Development of an online training program for public library staff to deliver autism friendly story time sessions

Children on the autism spectrum are at risk of persistent impairments in literacy. Early literacy opportunities (e.g., Library Story Times) are thus important, but children on the spectrum experience barriers to participating in these. Our objective was to develop an online training package to support implementation of autism-friendly Story Time sessions for librarians. A mixed methods approach was undertaken across three phases. Phase 1 included face-to-face training development and implementation \( (n = 22) \) and quantitative evaluation (autism knowledge, confidence, and social validation). Phase 2 included implementation in libraries and qualitative evaluation of the utility and implementation of training through librarian interviews \( (n = 5) \). Phase 3 included translation and implementation of an online module \( (n = 22) \) and quantitative evaluation (autism knowledge, confidence, and social validity). Participation in both training modalities increased knowledge of autism and confidence to include children on the spectrum in Story Time sessions. Social validity of both modalities was rated highly. Librarians indicated changes in practice following training, although full implementation of the package was limited to librarians receiving additional coaching. Limitations, future research, and implications in terms of future training and supports including the value of ongoing coaching for implementation are discussed.

Keywords: emergent literacy; knowledge translation; librarians; libraries; autism spectrum disorder; autism; pre-school; early learning
Introduction

Autism is a neurodevelopmental condition, characterised by social communication challenges and specialised interests and/or routines (American Psychiatric Association, 2013) that occurs in approximately 1-2% of the population (Australian Bureau of Statistics, 2019; Maenner et al., 2020). Up to 65% of children on the autism spectrum¹ show impairments in reading, particularly reading comprehension (Åsberg Johnels et al., 2019; Nation et al., 2006). Reading with understanding is crucial for participation in educational, community, and vocational domains, thus providing early literacy learning opportunities is of utmost importance for all children. Literacy development begins in the first years of life (i.e., emergent literacy period), through engagement with activities such as visiting libraries, participating in early literacy sessions/Story Times, and shared book reading with parents/caregivers (Boudreau, 2005; Sénéchal & Young, 2008). These early experiences enhance emergent literacy skill development (e.g., knowing that letters represent sounds, that written words carry meaning) which is an important precursor to later reading in young typically developing children (i.e., those without developmental disorders; for a review see Dickinson et al., 2012). However, children on the autism spectrum often miss opportunities and experience barriers to participation in community activities such as visiting/participating in library activities and Story Times (Prendergast, 2016; Simpson et al., 2020). At the same time, librarians report a need or desire for more training in the area of both autism and disability more broadly (e.g., Prendergast, 2016; Kaeding, Velasquez, & Price, 2017). The goal of this project was to address this need by developing an online autism-friendly Story Times training package for librarians.

¹ The term “on the autism spectrum” and “on the spectrum” will be used throughout to refer to individuals with a diagnosis of Autism Spectrum Disorder based on the style guide of the funding agency (blinded for peer review) that are informed by research on preferences of the autism community (Kenny et al., 2016).
Public libraries provide free opportunities to foster emergent literacy development for children, including access to developmentally appropriate reading materials and librarian-led early literacy sessions/Story Times (International Federation of Library Services, 2007). However, children with disabilities, including autism, experience barriers to participation. For example, Prendergast (2016) investigated perspectives of librarians and parents of children with disabilities including autism (8/13 children aged 2-8 years) and found a number of barriers were reported. Librarians emphasised wanting to include children with a range of abilities in Story Time sessions but reported rarely experiencing participation by attendees with obvious disabilities and reported a lack of experience in this area. They expressed concerns about whether library staff would be able to understand and respond respectfully and supportively to challenging behaviour. Similarly, parents of children on the spectrum recalled negative experiences in libraries in response to their child’s challenging behaviour. This included challenges with their children participating where there was high noise or large crowds which led to discontinuing attendance. Librarians reflected on rare occurrences of successful inclusion such as when children attended quieter or less busy sessions. While librarians expressed willingness to make adjustments and accommodations on an individual basis, parents were hesitant to approach librarians around their child’s needs. Librarians expressed that they had limited training in including children with disabilities and some participants reported seeking out and wanting additional training to meet this need. Consistent with this sentiment, analysis of librarian training within the same paper indicated disability/early literacy was rarely covered in the random sample of twenty library degree programs reviewed. Further evidence of this need has been raised internationally in a study of 18 librarians whose focus was on working with children with disabilities (including autism) in the US and Canada. Kaeding et al (2017) found a lack of knowledge of disability was identified as the most common barrier to access (78%), and interview data using open-ended
coding of solutions to increase access similarly revealed that training of librarians was reported most frequently (39%).

