are from 2016 except Sate/Territory data reporting from March 2021)

Awareness

Table 2a summaries the responses from the *awareness* question (“*Have you heard of...?*”).

To investigate the level of awareness of DLD compared to the other neurodevelopmental disorders, a generalised linear mixed model (GLMM) was conducted in jamovi (The jamovi Project, 2021) using R statistics software (R Core Team, 2021) and the GAMLj module (Gallucci, 2019). The model compared the log likelihood of choosing “Yes” vs. “Not sure/No” in the *awareness* question. The model contained one fixed factor of Heard on five levels (DLD, SLI, ADHD, ASD and Dyslexia). The model also contained two covariates of Age and National Percentile rank for Socio-Economic Indexes for Areas (SEIFA) based on the respondents’ post codes (Australian Bureau of Statistics, 2018) in order to explore possible explanatory variables in the levels of awareness. The model had random intercepts for participants only as more complex models did not converge. See Table 2b for the results. With alpha set at 0.05, the results did not detect any effect of Age or SEIFA. The model did detect significant differences between DLD and all other disorders, and respondents were more likely to report awareness for DLD than SLI but less likely for DLD than ADHD, ASD and Dyslexia.

Table 2a. Awareness of neurodevelopmental disorders (“Have you heard of...?”)

	Yes	Not sure	No
DLD	53 (19.9%)	70 (26.3%)	143 (53.8%)
SLI	25 (9.4%)	35 (13.2%)	206 (77.4%)
ASD	259 (97.4%)	1 (0.4%)	6 (2.3%)
ADHD	260 (97.7%)	2 (0.8%)	4 (1.5%)
Dyslexia	262 (98.5%)	0 (0%)	4 (1.5%)

Table 2b. Fixed Effects Parameter Estimates

Effect	Estimate	SE	exp(B)	95% Exp(B) Confidence Interval		z	p	
				Lower	Upper			
(Intercept)	2.354	0.447	10.523	4.383	25.261	5.267	< .001	***
Age	0.003	0.021	1.003	0.962	1.045	0.120	0.904	
National Percentile	0.003	0.011	1.003	0.982	1.025	0.285	0.776	
SLI vs. DLD	-3.089	0.712	0.046	0.011	0.184	-4.341	< .001	***
ADHD vs. DLD	15.425	1.375	5.00E+06	337406.039	7.41E+07	11.215	< .001	***
ASD vs. DLD	15.009	1.299	3.30E+06	258557.930	4.21E+07	11.553	< .001	***
Dyslexia vs. DLD	16.487	1.543	1.45E+07	703304.375	2.98E+08	10.687	< .001	***

R code: Heard ~ 1 + Age + SEIFA + Disorder + (1 | ID)

Basic Knowledge

Those who responded “Yes” or “Not sure” to the *awareness* question were shown the *basic knowledge* question (“What is...?”). The *basic knowledge* question was answered by 100 people for DLD (75.2%), 45 people for SLI (75.0%), 233 people for ASD (89.6%), 234 people for ADHD (89.3%) and 235 people for dyslexia (89.7%). None of the people who responded “Not sure” to the *awareness* question about ASD (n=1) or ADHD (n=2) answered the corresponding *basic knowledge* question. However, 75.7% (n=53) and 77.1% (n=27) of those who responded “Not sure” to the *awareness* question about DLD (n=70) and SLI (n=35) did answer the *basic knowledge* question (note no one responded “Not sure” to the *awareness* question about dyslexia). Their responses were coded as either having basic knowledge or

not having basic knowledge (see Supplementary Material 3 for the coding guide) and the results are summarised in Table 3. Supplementary Material 3 also provides example responses.

Table 3. Basic knowledge about neurodevelopmental disorders (“*What is...?*”)

	Basic knowledge	No basic knowledge
DLD (n=100)		
“Yes” (n=47)	31 (31.0%)	16 (16.0%)
“Not sure” (n=53)	20 (20.0%)	33 (33.0%)
SLI (n=45)		
“Yes” (n=18)	8 (17.8%)	10 (22.2%)
“Not sure” (n=27)	3 (6.7%)	24 (53.3%)
ASD (n=233)		
“Yes” (n=233)	136 (58.4%)	97 (41.6%)
“Not sure” (n=0)	NA	NA
ADHD (n=234)		
“Yes” (n=234)	209 (89.3%)	25 (10.7%)
“Not sure” (n=0)	NA	NA
Dyslexia (n=235)		
“Yes” (n=235)	187 (79.6%)	48 (20.4%)
“No” (n=NA)	NA	NA

Responses reflecting no basic knowledge from those who responded “Yes” to the awareness question were also analysed. For DLD, most responses reflecting no basic knowledge were simply incorrect (n=11, 68.8%), for example, “*Difficulty pronouncing words*” and “*I’m assuming it’s the issue with speaking at the correct pace as set [sic]. E.g., Tat for cat at school age or not being able to even produce sounds or words*”. For SLI, the largest proportion of the responses reflecting no basic knowledge were explicit statements that they were not sure what SLI was (n=4, 40%), for example, “*Unsure about this*” and “*Actually, maybe I haven’t heard of this. I thought this had to do with speech production but*

I am not sure what belongs here. Severe stutter?". For ASD, the largest proportion of responses reflecting no basic knowledge were too broad or non-specific (n=58, 59.8%), for example, *"Different brain function 'wired differently'"* and *"Affects how people learn, communicate, cope with stress, etc."*. On the other hand, the largest proportion of responses reflecting no basic knowledge about ADHD were incorrect or reflected misconceptions about the disorder (n=10, 40.0%), for example, *"I personally don't believe in this one....just bad parenting, Just my opinion"* and *"Kids who are super naughty. Too many kids diagnosed with this before looking at their sugar filled diet"*. The largest proportion of the responses reflecting no basic knowledge about dyslexia were peripherally related, or were misconceptions related to visual processing (n=27, 56.3%), for example *"reading words and numbers back to front"* and *"Words and letters are jumbled and dance around on the screen/page"* (see Supplementary Material 3 for the coding scheme).

