

Preschool children's communication, motor, and social development: Parents' and educators' concerns

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Key words: children, development, communication, speech, language, behaviour, fine motor, gross motor, school readiness, parents, teachers, educators, early childhood, screening

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Abstract

Purpose: During early childhood it is important to identify which children require intervention before they face the increased demands of school. This study aimed to: (1) compare parents' and educators' concerns, (2) examine inter-rater reliability between parents' and educators' concerns, and (3) determine the group difference between level of concern and children's performance on clinical testing.

Method: Parents and educators of 1,205 4- to 5-year-old children in the Sound Start Study completed the Parents' Evaluation of Developmental Status. Children whose parents/educators were concerned about speech and language underwent direct assessment measuring speech accuracy ($n=275$), receptive vocabulary ($n=131$), and language ($n=274$).

Result: More parents/educators were concerned about children's speech and expressive language, than behaviour, social-emotional, school readiness, receptive language, self-help, fine motor, and gross motor skills. Parents' and educators' responses were significantly correlated (except gross motor). Parents' and educators' level of concern about expressive speech and language was significantly correlated with speech accuracy on direct assessment. Educators' level of concern was significantly correlated with a screening measure of language. Scores on a test of receptive vocabulary significantly differed between those with concern and those without.

Conclusion: Children's communication skills concerned more parents and educators than other aspects of development and these concerns generally aligned with clinical testing.

Key words: children, development, communication, speech, language, behaviour, fine motor, gross motor, school readiness, parents, teachers, educators, early childhood, screening

Preschool children's communication, motor, and social development: Parents' and educators' concerns

Early childhood is a time of maturation of skills including communication, motor, and social skills. Most children develop these skills and are ready for school while some children have difficulties and may require early intervention services prior to commencing formal schooling. Early identification of such children is imperative given the possible long-term consequences for later social, academic, and employment success (Glascoe, 2000a; McCormack, McLeod, & McAllister & Harrison, 2009). When early intervention follows early identification the risk of subsequent difficulties is lessened, which benefits children and their families as well as the community as a whole. Current healthcare models emphasise the need to consider the child's context when assessing and evaluating developmental concerns (e.g. World Health Organization, 2007), and a growing body of research has recommended the collection of information from parents, teachers and significant others as a first step in identifying potential difficulties and guiding assessments (Macy, 2012; Restall & Borton, 2010; Tervo, 2005).

The Parents' Evaluation of Developmental Status (PEDS, Glascoe, 2000b) is one tool that has been used widely to identify parental concern regarding children's development. According to Glascoe (2000a), "if parents' concerns are carefully elicited and interpreted, professionals can make accurate decisions about children's and families' psychosocial needs" (p. 138). Woolfenden, Eapen, Williams, Hayyen, Spencer, and Kemp (2014) reported a systematic review of 37 studies that used the PEDS with 210,242 children. The reported prevalence of parental concerns indicated substantial developmental risk (13.8% of parents had concerns indicating their child was at high developmental risk and 19.8% had concerns indicating their child was at moderate developmental risk). The PEDS has been adapted for use in Australia (Centre for Community Child Health, CCCH, 2005) and a number of studies

have been conducted exploring the utility of the tool with parents, educators, and health professionals (e.g. Armstrong & Goldfeld, 2008; Coghlan, Kiing, & Wake, 2003; Limbos & Joyce, 2011; Wake, Gerner & Gallagher, 2005). Parents' concern (as measured by the PEDS) has been used as a predictor of subsequent academic success, with studies providing different outcomes. Wake et al. (2005) found that parents' concern regarding children's development at school entry (5-6 years) was not a good predictor of children's academic and language skills 2 years later. In contrast, parental concern about communication skills measured by the PEDS (for children aged 4-5 years) has been related to poorer performance at 6-7 and 8-9 years on a range of parent, educator, and child report measures of language, mathematics, learning, peer and educator relationships, and enjoyment of school (Harrison, McLeod, Berthelsen, & Walker, 2009; McCormack, Harrison, McLeod, & McAllister, 2011; McLeod, Harrison, Whiteford, & Walker, 2016).

A number of studies using the PEDS and other developmental screening tools have examined the most commonly reported areas of parental concern. By using the PEDS with an Australian community sample of children ($n = 262$; aged 18 months to 5 years, 9 months), Coghlan et al. (2003) found the majority of concerns recorded in both the parent (P) and carer (C) groups were in the domains of behaviour (P=34.1%, C=21.0%), expressive speech and language (P=20.6%, C=18.7%), and social-emotional skills (P=20.7%, C=16.4%). In the Coghlan et al. study, carers were staff members at early childhood centres attended by the participants. More concerns were expressed for boys than for girls and parents reported more concerns than carers in almost all categories, although overall agreement was high (>75%) (Coghlan et al., 2003).