Simpson et al (2020) explored library access by families of preschool-age children on the autism spectrum (n = 41) and typically developing peers (n = 164; M_{age} = 49.44 months, SD = 13.07). Parents of children on the spectrum reported visiting the library and attending early literacy sessions less often than parents of typically developing children. They found parents of children on the spectrum more frequently reported the environment did not suit their child’s needs, and that their child was not interested as reasons for not attending. While the authors did not ask parents to elaborate on reasons why the environment was unsuitable, a number of potential explanations were posited by the authors including the language level of librarian-led early literacy sessions, and the sensory environment including the presence of unexpected noises, visual stimulation, and unpredictable sensory input (e.g., noise, lighting, routine). This is consistent with previous research finding challenges in responding to the sensory environment had a negative impact on participation in community activities for those on the spectrum (Chien et al., 2017; Schaaf et al., 2011). The authors highlight the need for autism-friendly library sessions, including building staff capacity to support use of appropriate language levels, child interest, and consideration of the sensory environment to facilitate greater engagement of children on the autism spectrum. Consistent with these recommendations, recent initiatives have emerged in libraries internationally to be “sensory friendly” or “autism friendly” (e.g., see Sensory Friendly Story Times in the US, Autism Speaks, 2019; Autism Friendly libraries in the UK, Ascel, 2020), however to the authors’ knowledge these initiatives have not been informed by specific research/development and no specific training/evaluation of training for librarians has been published.

In terms of promoting early literacy acquisition, research into shared book reading interventions with young children on the spectrum and their parents have shown promising
results, including an increase in the duration of shared book reading and an increase in children’s participation (Boyle et al., 2019; Fleury et al., 2014; Whalon et al., 2015). Interventions have drawn from five key features that support literacy acquisition in typically-developing children. These include: (1) frequent exposure to book-related language (i.e., words a child may not encounter in everyday conversations, e.g., giraffe, exhausted); (2) encouraging engagement and joint attention; (3) being responsive to the child’s interests; (4) explicit teaching of early print- and language-related skills; and (5) providing correct language models during shared book reading (Dickinson et al., 2012; Whitehurst & Lonigan, 1998). We have incorporated these key features into modules for training parents of children with ASD to foster their children’s skills.

{Blinded for peer review} investigated the impact of a parent coaching intervention for preschoolers on the spectrum in a randomised control trial. The intervention was conducted over eight weeks and delivered by a certified practicing speech pathologist and consisted of one 45-minute parent training session, and four fortnightly follow-up visits, with alternating phone calls between. The intervention focused on three strategies that are directly linked to the five key shared book reading behaviours outlined above: building vocabulary using a dialogic reading approach (Whitehurst, Arnold, Epstein, Angell, Smith, & Fischel, 1994); making it fun (to promote engagement); and a focus on story structure to facilitate understanding. Results indicated that the parents in the intervention group significantly increased the time spent sharing the book with their children following the intervention. This increased book sharing duration was linked with a higher use of parent behaviours known to facilitate their child’s language development. Moreover, the significant increase in time spent sharing a book was linked to an increase in children’s verbal behaviour (i.e. the children became more talkative). Social validity was high with parents reporting feeling satisfied with the book reading strategies and reporting the intervention had changed the way they shared
books with their child. We modelled our training for librarians on our previous study involving parents [withheld for blind review], by focusing on supporting the development and use of strategies and behaviours known to facilitate children’s language and literacy development. We added a strategy related to the teaching of print-related skills i.e., letters and sounds (e.g., pointing these out during shared book reading), based on recent findings that showed a proportion of children on the spectrum have difficulty learning those early print-related skills and the importance of those skills for learning to read (Westerveld et al., 2017; 2018). Consistent with the parent-coaching program, we likewise elected to include a program across multiple weeks to give children an opportunity to adapt to the potentially new situation/routine of attending Story Times.

In summary, previous research has found that literacy is a significant area of need for children on the spectrum (Åsberg Johnels et al., 2019; Nation et al., 2006). Given literacy development begins long before children start school, this provides an opportune time to foster skills prior to the onset of challenges. Public library Story Times provide an ideal context for fostering emergent literacy skills both directly by librarians and through building capacity in parents to use similar strategies at home. However, previous research suggests significant barriers exist in terms of the environment, parental concern regarding stigmatisation of challenging behaviours, and concerns regarding engagement and interest in these activities by children themselves. Compounding this, while public libraries provide an ideal freely accessible context with librarians eager to support participation by all children, a need for further training and skills has been expressed by librarians in previous research (Prendergast, 2016). Thus, meeting this gap in professional development provides an opportunity to build both librarian and parent capacity, while supporting children’s emergent literacy development.
**Current Study**

We report on research undertaken to design the Autism Friendly Story Times training for librarians in Australia. A mixed methods approach was selected consistent with recent reviews of other early literacy initiatives (e.g., book gifting) that call for a need to include quantitative (breadth of evidence) and qualitative (depth of evidence) components for a nuanced understanding of the complexity of implementation of literacy initiatives in community settings (Barratt-Pugh & Rohl, 2016). The aim of this project was to develop an online training package for ongoing use by librarians. We sought to provide an initial proof-of-concept that training could increase knowledge and self-efficacy to include children on the spectrum, and that it was deemed acceptable and useful by librarians (i.e. high social validity). Based on previous research, key areas to include in the training package were building autism knowledge (diagnosis and cognitive characteristics that may impact literacy), emergent literacy knowledge including theoretical overview of emergent literacy development (Gough & Tunmer, 1986), emergent literacy development in children on the spectrum (Westerveld et al., 2017), and specific strategies for working with children on the spectrum including supporting and understanding behaviour, fostering shared book-reading, and using visual and other strategies to support engagement (Simpson et al., 2020; {Blinded for peer review}). At each phase, key research questions were whether training was considered socially valid, what areas to change or add to (i.e., feedback for refinement), and whether training led to increases in knowledge and self-efficacy.