To analyse whether basic knowledge differed across the different disorders, GLMM was conducted in the same way it was conducted with the responses to the *awareness* question (see Table 4 for the results). The same fixed effects, covariate and random effects variables were entered. With alpha set at 0.05, the results again did not detect a significant effect for Age or SEIFA. The model did detect that the respondents were significantly more likely to report basic knowledge about DLD than SLI, but significant less likely to report accurate knowledge about DLD compared to both ADHD and Dyslexia.

Table 4. Fixed Effects Parameter Estimates

Effect	Estimate	SE	exp(B)	95% Exp(B) Confidence Interval		z	p	
				Lower	Upper			
(Intercept)	1.086	0.414	2.962	1.317	6.664	2.625	0.009	**
Age	-0.004	0.028	0.996	0.943	1.051	-0.155	0.877	
National Percentile	-0.018	0.014	0.982	0.956	1.009	-1.292	0.196	
SLI vs. DLD	-2.122	0.696	0.120	0.031	0.469	-3.049	0.002	**
ADHD vs. DLD	2.350	0.795	10.484	2.206	49.822	2.955	0.003	**
ASD vs. DLD	0.189	0.616	1.208	0.361	4.042	0.307	0.759	
Dyslexia vs. DLD	2.350	0.795	10.484	2.206	49.822	2.955	0.003	**

R code: Knowledge ~ 1 + Age + SEIFA + Disorder + (1 | ID)

Sources of awareness

Figure 1 illustrates the responses from the question about the *sources of awareness* for each disorder (“Where did you hear about...?”). This question was only shown to those who responded “Yes” or “Not sure” to the *awareness* question and the responses were optional. The source of awareness question regarding DLD was answered by 94 people (70.7%), 38 people for SLI (63.3%), 258 people for ASD (99.2%), 260 people for ADHD (99.2%) and 260 people for dyslexia (99.2%). More than one option could be chosen for this question.

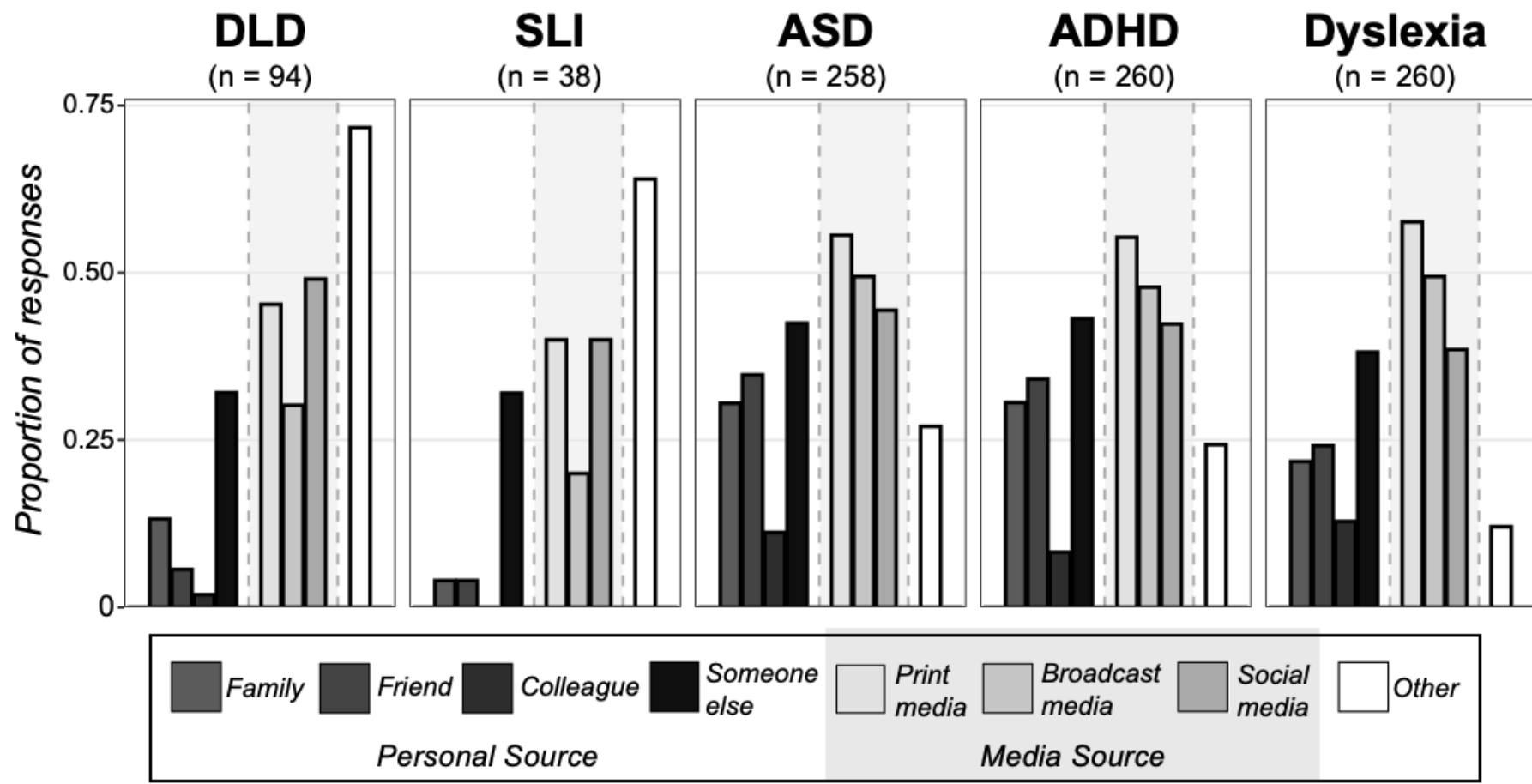


Figure 1. Sources of awareness for neurodevelopmental disorders

Table 5 shows the mean number of sources of awareness for each disorder.

Consistent with the data presented in Table 2 (*awareness*), the number of sources of awareness is highest for ASD, followed by ADHD and Dyslexia, and lowest for DLD and SLI.

Table 5. Number of sources of awareness for neurodevelopmental disorders (*“Where did you hear about...?”*) with mean (standard deviation).