Across studies that consider parent concern, communication skills (e.g. speech and/or language) were one of the most frequently reported areas of concern. McLeod and Harrison (2009) analysed PEDS data from a population sample of 4,983 children (ages 4–5 years)

from the Longitudinal Study of Australian Children (LSAC, Australian Institute of Family Studies, 2009) and reported 25.2% of parents had concerns about how their child talked and made speech sounds (11.8% “yes, concerned”; 13.4% “a little concerned”). The high prevalence of parental concern reported by McLeod and Harrison (2009) might suggest that communication skills are among the most prominent areas of concern for parents of 4- to 5-year-old children, at the point of transition to school. However, there is a need to consider parents’ concerns regarding children’s communication in the context of other developmental areas for preschool children. In essence, a question remains as to whether parents’ concerns for children aged 4 to 5 years old reflect those expressed by parents with children of broader ages (e.g. those reported by parents of children aged 1;6 to 5;6 years in Coghlan et al., 2003), and whether concerns regarding communication remain prominent when development is screened with a wider lens (e.g. expanding McLeod and Harrison, 2009 by considering all the items on the PEDS). It is also important to determine similarities and differences between parents’ and educators’ concerns and their correspondence with testing by speech-language pathologists (SLPs).

There is a body of research that has investigated the difference between parent and educator reports of speech and/or language difficulty with varying results. Some indicate limited correlation between parent and educator reports (Boynton Hauerwas & Addison Stone, 2000), while others found moderate correlations (Bishop & Baird, 2001; Massa et al., 2008). Further examination of this relationship is required to explore the inter-rater reliability of parent and educator concern and explore the possible reasons for differences in reporting. There also is a body of research that has investigated the difference between clinical assessment and parent/educator reports of speech and/or language difficulty. When parent/educator reports have been compared to clinical assessment conducted by SLPs, the results have also been variable. A number of studies suggest educators are better able to

identify children who have typically developing communication skills compared to children with difficulties (i.e. higher *specificity* than *sensitivity*) (e.g. Antoniazzi, Snow, & Dickson-Swift, 2010; Cabell, Justice, Zucker, & Kilday, 2009; Jessup, Ward, Cahill, & Keating, 2008), while parents are often able to identify children with speech and/or language difficulties who would receive a clinical diagnosis (Anderson & van der Gaag, 2000; Bishop & McDonald, 2009; Harrison et al., in press). There are a number of factors that may contribute to the variation in findings reported across studies exploring parents' and educators' concerns, including the age of the children in the samples (Restall & Borton, 2010), and socioeconomic status of the family (Nicholson, Lucas, Berthelsen, & Wake, 2012). To date, there has not been a large-scale study of parents' and educators' concerns regarding 4- to 5-year-old children who transitioning to school, and therefore have increasing demands on their communication, motor, and social skills.

Aims

The aims of the current research were:

1. To identify the most frequently occurring concerns surrounding the development of 4- to 5- year-old children from the perspective of parents and the perspective of educators.
2. To examine the inter-rater reliability between parents' and educators' concerns regarding 4- to 5-year-old children.
3. To determine group differences between parents' and educators' level of concern with results from assessment of speech and language for children with speech sound disorders.

It was hypothesised that parents and educators are more likely to be concerned about 4- to 5-year-old children's speech and language than their motor and social skills, that they have similar concerns, and their concerns about speech and language align with clinical testing.

METHOD

Context of the Current Study

The Sound Start Study is a 3-year study with the primary aim to conduct a cluster randomised controlled trial of the effectiveness of the Phoneme Factory Sound Sorter software for children with speech sound disorders (McLeod, Baker et al., in press). In order to determine an appropriate sample of children with speech sound disorder to participate in the randomised controlled trial, screening (stage 1) and speech and language assessments (stages 2 and 3) were undertaken. The current paper reports on data from stages 1, 2 and 3 of the Sound Start Study (see Figure 1). The intervention (stage 4) and post-intervention outcome assessments (stages 5 and 6) are described in McLeod, Baker et al. (in press).