**Methodology**

We employed Design-Based Research (DBR) methodology to develop the Autism Friendly Story Times program. This methodology was selected consistent with our research drawing from pragmaticism to address a real-world challenge using mixed methods as it emphasises (a) an iterative cyclical process of design, evaluation, and redesign, and (b) involvement of
both researchers and practitioners in collaborative partnerships (Anderson & Shattuck, 2012). DBR was developed in the field of education with a goal to translate research into improved real-world practice and has been applied widely in this field (for an overview see Anderson & Shattuck, 2012). Our multidisciplinary team included psychology, speech pathology, occupational therapy, education, library services, and individuals on the spectrum brought a rich range of perspectives to the design, implementation, and evaluation components. Members were invited to join the team to meet the multidisciplinary needs of children on the autism spectrum and their families as well as the needs of librarians, by demonstrating knowledge and experience of autism (psychology, speech pathology, occupational therapy, education, and lived experience of individuals on the spectrum); understanding of child, language, and literacy development and intervention (speech pathology, psychology, and education), librarian education and training (library services); and knowledge translation (psychology). Figure 1 shows the cycle progression across the three phases: (1) content generation and quantitative evaluation of face-to-face content; (2) implementation and qualitative exploration; and (3) implementation and quantitative evaluation of online implementation. A convergent parallel design was embedded into Phase 1 and 2 where quantitative and qualitative data were collected, analysed separately, and then merged to inform the next phase of the training. Quantitative and qualitative data were generated consistent with the DBR methodology to provide a more comprehensive and nuanced evaluation of the outcomes (knowledge, efficacy, social validity, implementation to practice and recommendations). Quantitative data were used to evaluate knowledge, efficacy, and social validity of the training program, while qualitative data provided information about the librarians’ experience of applying the training to their context. Both quantitative and qualitative data were collected to evaluate the implementation of training to practice, and qualitative data were collected on recommendations for change consistent with the iterative
approach outlined in DBR. Ethical clearance for all phases of the research was obtained from the Human Research Ethics Committee (blinded for peer review). Participants provided written informed consent for each phase.

[Insert Figure 1]

**Phase 1: Face-to-face training**
We developed initial professional development materials that aimed to increase librarian knowledge in the areas of autism, emergent literacy development in children on the spectrum, and how to adapt shared book reading sessions for preschool children on the spectrum. These comprised four modules of approximately 90 minutes each covering “What is autism,” “Emergent literacy development,” “Strategies for supporting child behaviour and engagement in children on the autism spectrum”, and “Strategies for library sessions.” This last module included an overview of the six-week Autism Friendly Story Time sessions that were designed to build additional skills week by week, see Table 1. Each session included a new strategy to discuss with parents, modelling of the strategy in the session, providing parents with a book from the session to practice at home, and a bookmark and handout that was a reminder of the strategy.

[Insert Table 1 here]

**Method**

**Participants**
Twenty-two library staff (20 females, 2 males) were recruited from 17 Brisbane City Council public libraries using convenience sampling via e-mail and library contact; participation was voluntary. Roles included library assistant, library technician, team leader, and outreach librarian. Experience ranged from 1 to 30 years ($M = 8.82; SD = 10.00$) and 60% of participants ($n = 12$) reported previous experience with autism. Participants included two
under 25, six aged 26-35, five aged 36-45, six aged 46-55, and three aged 56-65. Highest level of qualifications included senior certificate/12 years of formal schooling \((n = 3)\), vocational diploma \((n = 3)\), bachelor degree \((n = 10)\), and postgraduate studies \((n = 6)\).

**Measures**

A specifically developed pre/post-training questionnaire was completed by library staff to determine changes in autism knowledge (i.e., knowledge of autism and emergent literacy; knowledge of ways to make Story Times more autism-friendly) and confidence to include children on the spectrum in Story Times. The autism knowledge and confidence scales were adapted from the *Autism Inclusion Questionnaire* sections 2 (Knowledge of Autism Spectrum Disorders) and 3 (Opinions about Inclusive Education) respectively (Segall, 2008). This measure was selected as a recent review (Harrison et al., 2017) suggested that the Autism Inclusion Questionnaire showed strong psychometrics and met criteria as a “well-established assessment”; as such, relevant items/scales were used. We however used a five-point Likert Scale (Strongly Disagree to Strongly Agree) to capture greater variability in responses, consistent with other autism knowledge measures (e.g., Stone, 1987). Items were added to evaluate knowledge of emergent literacy targeted in training (e.g., “Children with autism don’t need phonological awareness and learn to read through sight words” [false]) and to cover DSM-5 criteria (e.g., “Asperger’s is part of the autism spectrum” [true]). The knowledge of ways to make Story Times more friendly scale was developed based on content of training delivered by the authors. All measures were reviewed by the multidisciplinary research team and checked for face validity and internal consistency. The final knowledge of autism and emergent literacy scale included 21 items and showed acceptable internal consistency pre-test (Cronbach’s alpha = .77) and post-test (Cronbach’s alpha = .80). The knowledge of ways to make Story Times more friendly scale included 10 items and showed acceptable internal consistency at both time points (Cronbach’s alpha pre-test = .75, post-test
The confidence scale initially showed poor internal consistency (Cronbach’s alphas pre = .56, post = .63), thus two items were removed due to poor item-total correlations at both time points resulting in acceptable internal consistency (Cronbach’s alpha at pre = .74, and post = .82), with the final scale including 8 items, see Appendix.