	Number of sources from personal connections	Number of sources from media	Total number of sources
DLD (n=94)	0.30 (0.60)	0.70 (0.92)	0.39 (0.99)
SLI (n=38)	0.26 (0.50)	0.66 (0.80)	1.34 (0.98)
ASD (n=258)	1.94 (1.04)	1.50 (1.24)	2.87 (1.76)
ADHD (n=260)	1.15 (1.01)	1.43 (1.25)	2.83 (1.88)
Dyslexia (n=260)	0.96 (0.95)	1.45 (1.16)	2.54 (1.55)

In the optional text responses when “Other” was chosen, there were two main sources of awareness other than the predetermined response options across the disorders. First, there were those who said they had the disorder themselves; 28 people (10.9% of the respondents) for ASD, 31 people (11.9%) for ADHD and 4 people (1.5%) for dyslexia. None of the people who responded to this question identified themselves as having DLD or SLI. Second, there were those who said they learned about the disorder at school/university; 14 people (5.4%) for ASD, 11 people (4.2%) for ADHD, 13 people (5.0%) for dyslexia, 8 people (8.5%) for DLD and 7 people (18.4%) for SLI.

Perceived prevalence

The last question in the survey was *“In your opinion, which of the following neurodevelopmental disorders is most prevalent?”*, which required a response. ADHD had the greatest number of responses, with 108 responses (40.6%), followed by ASD with 100

responses (37.6%). Dyslexia was selected by 46 people (17.3%). DLD and SLI had the lowest responses with 9 people (3.4%) and 3 people (1.1%), respectively.

Discussion

In this study, we aimed to determine the levels of awareness of DLD in broad and unspecified groups of social media users; and we did so in the context of other neurodevelopmental disorders including ASD, ADHD and dyslexia. It is axiomatic that increasing the levels of public awareness of DLD is important. The efforts to increase the public profile of DLD are ongoing and empirical data describing the current levels of awareness of DLD can facilitate such efforts. While the current study cannot necessarily provide levels of “public” awareness of DLD at the level of the broader society in Australia, the data from the sample of social media users in Australia provide some important insights and future directions for research and advocacy.

Public awareness and basic knowledge

Despite its high prevalence and serious long-term consequences, DLD has long been suspected as being largely unknown by the public, and even described as “the most common developmental disorder people have never heard of” (Norbury, 2017). Our findings confirm that DLD indeed had a low level of awareness in our sample of social media users in Australia. Only about 20% of the respondents of our survey had heard of DLD, in contrast to over 97% of respondents who had heard about ASD, ADHD and dyslexia. Given such a stark and substantial difference in the levels of awareness in our sample, it may be possible to suggest that such a trend is likely to be observed at a broader level in Australia. In addition to the high level of awareness of ASD, ADHD and dyslexia, most respondents also appeared to have basic knowledge about these neurodevelopmental disorders. However, the

proportion of respondents who failed to demonstrate basic knowledge about ASD was higher than ADHD and dyslexia. This was because most responses about ASD that reflected no basic knowledge, were too broad or non-specific according to our coding scheme, rather than having *no* knowledge at all. These findings are consistent with previous research suggesting that despite high levels of public awareness, people typically have broad or non-specific knowledge about common neurodevelopmental disorders (e.g. Dillenburger et al., 2013).

On the other hand, our survey found that only about 30% of people who had heard about DLD had basic knowledge of the disorder. Unlike ASD, ADHD or dyslexia, most responses reflecting no basic knowledge about DLD were simply incorrect, often confusing DLD with speech sound disorders. These findings align with concerns raised by McGregor (2020), namely that the distinction between *speech* and *language* may not be meaningful outside of speech-language pathology. This lack of shared understanding between the public and the profession of speech-language pathology about the very definition of *language* may contribute to the low level of understanding about DLD.

Furthermore, only nine respondents (3.4%) believed DLD was the most prevalent neurodevelopmental disorder, with most respondents believing ASD (37.6%) or ADHD (40.6%) to be the most prevalent, compared to the estimated prevalence of 7.5% for DLD and 0.7% and 5.0% for ASD and ADHD (Bishop, 2010; Norbury et al., 2016). It is particularly interesting to find that one in three people believed ASD was the most prevalent, when it is, in fact, the least prevalent of the neurodevelopmental disorders included in the survey. These findings may be the collateral result of the successful and widespread public health campaigns to raise awareness of ASD (Ahmed, Bath, Sbaffi, & Demartini, 2018; Dillenburger et al., 2013) and likely to reflect and confirm poor awareness and basic knowledge of DLD.

Personal Connections as a Source of Awareness

Our findings on where the respondents heard about neurodevelopmental disorders could provide some insights into the low levels of awareness and knowledge about DLD, and its perceived prevalence. Figure 1 shows a pattern of responses about DLD that is very different from ASD, ADHD and dyslexia. Survey respondents had a greater number of personal connections to ASD, ADHD and dyslexia in comparison to DLD (also see Table 4). This is at odds with the fact that DLD is more prevalent than ASD, ADHD or dyslexia. In addition, 28 respondents (10.9%) indicated that they had ASD, 31 respondents (11.9%) indicated that they had ADHD and four respondents (1.5%) indicated that they had dyslexia; but no one indicated that they had DLD (or SLI). These findings reflect that DLD is a hidden disability and individuals with DLD are under-served (McGregor, 2020). Given that the survey respondents were adults, limited services available for adults with a positive history of DLD may have contributed to this finding. If people know family members, friends and acquaintances with a diagnosis of ASD, ADHD or dyslexia, they would be more likely to seek information about these neurodevelopmental disorders, thus perceiving them to be more prevalent. It is therefore possible that awareness of DLD is stuck in a negative feedback loop, where a lack of support and services for those with a history of DLD is indirectly contributing to the low awareness of the disorder.

Media as a Source of Awareness

The media platforms from which the respondents heard of DLD also showed a pattern of responses different to that of ASD, ADHD and dyslexia. For ASD, ADHD and dyslexia, print media had the greatest number of responses, followed by broadcasting media, with social media having the least number of responses. Conversely, social media had the greatest number of responses for DLD. Two interpretations appear possible. First, there have been

both wide print and broadcast media representations of ASD (Dean & Nordahl-Hansen, 2021; Jones & Harwood, 2009; Pesonen, Itkonen, Saha, & Nordahl-Hansen, 2021; Prochnow, 2014), ADHD (Horton-Salway, 2011; Horton-Salway & Davies, 2018) and dyslexia (Kirby, 2019). However, this has not been the case for DLD. Second, our results found a relatively high level of social media exposure to DLD. This could reflect the success of the current efforts to raise awareness through campaigns, such as *DLD and Me*, *DLD Project* and *RADLD*, which have extensively utilised social media platforms.