Participant Recruitment

A total of 79 early childhood centers in Sydney, Australia were invited to participate in the Sound Start Study, with 45 consenting to participate (11 sites participated in more than one year of the study). A total of 1,920 4- to 5-year-old children attended these early childhood centers during the study and parents of 1,205 children (62.7%) completed the screening questionnaire and therefore participated in stage 1 (Figure I). Children in stage 2 were those whose parents and/or educators were concerned about speech production and consented to participate in the assessment phase of the Sound Start Study (Figure I). Parents and/or educators had identified that they had concerns (*yes* or *a little*) about how the child “talks and makes speech sounds” (Glascoe, 2000b), and that the child’s speech was either not clear to their family or to others. Children were excluded if persistent hearing loss, cleft lip and/or palate, or developmental delay was reported. Children in stage 2 were required to speak English, and if they spoke another language(s), they had to speak English equally well or better than their other language. Children in stage 3 had an identified phonologically-based speech sound disorder. They had a standard score of ≤ 6 for percentage of consonants correct (PCC) on the Diagnostic Evaluation of Articulation and Phonology (DEAP, Dodd, Hua, Crosbie, Holm, & Ozanne, 2002), produced a phonological process that could be targeted in

the computerised intervention, and passed assessments of hearing, oromotor structure and function, and non-verbal intelligence. Children in stage 1 are the focus of Aim 1 and children in stages 2 and 3 are the focus of Aims 2 and 3 in the current study.

Insert Figure I here

Stage 1: Participants

Participants in stage 1 were 1,205 children aged between 4;0 and 5;7 ($M = 53.2$ months; $SD = 3.88$ months), of which 630 (52.3%) were male and 575 (47.7%) were female (see Table I). Children's socio-economic status was determined using the decile of their residential geographic location (postcode) within the Index of Relative Socioeconomic Advantage and Disadvantage (IRSAD, ABS, 2011). Areas with a decile of 1 are considered most disadvantaged while areas with a decile of 10 are considered most advantaged. Participants' IRSAD deciles ranged from 1 to 10 with a mean decile of 6.19 ($SD = 2.99$) and mode of 10 (25th percentile = 4, 50th percentile = 7, 75th percentile = 9). Information about socio-economic status was not available for eight participants. The majority of children ($n = 760$, 63.1%) were monolingual users of English, 407 (33.8%) spoke English and one other language, and 38 (3.6%) children speaking English and two or three other languages (see Table I). There were a total of 68 different languages other than English spoken by the children and some spoke more than one additional language. The most commonly reported were: Arabic ($n = 67$), Urdu ($n = 28$), Hindi ($n = 27$), Korean ($n = 24$), Mandarin ($n = 21$), and Spanish ($n = 20$). All children were exposed to English in their early childhood centers. Parents reported that most children used English *very well* ($n = 834$, 69.2%), with fewer using English *somewhat well* ($n = 273$, 22.7%), or *not very well* ($n = 80$, 6.7%). The parents of 18 (1.5%) children did not report English proficiency although all of these parents reported that their children used English.

Insert Table I here

Stage 1: Children's parents and educators.

Questionnaires containing the PEDS questions were completed by parents¹ of all 1,205 children participating in this study. The majority of respondents were mothers ($n = 1061$, 88.0%), followed by fathers ($n = 131$, 10.9%), grandmothers ($n = 5$, 0.4%), carers ($n = 3$, 0.2%), an aunt ($n = 1$, 0.1%), a cousin ($n = 1$, 0.1%), and an adult sibling ($n = 1$, 0.1%). Relationship was not provided by 2 (0.2%) respondents. While the majority of parents completed the written questionnaire on their own ($n = 1156$, 95.9%), 49 (4.1%) completed the questionnaire with the assistance of a researcher. During stage 1, 1,123 (93.2%) parents allowed educators' reports to be completed on their child and educators of 1,064 (88.3%) children completed questionnaires.

Stage 1: Representativeness of the sample compared with Australian children.

The representativeness of the 1,205 parents and children described within this paper was determined by comparing key characteristics of the current cohort with data reported for 4- to 5-year-old children from the Longitudinal Study of Australian Children (LSAC) Birth cohort (wave 3). Table II presents demographic characteristics from the current sample, the 4,386 children from the LSAC cohort who were aged 4- to 5-years, and a sub-cohort of 3,383 of the 4- to 5-year-old children from LSAC who attended early childhood centers. These studies had a similar male to female ratio and the average age of the children in the Sound Start Study was three to four months younger than in the LSAC samples. A larger number of children spoke a language other than English in the Sound Start Study compared with the LSAC samples. This is because the LSAC sample was a national sample, whereas the Sound Start Study was conducted in one city (Sydney) within the Australian state that has the largest number of children who speak a language other than English (McLeod, 2011). The frequency

¹ The term *parent* is used within this paper to refer to a child's caregiver.

of parent concern about speech and language was notably higher for this participant group than for the LSAC sample.