Demographics including gender, age, role, years working in libraries, and experience with autism were included at pre-test. At post-test, social validity was added which was based on the Intervention Rating Profile-15 (Martens et al., 1985), adapted and used in previous autism training studies (Briere et al., 2015; Keen et al., 2017). It was used to assess whether the participants found the training sessions implemented valuable and acceptable (e.g., “I would be willing to use the strategies I learnt today in the future”) and included 9 items on a 5-point Likert Scale.

**Procedure**
Participants completed questionnaires immediately pre- and post-training. The training day was conducted over eight hours in four sections that were developed and delivered by the first, second, third, and sixth authors.

**Results**

**Data Screening**
Under 5% of data were missing, and were missing completely at random, Little’s MCAR test \( \chi^2 (1343) = .00, p = 1.00 \). Expectation Maximisation (EM) was used to replace missing values to retain the full sample for analysis, as is acceptable under these conditions (Tabachnick & Fidell, 2007).
Knowledge and Confidence

Librarians increased their autism and emergent literacy knowledge from pre-test ($M = 82.89, SD = 7.26$) to post-test ($M = 90.26, SD = 6.73$), $t(1, 21) = 6.917, p < .001, d = 1.05$. They increased in knowledge regarding ways they could make their Story Time sessions more autism-friendly, from pre-test ($M = 39.68, SD = 4.65$) to post-test ($M = 44.00, SD = 4.75$), $t(1, 21) = 5.338, p < .001, d = .92$. Finally, participants reported feeling significantly more confident in their ability to include children with autism in their Story Time sessions from pre-test ($M = 32.95, SD = 3.51$) to post-test ($M = 35.59, SD = 3.61$), $t(1, 21) = 3.480, p = .002, d = .74$.

Social Validity

Librarians rated the training as highly socially valid with all means above 4.3 on a 5-point scale (with 5 indicating higher support), see Table 2. Open-ended feedback indicated the training was viewed as “Interesting and informative.”, “Well-paced and suited to audience and our role requirements,” and “Fantastic Training.” Open-ended feedback suggested some librarians enjoyed the mixture of text and video used in the training and materials (e.g., handouts) supplied. Suggestions for improvement included greater opportunities for problem-solving in groups and more examples for implementation of strategies in Story Times. These suggestions were consequently incorporated into the next iteration of training (online discussion board, more examples added to materials), described in Phase 3.

[Insert Table 2 here]

Phase 2: Implementation

In the second phase, implementation of strategies in practice following online training was explored to generate first-hand information on how the face-to-face training supported
librarians’ practice. The aim of this phase was to explore implementation in libraries through mixed methods. This included those who completed training only and implemented Story Times without support (independent implementation) and staff from one library who implemented an Autism-Friendly Story Time program (pilot implementation) with support from the research team.

Method

Participants
Participation was voluntary with participants recruited from Phase 1 \((n = 22)\) via e-mail (including an initial e-mail to all attendees, and follow-up one to two weeks afterwards to those who had not responded), and included eight participants who agreed to and completed the Phase 2 follow-up questionnaire (36% response rate). These respondents were asked whether they would be willing to also complete a follow-up interview for further information which resulted in three of these participants (Kori, Julia and Sarah\(^2\)) also completing an interview. In addition, interviews were conducted with two librarians (Melanie and Tracey) after they implemented the pilot program. The five interviewed participants were female, and most were library assistants with Kori the exception, who was a team leader.

Measures

Follow-up Questionnaire
The questionnaire was developed by the researchers and included closed and open questions to evaluate whether librarians perceived that attending training influenced their practice, and if yes how, and if no, why it did not. An opportunity to provide further feedback on any components potentially missing from the training was also provided, see Appendix.

\(^2\) Note pseudonyms have been used
Interviews

The interviews consisted of nine pre-composed, open-ended questions with additional follow-up questions provided as required to ensure that the librarians’ responses were clearly understood. These questions were designed to encourage participants to reflect on their Story Time sessions, the information provided in the training, and any impact on perceived self-efficacy, see Appendix.

Procedure

Data Collection

Follow-up questionnaires. Approximately six months post-training all participants from Phase 1 were invited via email to complete the follow-up questionnaire online which took approximately five minutes.

Interviews. Questions were provided in advance for librarians to consider responses if desired. Interviews were completed in person (Melanie and Tracey) or over the phone (Kori, Julia and Sarah) by a member of the research team or trained Research Assistant and were on average 24 minutes in duration (range 13-30min). Interviews were audio recorded.

Implementation

Pilot Program. Six weekly Story Time sessions were conducted at one (blinded for peer review) public library by two librarians who had completed the Phase 1 training. They received support from the research team attending each session who observed and debriefed after each including a discussion of what went well, answering any questions about implementation, and providing tips for the next session. These sessions were offered to preschool-aged children on the spectrum and their families with the invitation to participate
also extended to families of typically developing children and those who had not yet received a formal autism diagnosis. Family participation varied from week to week from two to six children; one child on the autism spectrum attended with his sister and caregivers for the entire program.

Independent. The remaining participants from Phase 1 were encouraged to implement practices at their own libraries following their training. No further support or coaching was provided.