It is possible that some of the respondents have come across information about DLD for the first time on social media, as a result of the widespread social media campaigns by these initiatives. This could potentially explain why the respondents' basic knowledge of DLD was so low. Information consumption on social media can be fragmented, partial and brief, often focussed only on the headlines and accompanying pictures (Broczkowski, Mitchelstein, & Matassi, 2018). Therefore, reading about DLD for the first time incidentally on social media could lead to incomplete or incorrect knowledge of DLD.

However, the survey respondents could have also used social media to seek further information about DLD, to which they had been exposed elsewhere first. Although there is a lack of research on information-seeking behaviours of social media users with regards to neurodevelopmental disorders (Zhao & Zhang, 2017), research on health information seeking behaviours suggests that people tend to use social media specifically to seek further information about a health condition which they have already heard from other media platforms and health professionals (Hogue, Doran, & Henry, 2012).

While social media is an effective means for public health campaigns to directly reach a wide audience, our findings suggest social media alone is not likely to be sufficient in increasing public awareness and knowledge about DLD. If people are exposed to DLD for the

first time on social media platforms, they may be more susceptible to acquiring incomplete or incorrect information. On the other hand, those who seek more targeted information about DLD on social media could be the ones who already know about DLD (from other media or health professionals). In which case, social media may not serve its purpose of increasing awareness of DLD.

Comparison of public awareness between DLD and SLI

Finally, our results found awareness and knowledge of DLD to be higher than SLI. This may reflect international efforts to raise awareness of DLD by numerous stakeholders, including public health campaigns (including *DLD and Me*, *DLD Project*, *RADLD*) and the CATALISE consortium members (Bishop et al., 2017). Although our study suggests that much more work is needed, the current efforts appear to be having a small but positive impact.

Limitations and Future Research Directions

The small sample size and the sampling method are limitations of the current study. Initially, we intended to conduct the survey, using the same sampling and data collection methods as in previous studies investigating public awareness of communication disorders (e.g. McCann et al., 2012). However, the physical distancing rules imposed in Australia due to COVID-19 at the time of this study prevented researchers from collecting data physically in the community. While online surveys can be as reliable and valid as offline surveys (Eysenbach & Wyatt, 2002), using only one social media platform to advertise the online survey could be a limitation. Future studies should use a wide range of online and offline platforms to investigate the levels of awareness and knowledge of DLD (and other neurodevelopmental disorders) in a larger sample. Future studies should consider designing a targeted survey to address more specific research questions, including demographic factors associated with awareness and knowledge of DLD.

In addition, there is an inherent risk of self-selection bias in an online survey disseminated through social media platforms. Given the high profile of ASD, ADHD and dyslexia, it is possible that the level of awareness of these neurodevelopmental disorders, in particular, may have been over-estimated in our study due to self-selection bias.

Specifically on the sources of awareness we investigated in our study, the formulation of this question meant that we could not identify how people heard of DLD and the other neurodevelopmental disorders for the first time. Understanding how people first come to learn about DLD would likely generate useful information to guide more targeted approaches to public health campaigns raising awareness of DLD.

Conclusion and Recommendations

The current study provides preliminary data showing that awareness and knowledge of DLD are generally poor and worse than that of ASD, ADHD and dyslexia in Australia. However, awareness and knowledge of DLD was found to be greater than SLI. This is promising for DLD public health campaigns given the recent adoption of the term DLD in both research and practice. Nevertheless, it is clear that more work needs to be done to raise awareness of the disorder. Public health campaigns raising awareness of DLD should consider more targeted strategies working alongside traditional print and broadcast media. There should also be an emphasis on informing the public about what language is, because the esoteric distinction we make in speech-language pathology between speech and language is not easily understood by the public (McGregor, 2020). While social media has been used widely to raise awareness of DLD, its effectiveness is unclear. We must consider the possibility that social media campaigns can create echo chambers in which we attempt to raise awareness about DLD amongst those who are already aware. Despite the high public prevalence of DLD, most respondents did not know anyone with the disorder. Therefore, another way to

improve public awareness of DLD would be to increase service provisions for adults with a positive history of DLD. We cautiously suggest that supporting and empowering individuals with DLD in engaging in campaigns and advocacy would have a positive impact in raising awareness of this common and lifelong disorder.

References

- Ahmed, W., Bath, P. A., Sbaffi, L., & Demartini, G. (2018). Measuring the effect of public health campaigns on Twitter: The case of World Autism Awareness Day. In G. Chowdhury, J. McLeod, V. Gillet, & P. Willett (Eds.), *Transforming Digital Worlds: iConference 2018. Lecture Notes in Computer Science* (Vol. 10766): Springer, Cham.
- Alsehemi, M. A., Abousaadah, M. M., Sairafi, R. A., & Jan, M. M. (2017). Public awareness of autism spectrum disorder. *NeuroSciences (Riyadh)*, 22(3), 213-215.
- Anker, A. E., Feeley, T. H., McCracken, B., & Lagoe, C. A. (2016). Measuring the effectiveness of mass-mediated health campaigns through meta-analysis. *Journal of Health Communication*, 21(4), 439-456.
- Australian Bureau of Statistics. (2018). Census of Population and Housing: Socio-Economic Indexes for Areas (SEIFA), Australia, 2016. Retrieved from <https://www.abs.gov.au/ausstats/abs@.nsf/Lookup/by%20Subject/2033.0.55.001~2016~Main%20Features~SEIFA%20Measures~14>
- Bishop, D. V. M. (2010). Which neurodevelopmental disorders get researched and why? *PLoS ONE*, 5(11), e15112. doi:10.1371/journal.pone.0015112
- Bishop, D. V. M., Snowling, M. J., Thompson, P. A., Greenhalgh, T., & the CATALISE-2 consortium. (2017). Phase 2 of CATALISE: a multinational and multidisciplinary