Insert Table II here

Stage 2: Participants

There were 327 children eligible for inclusion in stage 2, and 275 were assessed (see Figure I). The 275 children assessed in stage 2 were aged between 4;0 and 5;6 ($M = 54.3$ months; $SD = 4.3$ months), and 170 (61.8%) were male. Participants' IRSAD deciles ranged from 1 to 10 with a mean decile of 5.72 ($SD = 3.1$) and mode of 8 (25th percentile = 4, 50th percentile = 6, 75th percentile = 8). All children in stage 2 spoke English and where another language was used children spoke English equally well or better than their other language/s. The majority of children ($n = 205$, 74.5%) were monolingual users of English, with 66 (24.0%) children using English and another language, and the remainder using English and two ($n = 3$, 1.1%) or three ($n = 1$, 0.4%) other languages. The majority ($n = 146$, 53.1%) of children were reported to use English *very well*, with less ($n = 108$, 39.7%) reported to use English *somewhat well*, and few ($n = 18$, 6.5%) reported to use English *not very well* (see Table I). Additional information about stage 2 is available in McLeod, Crowe et al. (in press).

Stage 3: Participants

There were 137 children eligible for inclusion in stage 3, and 132 were assessed (see Figure I). The 132 children assessed in stage 3 were aged between 4;0 and 5;5 ($M = 55.0$ months; $SD = 4.3$ months), and 84 (63.2%) were male. Participants' IRSAD deciles ranged from 1 to 10 with a mean decile of 6.05 ($SD = 3.1$) and mode of 8 (25th percentile = 4, 50th percentile = 7, 75th percentile = 9). All children in stage 3 spoke English and where another language was used children spoke English equally well or better than their other language/s. The majority of children ($n = 108$, 81.8%) were monolingual users of English, with 22 (16.5%) children using English and another language, and two (1.5%) children using English

and two other languages. The majority ($n = 68$, 51.1%) of children were reported to use English *very well*, with less ($n = 53$, 39.8%) reported to use English *somewhat well*, and few ($n = 9$, 6.8%) reported to use English *not very well* (see Table I).

Instruments

Parents' Evaluation of Developmental Status.

The Parents' Evaluation of Developmental Status (PEDS) (CCCH, 2005; Glascoe, 2000b) is a brief parent-report measure for children aged 0 to 8 years that includes two general questions, and eight specific questions about different areas of child development. For example, "Do you have any concerns about how your child talks and makes speech sounds?" For each item, parents are required to mark one of three responses regarding whether they had concerns: *No* (taken to suggest that the child's development is typical), *yes*, or *a little* (taken to indicate concern (CCCH, 2005)). The PEDS was "designed to facilitate parent-professional communication and to ensure that developmental and behavioural problems in children are detected and addressed" (CCCH, 2005, p. 2) and includes recommendations for different age ranges. Five of the ten questions are classified as areas of "significant predictive concern" for children aged 48 to 53 months: global/cognitive, expressive speech and language, receptive language, gross motor, and other. The PEDS is reported to have good concurrent validity, sensitivity and specificity (CCCH, 2005; Coghlan et al., 2003; Glascoe, 1994, 1998; 2003; Limbos & Joyce, 2011) although not as high as some other measures (Limbos & Joyce, 2011). For example, Glascoe (2003) summarised four studies into the PEDS and indicated that sensitivity ranged from 74% to 79% and specificity ranged from 70% to 80% for children aged 0 to 8 years. Limbos and Joyce (2011) indicated that the PEDS had moderate sensitivity (74%) but low specificity (64%) in contrast to the Ages and Stages Questionnaire (Bricker & Squires, 1999) that had higher sensitivity (82%) and specificity (78%). The PEDS has been used to identify 4- to 5-year-old children's speech and language

competence in studies such as the LSAC study (Harrison & McLeod, 2010; Harrison, McLeod, Berthelsen & Walker, 2009; McCormack et al., 2011; McLeod & Harrison, 2009; McLeod, Baker et al., in press) and the Sound Effects Study (Harrison et al., in press; McLeod, Harrison, McAllister, & McCormack, 2013).