Data Analysis

Questionnaires. Data were analysed using descriptive statistics (count of each response) and open-ended responses summarised by the first and third authors.

Interviews. All interviews were transcribed verbatim by a professional transcription organisation. Analysis drew on an evaluation framework (Paton, 2015). An inductive approach was adopted to provide representations of how the participants applied training to practice and their evaluation of the acceptability and perceived value of the training for practice. Analysis was conducted by the second and third author who are experienced qualitative researchers. Each independently read each transcript for both sets of interviews and identified initial codes generated from the two interview populations. They then met and discussed and refined codes. Due to the similarities of emerging themes across the interviews (pilot and independent implementation), the results were combined to provide formative evaluation of the implementation of training information to practice. Given the similarities of emerging themes, it was interpreted that saturation had been achieved. The interview data was then coded by the second author, and the third author completed a data quality check by
revisiting the transcripts to ensure that the analysis comprehensively reported the data generated from the interviews and looked for alternative experiences.

Results

Follow-up Questionnaire

Seven of the eight librarians reported that attending the workshop led to changes in their Story Times practice. The remaining participant reported, “I haven’t been able to use tips and techniques used yet” as Story Times were “on a day I don’t work.” For librarians reporting changes in practice, they elaborated in open-ended comments on feeling increased confidence (e.g., “confident in assisting parents of children on the autism spectrum with information and book choices”) and greater awareness, for example reporting that she had “become more aware of the needs and difficulties of children on the autism spectrum”. Others shared that the training had led to change in Story Times procedure, including using more narrative stories, and outlining the schedule for sessions to the children at the start of sessions. Environmental considerations were also highlighted including, “Being more mindful of children that may be sensitive to noise, lights, others, etc,” informing participating children of expectations and sequence of activities, and providing a “chill out zone.” Participants did not identify any components to add to the training, for example, “No, everything was covered really well!”

Interview

Three themes were generated from the interviews which included “Confidence in providing a more supportive environment”, “Valuing the Story Time session as a literacy learning experience”, and “Developing skills”.

Confidence in providing a more supportive environment.

Consistent with questionnaire responses, during interviews librarians described how the training increased their understanding of influences on children’s behaviour and their confidence in being able to provide a supportive environment. This led to a change in attitude towards children’s behaviour. Julia explained how now when she observed a child demonstrating challenging behaviours she was “not as quick to judge as I may have been in the past”. The librarians felt it was important to identify factors which may influence children’s behaviour, and to adapt their practices to providing a supportive environment for children on the spectrum.

To reduce barriers to children’s participation in Story Times, the librarians described feeling more confident in approaching families to ask how they could provide support. Kori discussed implementing this by approaching a caregiver and saying, “we really want you to stay, we know this is difficult… what can we do?”. Similarly, Melanie now invites parents to discuss any issues their child may experience in engaging in the session. This communication with caregivers was viewed as important and assisted the librarians in providing specific support for the children in the group. For example, Melanie and Tracey explained how, when the child’s caregivers informed them the child had difficulty sitting on a cushion, they provided him with a chair. They also adapted the seating arrangements when told a child had difficulty hearing on one side. In addition, they were more aware of the impact of their behaviour on the children. For example, Melanie and Tracey discussed how they noticed a child covered his ears when the tambourine was played and as a result Tracey stopped using the tambourine when he was in the session.

Increased understanding of autism led Julia to feel “more accommodating to things going wrong in the sessions”. She felt this more relaxed approach led parents and children to be more comfortable in the sessions. Similarly, Melanie shared “I feel like just by taking a
scope of the room, going okay this is what we’re doing, we’re all good, …I don’t think it’s scary anymore”. She also commented that she had learnt a lot from conducting the sessions “definitely a crazy amount of development between now and then”. For Tracey there was an acceptance that child participation will vary across sessions and “there are kids that’ll just wander but that’s alright”. This idea was reflected in a comment by Julia who stated: “every child is different…and not one situation is going to be the same, I find I’m more accepting of that”.

Librarians also reported introducing safe spaces and visual schedules. Within a week of training completion, Kori had implemented a “chill out zone” to provide children with a space away from the group. This was beneficial for a mother who previously would remove her child from the library when she became upset or overwhelmed. Melanie and Tracey also provided a quiet area and although this had not yet been required, they felt parents knowing it was available was important. The schedule was a practice adopted by the majority of the librarians. This was viewed as working well and a practice that could be used in all sessions. Kori said it “benefits everybody” and she had received positive feedback from families. Melanie felt the visual schedule “gave the structure so the kids knew what was coming” however she did comment it required teaching the children how to use the schedule.

*Valuing the Story Time session as a literacy learning experience*

Following training, librarians reported they took a more purposeful approach to their Story Times in order to support (emergent) literacy development. Julia described how her view of sessions had changed from a “performance” to “facilitating early literacy for parents and children before they get to school”. Overall, the librarians felt the strategies learnt during the training were applicable to their general Story Times’ delivery. Tracey realised “I can use what I’ve learned in those sessions outside as well. It’s not the other way around”. In particular, the librarians reported being more selective of the type and number of stories told.
They selected stories with stronger narratives, delivered fewer stories, and focused on ensuring children understood the words and comprehended the story. As Melanie explained “before the autism Story Time I didn’t do retells but now I do it religiously and I think it really helps”. The librarians were also more selective in their choice of songs and props to support the story and reinforce learning. Tracey used the props for retelling and felt these made the session more interactive and engaging. What was important for Tracey was the children’s “interaction and seeing that they...enjoy the book” which she saw as “really rewarding”, as well as providing the children the opportunity to talk about the story and what they understood. There was a feeling expressed of children learning more in the new delivery of Story Time sessions. Not only was this evident in the retelling but there was also a change reported in the children’s behaviour in the post session craft activities. Melanie shared her observation that previously in these sessions the children would draw anything “but when I’ve done the retells the drawings are more related to the story”. She interpreted this as an indicator of greater story comprehension.