- Delphi consensus study of problems with language development: Terminology. *The Journal of Child Psychology and Psychiatry*, 58(10), 1068-1080.
- Broczkowski, P. J., Mitchelstein, E., & Matassi, M. (2018). "News comes across when I'm in a moment of leisure": Understanding the practices of incidental news consumption on social media. *New Media & Society*, 20(10), 3523-3539.
- Code, C., Papathanasiou, I., Rubio-Bruno, S., de la Paz Cabana, M., Villanueva, M. M., Haaland-Johnsen, L., . . . Robert, A. (2016). International patterns of the public awareness of aphasia. *International Journal of Language & Communication Disorders*, 51(3), 276-284.
- Code, C., Simmons Mackie, N., Armstrong, E., Stiegler, L., Armstrong, J., Bushby, E., . . . Webber, A. (2001). The public awareness of aphasia: An international survey. *International Journal of Language & Communication Disorders*, 36(S1), 1-6.
- Conti-Ramsden, G., & Botting, N. (2008). Emotional health in adolescents with and without a history of specific language impairment (SLI). *The Journal of Child Psychology and Psychiatry*, 49(5).
- de Lemos, C., Kranios, A., Beauchamp-Whitworth, R., Chandwani, A., Gilbert, N., Holmes, A., . . . Botting, N. (2022). Awareness of developmental language disorder amongst workplace managers. *Journal of Communication Disorders*, 95, 106165.
- Dean, M., & Nordahl-Hansen, A. (2021). A review of research studying film and television representations of ASD. *Review Journal of Autism and Developmental Disorders*(Advance Online Publication).
- Del Tufo, S. N., & Earle, F. S. (2020). Skill profiles of college students with a history of developmental language disorder and developmental dyslexia. *Journal of Learning Disabilities*, 53(3), 228-240.

- Dillenburger, K., Jordan, J. A., McKerr, L., Devine, P., & Keenan, M. (2013). Awareness and knowledge of autism and autism interventions: A general population survey. *Research in Autism Spectrum Disorders, 7*(12), 1558-1567.
- Dubois, P., St-Pierre, M.-C., Desmarais, C., & Guay, F. (2020). Young adults with developmental language disorder: A systematic review of education, employment, and independent living outcomes. *Journal of Speech, Language, and Hearing Research, 63*(11), 3786-3800.
- Dumesnil, H., & Verger, P. (2009). Public awareness campaigns about depression and suicide: A review. *Psychiatric Services, 60*(9), 1203-1213.
- Duranović, M., Georgieva, D., Lenček, M., Novović, T., & Kačka, M. (2018). Public awareness of dyslexia in Balkan countries. *Foreign Language Teaching, 45*(5), 471-484.
- Eysenbach, G., & Wyatt, J. (2002). Using the internet for surveys and health research. *Journal of Medical Internet Research, 4*(2), e13. doi:10.2196/jmir.4.2.e13
- Gallucci, M. (2019). GAMLj: General analyses for linear models. (Version jamovi module). Retrieved from <https://gamlj.github.io/>
- Hampshire, A. (2018). The most common childhood difficulty you've never heard of. Retrieved from [https://www.qegateshead.nhs.uk/DLD#:~:text=Developmental%20Language%20Disorder%20\(DLD\)%20is,2%20children%20in%20every%20classroom.](https://www.qegateshead.nhs.uk/DLD#:~:text=Developmental%20Language%20Disorder%20(DLD)%20is,2%20children%20in%20every%20classroom.)
- Hobson, H. M., & Bird, G. (2019). *High rates of language impairment in vulnerable populations: the case for improving cross-sector awareness of developmental language disorder*. Paper presented at the 4th International Conference on Educational Neuroscience, Abu Dhabi, United Arab Emirates.

- Hogue, M.-C. B., Doran, E., & Henry, D. A. (2012). A prompt to the web: The media and health information seeking behaviour. *PLoS ONE*, 7(4), e34314.
- Horton-Salway, M. (2011). Repertoires of ADHD in UK newspaper media. *Health: An Interdisciplinary Journal for the Society Study of Health, Illness and Medicine*, 15(5), 533-549.
- Horton-Salway, M., & Davies, A. (2018). *The discourse of ADHD: Perspectives on Attention Deficit Hyperactivity Disorder*: Palgrave Macmillan, Cham
- .
- Jones, S. C., & Harwood, V. (2009). Representations of autism in Australian print media. *Disability & Society*, 24(1), 5-18.
- Keppel, K., Bilheimer, L., & Gurley, L. (2007). Improving population health and reducing health care disparities. *Health Affairs*, 26(5), 1281-1292.
- Kirby, P. (2019). Gift from the gods? Dyslexia, popular culture and the ethics of representation. *Disability & Society*, 34(9-10), 1573-1594.
- Kovač, M. (2019). *Dyslexia awareness in Croatia*. University of Zagreb, Zabreb, Croatia.
- Law, J., Boyle, J., Harris, F., Harkness, A., & Nye, C. (2000). Prevalence and natural history of primary speech and language delay: Findings from a systematic review of the literature. *International Journal of Language & Communication Disorders*, 35(2), 165–188. doi:10.1080/136828200247133
- Lyons, C. (2017). SPA adopts terminology for language disorder and DLD. *Speak Out*(February), 6.
- McCann, C., Tunncliffe, K., & Anderson, R. (2012). Public awareness of aphasia in New Zealand. *Aphasiology*, 27(5), 568-580.

- McGregor, K. K. (2020). How we fail children with developmental language disorder. *Language, Speech & Hearing Services in Schools, 51*(4), 981-992.
- McLeod, J. D., Fettes, D. L., Jensen, P. S., Pescosolido, B. A., & Martin, J. K. (2007). Public knowledge, beliefs, and treatment preferences concerning attention deficit hyperactivity disorder. *Psychiatric Services, 58*(5), 626-631.
- Norbury, C. F. (2017, September 22). Developmental language disorder: The most common childhood condition you've never heard of. *The Guardian*. Retrieved from <https://www.theguardian.com/science/head-quarters/2017/sep/22/developmental-language-disorder-the-most-common-childhood-condition-youve-never-heard-of>
- Norbury, C. F., Gooch, D., Wray, C., Baird, G., Charman, T., Smionoff, S., . . . Pickles, A. (2016). The impact of nonverbal ability on prevalence and clinical presentation of language disorder: evidence from a population study. *The Journal of Child Psychology and Psychiatry, 57*(11), 1248-1257.
- Pesonen, H., Itkonen, T., Saha, M., & Nordahl-Hansen, A. (2021). Framing autism in newspaper media: an example from Finland. *Advances in Autism, 7*(2), 167-177.
- Prochnow, A. (2014). An analysis of autism through media representation. *ETC: A Review of General Semantics, 71*, 133-149.
- R Core Team. (2021). R: A Language and Environment for Statistical Computing (Version 4.0). Retrieved from <https://cran.r-project.org>. (R packages retrieved from MRAN snapshot 2021-04-01).
- Reilly, S., Tomblin, J. B., Law, J., McKean, C., Mensah, F. K., Morgan, A., . . . Wake, M. (2014). Specific language impairment: A convenient label for whom? *International Journal of Language and Communication Disorders, 49*(4), 416-434.