The 2-page parent screening questionnaire used in the Sound Start Study and administered at stage 1 included the PEDS questions and additional questions regarding children's speech and language (including questions developed for LSAC), languages spoken in the home, attendance at speech therapy, and speech intelligibility (intelligibility results are reported in McLeod, Crowe, & Shahaian, 2015). The 1-page educator questionnaire contained the PEDS questions and the same speech and language questions as the parent questionnaire.

Assessment of speech sound production.

Participants' speech sound production skills were assessed in stage 2 of the Sound Start Study using the single word Phonology subtest of the DEAP (Dodd et al., 2002). The DEAP was selected as it enabled comprehensive sampling of consonants, vowels, and consonant clusters and provided normative data for Australian and British children. PCC scores were based on the children's completion of the Phonology subtest as required by the DEAP manual. Percentile ranks and scaled scores ($M = 10$, $SD = 3$) were determined from the manual based on the participants' ages. Standard scores below 7 are outside of the normal range (Dodd et al., 2002).

Assessment of language.

Participants' language skills were screened during stage 2 of the Sound Start Study using the screening test of the Preschool Language Scales, Fifth Edition - Australian and New Zealand Language Adapted Edition (PLS-5S, Zimmerman, Steiner, & Pond, 2013). Testing involved answering questions (e.g. categorisation of foods) or pointing within the test booklet

(e.g. to letters or pictures). To achieve a pass on the PLS-5S children were required to score at least 4 out of 5, for children aged 4;0-4;11 or 5 out of 6, for children aged 5;0-5;11. Total language scores and pass/refer results were recorded based on the participants' ages.

Participants' receptive vocabulary skills were assessed during stage 3 of the Sound Start Study using the Peabody Picture Vocabulary Test-4 (PPVT-4, Dunn & Dunn, 2007). Testing involved the examiner reading a word (e.g. *globe*) and the child identifying the item from a selection of four colour images. Raw scores were converted to percentile ranks and standard scores ($M = 100$, $SD = 15$) from the manual based on the participants' ages. Standard scores below 70 ($-2SD$) were considered to be outside of the normal range (Dunn & Dunn, 2007).

Procedure

Ethical approval was obtained from the Charles Sturt University Human Research Ethics Committee (Approval number – 2013/070), the NSW Department of Education and Communities State Education Research Applications Process (SERAP) (Approval number – 2013267), and individual early childhood centres. Involved early childhood centre staff and participants' parents were invited to give consent. Children were invited to give assent.

The parents' and educators' screening questionnaires included the questions from the PEDS (CCCH, 2005; Glascoe, 2000b) with permission from the publishers. During stage 1 of the Sound Start Study, one of two experienced speech-language pathologists (SLPs) took the screening questionnaires to the directors at each of the consenting early childhood centres. The questionnaires were distributed to the parents in one of two ways depending on the preference of each early childhood center director. Either the director invited each parent of attending 4- to 5-year-old children to complete a questionnaire, or the SLP stood towards the entrance of the early childhood center at the beginning and/or end of the day and invited each parent of a 4- to 5-year-old child to complete a questionnaire. Parents could request that the

SLP assist with completion of the questionnaire, especially if they had difficulty reading the questions. Educators were also invited to complete a similar screening questionnaire for all 4- to 5-year-old children in their early childhood centre whose parents provided consent.

Following the completion of the parent and educator questionnaires in stage 1, questionnaires were collected, data was entered in to SPSS and children who were eligible for further participation were identified. Eligibility was based on parent and/or educator reported concerns for the child's "talking and making speech sounds" and the child's speech was "not clear to family" or "not clear to others". Children with an identifiable cause for their speech and language difficulties (e.g. hearing loss, cleft lip and/or palate, developmental delay) were excluded from participation in stages 2 and 3.

Eligible children were assessed on a range of skills by the project SLP assigned to their centre in stages 2 and 3. Assessments administered in stage 2 were designed to screen participants' speech and language skills and included the single-word phonology subtest of the DEAP (Dodd et al., 2002), which examined the ability to "make speech sounds" (speech) and the language section of the PLS-5S (Zimmerman et al., 2013), which primarily examined the ability to "talk" (expressive language). The mean duration between stage 1 and stage 2 assessments was 41 days. Assessments administered in stage 3 were designed to provide a comprehensive profile of participants' skills and included the PPVT-4 (Dunn & Dunn, 2007), which examined the ability to "understand others" (receptive vocabulary). The mean duration between stage 2 and stage 3 assessments was 29 days. Each assessment was undertaken and scored using procedures described in the examiners' manuals. Assessments were video and audio-recorded online, and phonetic transcriptions were checked after the assessments using the recordings.