Librarians valued the new strategies, however Tracey felt that initially preparing resources for Story Time, “setting it up and putting it together and ... learning new songs” was time consuming. However, librarians commented that once these resources were made, they could be reused by others. The willingness to share with colleagues was also evident in their willingness to share the training strategies with other staff. Kori reported she spoke “to our team at length about the importance of reading narrative stories”. However, Tracey found when sharing her experiences with colleagues “it’s just getting that bit of scepticism you know out of the equation”

Developing skills
Librarians discussed how strategies from training were applicable to their settings, however they suggested areas to further support developing skills, particularly for inexperienced
librarians. Tracey suggested including examples of implementation of practices in Story Times. Both Melanie and Kori discussed the challenge of communicating information about shared reading strategies with parents during the sessions. They suggested included scripts of parent messages that could be used by librarians. In addition, Kori suggested having a booklist of suitable picture books with strong narratives would be a time saving resource.

**Phase 3: Online training and implementation**

The online training was designed to enable greater geographical distribution of the Phase 1 training modules to librarians to improve the availability of Autism-Friendly Story Time sessions for families in the long-term. Interview feedback from Phase 2 was incorporated into the Phase 3 online training development to include scripted explanations for librarians to say to parents and printable resources (e.g., social story templates, visual schedule templates, and bookmarks of strategies covered in each session) to reduce burden on librarians creating materials to support implementation. Resources created by the librarians in the pilot were also used as examples (e.g., a video of using a visual schedule created in the pilot demonstrated by the first author, photographs of props for Story Times) and included in online training package. This phase included pre/post evaluation by librarians to investigate whether training led to increases in knowledge and self-efficacy, social validity of training, and any feedback for refinement of training.

**Method**

**Participants**

Participants included 22 female librarians (three library technicians, 12 library assistants, four team leaders, one co-ordinator, and two with no response) from 11 different libraries who were recruited via e-mail and participated voluntarily. This included one participant under 25, six 26-35, four 36-56, eight 46-55, and one in the 56-65 years age bracket (with two
participants not reporting their age). Half (50%) reported some experience with autism prior to training (mostly family member or friend’s child), with only four participants (18%) reporting having worked with someone on the spectrum. All 22 librarians completed the initial pre-test; 20 completed the immediate post-test assessment following completion of the online training. Four female participants (one 26-35, one 36-45, and two 46-55) were involved in implementation at one library with support from the fourth author and completed a follow-up survey of their experiences with implementation following online training.

**Measures**

**Pre/post measures**
The same measures were used as Phase 1, but completed online, including autism knowledge (21 items), confidence (10-items), and social validity (8-items). Additionally, access and use data, and discussion board use were captured by the online platform.

**Follow-up survey**
This was a 33-item survey designed by the authors to evaluate participant experiences and suggestions for improvements or future inclusions (open-ended items), what strategies worked well and were rated useful (13-item Likert scales), how helpful each element of training was (10-item Likert scales and “other”), and self-efficacy on a single 5-point Likert Scale, see Appendix. Open-ended questions were focussed on any changes in practice informed by Phase 2 interviews, but in a questionnaire format as requested by librarians who participated in the current phase to better fit their needs and availability. The survey took approximately 15 minutes to complete.
Procedure

Online Training
The professional learning consisted of pre- and post-training questionnaires and four learning modules. These modules reflected those included in the face-to-face training (“What is autism,” “Emergent literacy development,” “Strategies” for supporting child behaviour and engagement in children on the autism spectrum”, and “Strategies for Story Time sessions”), however included video mini-presentations and demonstrations in place of live lectures, and additional resources gained from Phase 2. During the training, participants were also encouraged to engage in an online discussion forum to share their questions, reflections and experiences based on feedback from Phase 2. This forum was monitored regularly by research staff, with input provided where necessary. Participants were invited to complete the online training from September to December 2018 and were able to leave and return to the site if required. Overall, the online training took approximately 3-4 hours to complete.

Implementation
Following online training, four librarians completed the 6 weekly Story Time sessions at a library with support from the (fourth author) only. The fourth author attended 5 out of the 6 sessions delivered and supported librarians through reflecting on what was successful in the session and areas to review, providing positive feedback on the use of strategies from the training, and discussing potential resources (e.g., props) to use in sessions. Family participation in these sessions was promoted through flyers on display in the library and directly contacting parents in the library at the time or those who had expressed an interest in the Phase 2 sessions.
Results

Data Screening
Missing value analysis for pre/post comparisons showed 5.63% missing data which was missing completely at random, Little’s MCAR test $\chi^2 (389) = .001$, $df = 389$, $p = 1.00$. Data screening revealed that the online learning platform with the survey setting had collated the data anonymously, which did not allow matching of specific participant data; this could not be re-identified or matched (see Blackboard Inc, 2018), thus no data imputation was used for missing data for this phase. Further, quantitative analyses pre/post focussed on descriptive analysis due to inability to match specific responses. Means and standard deviations were calculated for all available data (with missing data deleted listwise by analysis).