Simmons Mackie, N., Code, C., Armstrong, E., Stiegler, L., & Elman, R. J. (2002). What is aphasia? Results of an international survey. *Aphasiology*, *16*(8), 837-848.

The jamovi Project. (2021). jamovi (Version Version 1.8). Retrieved from

<https://www.jamovi.org>

Thordardottir, E., Topbaş, S., & Working Group 3 of COST Action IS1406. (2021). How aware is the public of existence, characteristics and causes of language impairment in childhood and where they have heard about it? A European survey. *Journal of Communication Disorders*, *89*, 106057.

Yew, S. G. K., & O'Kearney, R. (2013). Emotional and behavioural outcomes later in childhood and adolescence for children with specific language impairments: meta-analyses of controlled prospective studies. *The Journal of Child Psychology and Psychiatry*, *54*(5), 516-524. doi:doi.org/10.1111/jcpp.12009

Young, A. R., Beitchman, J. H., Johnson, C., Douglas, L., Atkinson, L., Escobar, M., & Wilson, B. (2002). Young adult academic outcomes in a longitudinal sample of early identified language impaired and control children. *The Journal of Child Psychology and Psychiatry*, *43*(5), 635-645.

Zhao, Y., & Zhang, J. (2017). Consumer health information seeking in social media: a literature review. *Health Information and Libraries Journal*, *34*(4), 268-283.

Supplementary 1. Questions included in the survey

Section 1. Demographics

- What is your age? [Text response]
- What is your gender? [Text response]
- What is your occupation? [Text response]
- What is the highest level of education you have? [Options: Primary school, High school, Vocational college, University undergraduate degree, University postgraduate degree]
- What is the postcode of your home? [Text response]
- What ethnic group(s) do you identify with? [Text response]
- What languages do you speak? (Select all languages you can speak)
- Were you born in Australia? (*IF "No" were selected, How many years have you lived in Australia?*)

Section 2. Awareness, source of awareness and basic knowledge

- *Have you heard of autism spectrum disorder (ASD)? [Options: Yes, Not sure, No]
- Where did you hear about autism spectrum disorder (ASD)? You can choose multiple options. [I have a family member who has autism spectrum disorder (ASD); I have a friend who has autism spectrum disorder (ASD); I have a work colleague who has autism spectrum disorder (ASD); I know someone (other than family, friends, colleagues) who has autism spectrum disorder (ASD); I have read about autism spectrum disorder (ASD) from print media (including newspaper, magazine, books); I have heard about autism spectrum disorder (ASD) from broadcasting media (including television, radio, movies); I have heard about autism spectrum disorder (ASD) from social media (including Facebook, Instagram, Twitter); Other].
- What is autism spectrum disorder (ASD)? Tell me in your own words. [Text response]

Then the same questions about attention deficit hyperactivity disorder (ADHD), dyslexia, developmental language disorder (DLD) and specific language impairment (SLI) were asked.

Section 3. Perception of prevalence

- *In your opinion, which of the following neurodevelopmental disorders is most prevalent? [Options: autism spectrum disorder (ASD); attention deficit hyperactivity disorder (ADHD), dyslexia, developmental language disorder (DLD) and specific language impairment (SLI)]

* denotes questions that required a response

Supplementary Material 2. Reach of the Facebook ad

A screenshot of the Facebook ad post disseminated via online advertising on Facebook.

We are looking for any adults (18+ years) living in Australia to take part in a brief online survey about common developmental disorders. This online survey takes no more than 5 minutes to complete and will help researchers with future research directions. Please help us by completing this survey!

https://mqedu.qualtrics.com/jfe/form/SV_2bkt0RhLfrF0Rgy

The Facebook ad reached a total of 10,238 Facebook users. Figure 1s below shows the number of people the Facebook ad reached by State/Territory.

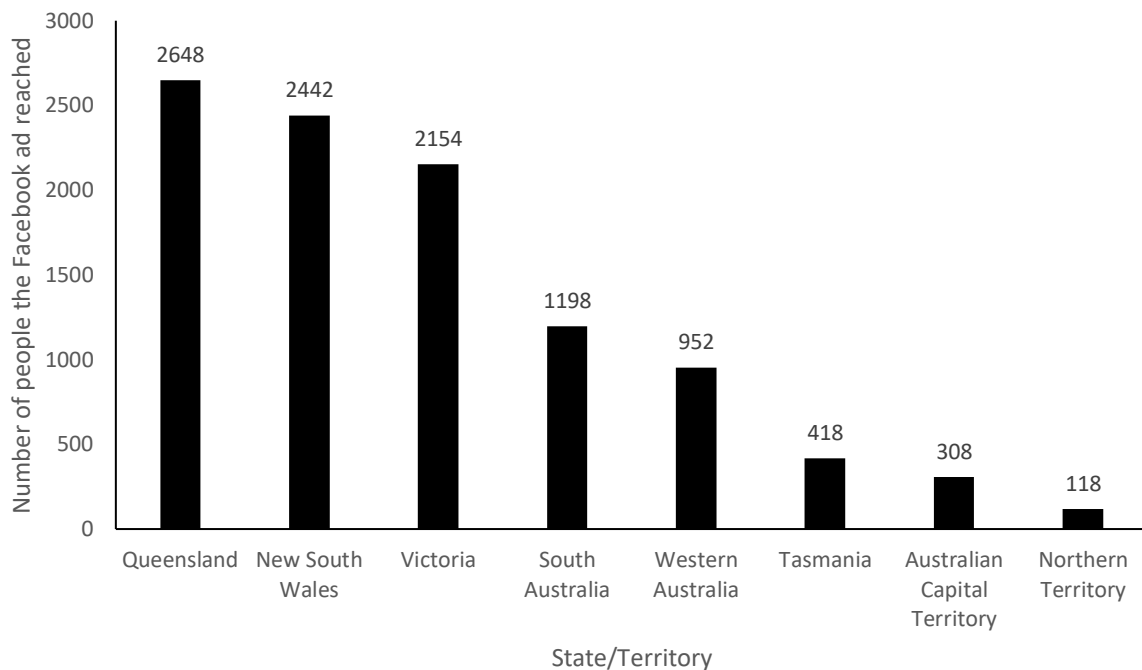


Figure 1s. Number of the Facebook ad reached in each State/Territory

Of the 10,238 Facebook users reached, 78.2% were female and 21.8% were male. Figure 2s. shows the breakdown of the percentages of people the Facebook ad reached by gender.

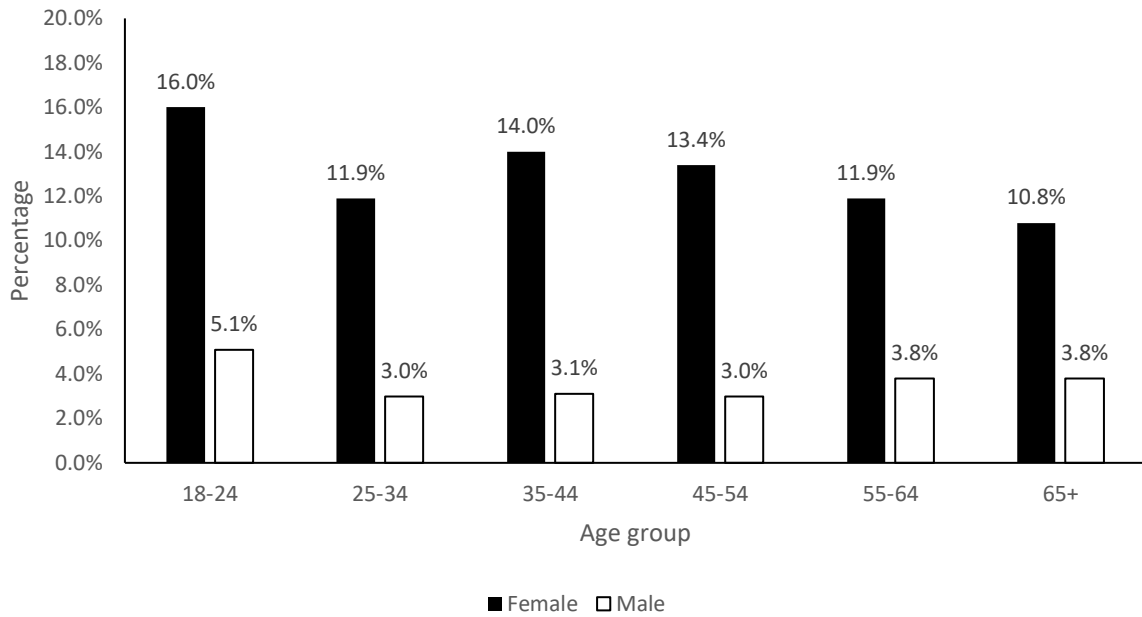


Figure 2s. Proportion of people the Facebook ad reached by gender

The Facebook ad had a total of 340 post engagements, 225 link clicks, 50 post interactions, 26 post comments and 4 post shares.

All data presented in this Supplementary Material are based on the data automatically generated by Facebook.

Supplementary Material 3. Basic knowledge responses

Notes on responses reflecting no basic knowledge

Responses were considered to reflect no basic knowledge

- if the response was incorrect
- if the response was too broad or non-specific
- if the response was related but peripheral
- if the respondent stated that they were not sure and that they were guessing, even though the response contained relevant information (as this was considered guessing)

1. Autism spectrum disorder

Response was considered to reflect basic knowledge if it contained references to (1) difficulties with social interaction and social communication or (2) restricted, repetitive patterns of behaviour, interests, or activities (American Psychiatric Association, 2013).

Example responses reflecting basic knowledge:

- “ASD is a neurological disorder that impacts how a person views and interacts with the world and other people. A person with ASD has a brain that works differently to a neurotypical brain, so they can often have difficulty with understanding social cues, processing the emotions of the people around them, and often also react to sensory stimuli in ways that aren't typical to the average person. People with ASD also have a tendency to fixate on particular topics, often allowing them to excel in the knowledge of that topic and are often good at spotting details that the average person would miss”
- “Autism Spectrum Disorder is being neurodiverse; this means that people with ASD have different neuropathways in their brain which can affect communication, social interactions and expressions. People on the spectrum often prefer structure, routine and order”
- “A developmental disorder which affects the ability to understand social cues, and leads to difficulties in communication. Individuals are typically inward-focused i.e. obsessive interests”
- “Neurodevelopmental disability, which has a very large spectrum on how people present with ASD from very severe - completely non-verbal, extreme sensory sensitivity to mild language difficulties and social difficulties. Each person can present differently whoever in general it affects communication, sensory processing, social interaction, varied learning abilities, psychosocial health”

Example responses reflecting no basic knowledge:

- “Different brain function 'wired differently'”
- “A milder form of autism, or bits of autism”
- “A neural processing disorder. It affects the way people understand the world and other people around them”
- “A different way of thinking and being”
- “A special person who has a Miss fire or over fire in neuro process. There are a number of puddles under the umbrella of Autism ranging from very clever to struggling”
- “A range of cognitive (often manifested as behavioral problems) "disorders" that range from mild to severe and may be noticeable or unnoticeable. It is just one of those things I know, but don't honestly know how to define”

2. Attention deficit hyperactivity disorder (ADHD)

Response was considered to reflect basic knowledge if it contained references to (1) abnormal levels of hyperactivity and impulsivity or (2) difficulty focusing (sustaining attention) or focusing for a long time (American Psychiatric Association, 2013).