Use of online training and online forum reflections
The online forum provided the opportunity for participants to comment on the information provided, ask for clarification, and to share ideas and experiences. Content analysis was conducted on the online forum comments. Ten participants contributed a total of 28 posts on the discussion forum. One post was excluded as it related to a technology issue only and one post included multiple topics. Introductions, including reasons for completing training and previous experience of autism, accounted for 37% of the posts. The remaining posts were focused on identifying what strategies staff were going to implement to practice (30%), experiences implementing the strategies to practices (30%), and sharing resources (11%).

Knowledge and Confidence
Librarians increased numerically in their knowledge of autism and emergent literacy from pre-test ($M = 83.84$, $SD = 5.73$, $n = 19$) to post-test ($M = 86.75$, $SD = 6.15$, $n = 20$). They increased numerically in their knowledge regarding ways they could make their Story Time sessions more autism-friendly, from pre-test ($M = 40.41$, $SD = 3.74$, $n = 22$) to post-test ($M =
43.05, $SD = 3.38$). Finally, participants reported numerically higher ratings of confidence in their ability to include children with autism in their Story Time sessions from pre-test ($M = 32.23, SD = 3.50$) to post-test ($M = 35.25, SD = 2.81$).

**Social Validity of Online Training**

As shown in Table 3 librarians ($n = 19$) rated the online training as socially valid with all means above 4.5/5 on a 1-5 scale with 5 indicating greater support. One participant strongly disagreed with the statement (see Table 3) that they would recommend the training to other librarians, yet open-ended feedback regarding social validity was predominantly positive, (“…with the increase in prevalence of children on the autism spectrum I can see that it is timely that I understand how I can contribute to development of their literacy skills as well as support them and their parents. I believe that if I implement the training I have received it will benefit most children. Even though I am a little concerned about ensuring the provision of an appropriate physical space in my library, I still wish that all my colleagues could have the same opportunity to participate in this workshop.”) and rated all other social validity questions 3-5 with 5 a more positive score so it was interpreted that this response may have been in error.

[Table 3]

Open-ended responses indicated further support for the training and components. For example, “I would recommend the training to all library staff”, “It's wonderful that this kind of training is becoming available so that more people have a better understanding of autism and how they can include autistic children in Story Times. Also, it was great to have more clear strategies for assisting parents with incorporating stories into their home routine.” Two librarians also commented on enjoying being able to use the Yammer discussion board. Suggestions for refinements in open-ended responses included refining the questionnaires with two participants giving feedback that some items could be interpreted multiple ways,
and a request for inclusion of additional scripts and videos of librarian implementation of autism-friendly Story Time sessions.

**Follow-up survey with librarians implementing sessions following online training**

All four librarians who were involved in the implementation component completed the follow-up survey. Qualitative content analysis was conducted by the third author and indicated that participants described the experience as “really helpful”, “interesting”, and “enlightening” as it built on knowledge gained through previous professional development, while providing “more insight into the minds” of children on the spectrum. Most (3/4) participants reported that the way they approached Story Times changed in response to the training and they now included “much slower paced sessions” and placed greater emphasis on the narrative components of the story. One participant also realised the benefits of the training concepts for use in regular Story Times specifying that she “could deliver the core benefits of the lessons” dependent on the different needs of the children attending the Story Times. The fourth participant clarified that while her approach did not change significantly, she now had “a better understanding of behaviour that I may have previously found frustrating”, consequently she reported feeling more skilled in helping children or their parents engage in Story Times. Author four who attended the sessions reported that the implementing library staff had informally commented that the autism friendly Story Times were found to be beneficial to parents and children from culturally and linguistically diverse backgrounds that they also worked with. Feedback for future training and implementation included incorporating more promotion of the program to facilitate greater community engagement.

Consistent with qualitative data, overall participants implementing Story Times reported high levels of confidence to implement autism friendly Story Times in future ($M = 4.25$, $SD = .50$, range = 4-5). As shown in Table 4, all participants reported the following
were “very useful”: visual schedules, slowing down, use of visual supports, and retelling the story. Participants reported that reading narratives and reading fewer stories in a session were “useful” or “very useful.” The discussion board (Yammer) was the only element that was rated low with an average of 2 on the 1 (not at all helpful) to 5 (very helpful) scale.

Discussion

The aim of this research was to design an online learning package for supporting implementation of autism-friendly Story Times in Australian libraries. The study was conducted using a DBR methodology, incorporating mixed methods to address the real-world challenge of providing autism-friendly Story Times in Australian Libraries. We have reported on the progression of design cycles involving development of learning content, validation of learning and social validity of content, implementation in practice, translation to online delivery and investigation of social validity in an online format.

Participation in professional development led to increases in knowledge and confidence of librarian staff. This was reflected in significant increases following face-to-face training (Phase 1), increases in the expected direction after online training (Phase 3), and reflected in qualitative feedback that indicated librarians both felt more knowledgeable and confident in including children on the spectrum in Story Times. These results indicate that both modalities have potential to bridge training/knowledge gaps identified in previous research (Prendergast, 2016).