Example responses reflecting basic knowledge:

- “ADHD is a condition in which people have trouble concentrating or focussing on an activity for long periods of time”
- “Difficulty in concentrating and attention , restless and unsettled , tend to be impulsive”
- “It’s a mental health disorder where there is an imbalance of hormones in a specific part in the brain. This causes the person to lose concentration and focus easily and feel so nervous and anxious that they can’t follow through with things. It’s probably then a neurological disorder too”
- “Have trouble concentrating and very disruptive”
- “The brain becomes overloaded and it’s hard to focus, the mind races and it’s hard to concentrate on one thing for a period of time”

Example responses reflecting no basic knowledge:

- “A diagnosis that some people are given by a psychologist or a doctor that attempts to explain cognitive and behavioural differences”
- “ADHD is a neurological variant, probably genetic. Similarly to Autism, it’s pathologised and quite stigmatised, and there’s much in-community discussion around the construction of the diagnostic models and the role that pharmaceutical companies have played in this. Also similarly to Autism, diagnostic inequity is a huge issue with ADHD, with people of colour and people of marginalised genders often going undiagnosed, getting diagnosed late, or being unable to access diagnosis because of cost”
- “I personally don’t believe in this one....just bad parenting, Just my opinion”
- “Kids who are super naughty. Too many kids diagnosed with this before looking at their sugar filled diet”
- “Very active, discipline is a problem. Inappropriate language”
- “A construct of Western medical institutions, categorising an abundance of energy and lack of focus/discipline”
- “they can get quite agitated and aggressive due to frustration”
- “Also a neurodevelopmental disorder which impacts executive functioning, time perception and learning”
- “Neurological brain disorder making learning and behaviour different and difficult for some people”
- “ADHD is a genetic neurodevelopmental condition affecting how information is processed”

3. Dyslexia

Response was considered to reflect basic knowledge if it contained references to learning difficulties characterised by problems with reading or spelling (American Psychiatric Association, 2013).

Example responses reflecting basic knowledge:

- “People with dyslexia struggle with reading/writing/spelling often confusing word with similar sounding words, or words that look similar eg start with the same letter/rhyme”
- “People with dyslexia make a lot of spelling mistakes and find it hard to read”
- “Difficulty with reading (orthographic not intelligence)”
- “Dyslexia is a neurological disorder which effects a person ability to read. People with dyslexia are intellectually capable however have difficult processing words”
- “Someone who has troubles reading and writing. Letters are often seen as being jumbled up which inhibits the person from making sense of the word”

Example responses reflecting no basic knowledge:

- “Confusion of words, numbers, sounds etc. Sometimes difficulty telling left from right”
- “Difficulty with words and numbers”
- “Print appears not clear and possibly not in order”
- “Confusion with numbers”
- “Not entirely sure, just heard of it”
- “When an individual gets confused very easily”
- “Processing disorder”
- “Dyslexia is where the input and output in the brain don’t quite match”
- “Dyslexia is an affliction pertaining to the perception and recognition of figures, shapes & forms in particular in confusion of stereorotation”

4. Developmental language disorder

Response was considered to reflect basic knowledge if it contained references to difficulties with language acquisition and use without a biomedical aetiology (Bishop, Snowling, Thompson, Greenhalgh, & the CATALISE-2 consortium, 2017).

Example responses reflecting basic knowledge:

- “I believe this is related to the development of language later and at a slower rate than the general population. I am not sure exactly, but I think it could be both speaking and the comprehension of language”
- “DLD is a specific language disorder where children are having difficulties using or understanding language despite not having a general learning disability”
- “Developmental language disorder is a disability that causes difficulty in understanding and comprehending language and hinder development of communication and language skills”
- “It is a language impairment disorder. There appears to not be any specific reason why the person has difficulty understanding what is said or in expressing themselves”
- “Difficulties with talking and/ or understanding language”
- “A disorder where someone has difficulty understanding language, even if it is their common language spoken at home.”

Example responses reflecting no basic knowledge:

- “I’m assuming it’s the issue with speaking at the correct pace as set. Eg. Tat for cat at school age or not being able to even produce sounds or words”
- “I would imagine it might be a term used for delayed language development where a cause can be identified? I am not sure I have necessarily heard the term DLD”
- “A global term that could be used to describe a range of language based disorders from delayed speech development, verbal dyspraxia etc.”
- “Slow to speak. Difficulty pronouncing words”
- “DLD is when a person can’t understand the sounds to copy the words said. Their brain doesn’t hear what an average person can & they need a trained speech therapist in this field to help them”
- “A group of disorders referring to speech development? Eg; stuttering”
- “I’m not 100% sure but I am assuming it when English isn’t first language and people have difficulty learning”
- “No really sure, but the term sounds familiar. I could guess from the name, but it would be guessing”
- “I’m guessing as I haven’t heard the term but it sounds like a developmental problem with either speech or comprehending language”

5. Specific language impairment

Response was considered to reflect basic knowledge if it contained references to difficulties with language acquisition and use without a biomedical aetiology (Bishop et al., 2017).

Example responses reflecting basic knowledge:

- “SLI where children are having difficulties learning language despite not having any underlying reason for the difficulties (such as hearing difficulties, lower IQ, attention etc)”
- “SLI is language-specific impairment in a child with no other difficulties”
- “Disorder that affects child’s ability to develop spoken or written language despite not having any hearing loss of intellectual disability”
- “Failure to develop language at an age appropriate level when there are no other underlying reasons for it. Same as DLD really”

Example responses reflecting no basic knowledge:

- “Perhaps a person with hearing impairment that "misses" elements during conversations, and so the structure of language (sentence construction etc) may be difficult to pick up...”
- “i think this includes speech difficulties like stuttering, where a certain area of communication is particularly affected whilst other areas develop normally”
- “I’m not 100% sure but assuming when individuals don’t understand a certain language”
- “Not sure - is it stuttering , lispng etc?”

References for Supplementary Material 3

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders: DSM-5* (5th ed.). Arlington, VA: Author.

Bishop, D. V. M., Snowling, M. J., Thompson, P. A., Greenhalgh, T., & the CATALISE-2 consortium. (2017). Phase 2 of CATALISE: a multinational and multidisciplinary Delphi consensus study of problems with language development: Terminology. *The Journal of Child Psychology and Psychiatry*, 58(10), 1068-1080.