Social validity for both the face-to-face and online training was rated highly including the social validity rating scale and ratings of usefulness/ likelihood to use training components/strategies. The high social validity is consistent with previous parent-coaching research used to inform session content {Blinded for peer review}. The finding that online training was similarly highly rated as face-to-face is an important finding. This finding is
consistent with broader autism research training (of teachers) where online and face-to-face coaching have been found to show similar outcomes (e.g., Ruble et al., 2013). This indicates online training may be a viable alternative to face-to-face training, allowing capacity for greater geographical distribution and extending the potential implementation beyond the life of the project. This may be particularly timely in light of the ongoing global pandemic (COVID-19) occurring in 2020, with further research into online training modalities of particular value moving forward.

Librarians indicated that training resulted in changes in their practice for both participants who completed the training only, and for those who received coaching/support to implement a six-session program. Full program implementation, however, was only reported to be completed by those who received coaching from either the research team or the (blinded for peer review) Co-ordinator. This is consistent with previous research that involved training of teachers working with students on the spectrum that found changes in practice following face-to-face or online coaching, but not for teachers who had access to online information only without coaching (Ruble et al., 2013; Beamish et al., 2020). This highlights that while training may result in improved confidence and knowledge, ongoing supports may be needed for complete implementation in practice to reap the full benefits. Results from Phase 3 indicate that this may be provided by senior staff locally, which may make this more sustainable than relying on external expertise/researchers.

In terms of areas for refinement, the need for scripts, resources, and examples to reduce burden to implement practices was highlighted. This was challenging in the context of the current study due to organisational restrictions on filming organisational sites and staff. However, meeting the needs for resources, the final online package included a number of templates and printable materials including social stories, a visual schedule, and bookmarks and other materials for printing and using with families. In addition, a number of examples of
real-world materials created by librarians in Phase 2 were included, such as a video of a visual schedule created by librarians but demonstrated by the first author, and photographs of props (e.g., story characters that could be printed). The content of the online package was rated to be highly useful/useable. This builds on the existing initiatives (Ascel, 2020; Autism Speaks, 2019), that have to the authors’ knowledge not evaluated the utility/usefulness of resources and indicates that elements such as the inclusion of session plans, parent handouts, social stories, and visual schedules, may be valuable resources for librarians to support more inclusive Story Times.

We have provided the first stages towards development and refinement of an online package to support autism-friendly Story Times addressing an important need for young children on the autism spectrum, their families, and librarians. However, four key limitations are acknowledged. First, further validation and refinement of pre/post measures (i.e., knowledge and confidence questionnaires) is needed. While we developed knowledge and confidence measures based on existing well-validated measures (Segall, 2008) and established internal consistency, future research to establish the factor structure, test-retest reliability, and concurrent and predictive validity would strengthen conclusions that may be drawn. Second, we relied on self-reports of practice changes and did not include direct observation measures which is an important next step. This could include whether ongoing coaching and what type is required for implementation given only those receiving additional supports implemented the full program following training. Third, evaluation of whether changes in librarian practice led to changes for children and their families, such as whether this structured program provided additional benefits over a standard Story Times offering, is an important future research question. This could also include investigation of potential benefits to children with other diverse needs, such as those from culturally and linguistically diverse families, as raised as a possible benefit from librarians in the present study. Further,
research into how to best attract and recruit families to Story Times is needed, with low uptake in the implementations. Fourth, due to technical issues, data could not be paired for pre/post statistical comparisons limiting conclusions that may be drawn from phase 3 in terms of changes in knowledge and confidence. While results were in the expected direction, and qualitative data provides support for changes in these areas, further evaluation (e.g., via a Massive Online Open Course [MOOC] with matching surveys embedded), is needed to ascertain changes in knowledge and confidence in response to online training.

This project provides an initial proof-of-concept for an online Story Times Training Package for libraries and illustrates a model for the development of knowledge tools and phases for development to move from traditional face-to-face formats to online formats developed through use of a DBR methodology that incorporated iterative cycles of design and multidisciplinary collaboration. This included first evaluating content, then implementation, then refining for online translation. Such a model may be useful in future knowledge translation efforts to support moving research to practice more rapidly through co-design or integrated knowledge translation type designs (for a review see Gagliardi et al., 2016), and provides a framework for building knowledge tools which is a key stage in knowledge translation frameworks (e.g., Knowledge to Action Framework, Graham et al., 2006)). While limitations of the present study are acknowledged, results provide preliminary support for the social validity, acceptability, and perceived usefulness of the training by librarians. Future research that includes further evaluation of changes in knowledge and self-efficacy would strengthen conclusions that may be drawn. Providing opportunities to access libraries and early literacy opportunities for all children is vital, and providing ecologically valid, useful training to librarians can support the best possible start to lifelong literacy development for all children, including those on the autism spectrum.
References

{one reference removed for blinding purposes}


Tables

Table 1. Overview of Autism Friendly Story Time Sessions across the Six Weeks

Table 2. Social Validity of the face-to-face Training \((n = 22)\)

Table 3. Social Validity of the Online Training

Table 4. Reflections on what worked and how useful each online training components was after implementing a series of six autism-friendly Story Time sessions \((n = 4)\)
Figures

Figure 1. Overview of design phases