Reliability

The two SLPs who assessed the participants re-transcribed 30 randomly selected

participants' DEAP-Phonology subtests. Inter-judge agreement was 90.1% based on 6,629 phonemes and intra-judge agreement was 91.5% based on 6,629 phonemes. When mismatches occurred, the decision of the SLP who completed the initial transcription was upheld. These figures are better than "acceptable agreement" (Shriberg & Lof, 1991, p. 255).

Data Analysis

Parents' and educators' responses were entered into SPSS, version 22.0 (IBM, 2013). For Aim 1 the sample frequencies and percentages were used to describe the sample. The frequency of all areas of concern reported by parents were ranked from 1-8 where 1 indicated the lowest frequency of concern and 8 indicated the highest frequency of concern. The McNemar test for paired differences was used to establish differences in the rank order. For Aim 2, the extent of ordinal correlation between parent and educator responses on PEDS was quantified using the Goodman and Kruskal gamma statistic (γ). The extent of agreement between parent and educator responses on the PEDS was measured using Cohen's kappa (κ) and distributional differences were assessed using the McNemar-Bowker test for paired data (χ^2).

In general, the correlation coefficient γ is an index of the direction and strength of the relationship between two ordinal variables and ranges from -1 (perfect negative correlation) through 0 (no correlation) to +1 (perfect correlation) with values between -1 and +1 reflecting the direction and relative strength of correlation. γ is preferable to Spearman's rank correlation coefficient or to Kendall's tau correlation coefficient when data may contain many tied observations as exhibited in a cross-tabulation of ordinal categorical data (Siegel & Castellan, 1988). In contrast, κ is a chance corrected measure of agreement between two raters with a value 0 indicating random chance agreement, and ostensibly with +1 indicating perfect agreement, and with values in-between reflecting the degree of chance corrected agreement. However, the value of κ is dependent on the number of categories, extent of

marginal homogeneity, and trait prevalence, and disagreement bias. Specifically, there is a potential for increasing disagreement between assessors as the number of categories increase, with a consequent decrease in the value of κ (Sim & Wright, 2005). It should also be noted that paradoxically an increase in trait prevalence of one category can lead to increasing agreement but with a decrease in kappa, and additionally disagreement bias (whether disagreements tend to occur in one direction) can additionally lead to a decrease in the value κ (Feinstein & Cicchetti, 1990). For these reasons, and in the absence of thresholds to aid interpretation of κ in a 3 by 3 cross-tabulation, we additionally report marginal distributions (see Table III) and simple unadjusted percentages of agreement. Disagreement bias was additionally assessed using the McNemar-Bowker test. The McNemar-Bowker χ^2 tests symmetry in a square repeated measures cross-tabulation; it considers only the disagreements between raters and tests whether the disagreements are directional. All three tests are described in detail by Sheskin (2011). The use of percentage agreement, the McNemar-Bowker test, and the Sign test specifically address Aim 1 (identification of areas of concern for parents and for educators). Cohen's kappa, the McNemar-Bowker test and the Goodman and Kruskal gamma coefficient examine the level of agreement, difference and extent of correlation between parent and educators concerns to address Aim 2. Further, clinical assessment data (percentage consonants correct (PCC) on the DEAP, total language score on the PLS-5S, and receptive vocabulary on the PPVT-4) was examined for variation between both parent and educator responses (yes, a little, no) on expressive speech and language using the nonparametric Kruskal-Wallis test to address Aim 3.

RESULT

Parents' and Educators' Areas of Concern

There were 1,205 children in stage 1 of the Sound Start Study. Complete parent-educator data for the PEDS were available for 1,056 children (Missing: parents $n = 4$;

educators $n = 145$). In total, 6.2% of possible parent-educator data was missing. In general, if the amount of missing data is small (e.g. around 5%) then biases and loss of power are likely to be inconsequential (see Graham, 2009). Bennet (2001) indicates analyses are prone to bias if more than 10% of the data is missing. An assessment of missingness indicated that the following variables were not associated with missing data: age of child at assessment ($p = .313$), child's sex ($p = .142$), caregiver relationship to child ($p = .137$), the child's percentage consonants correct on the DEAP ($p = .081$), and receptive vocabulary score on the PPVT-4 ($p = .472$). There was some evidence of a weak relationship between IRSAD and missingness ($p = .047$) and between total language score on the PLS-5S ($p = .037$) and missingness. For these reasons, the analyses were performed under multiple imputation (number of imputations = 50) and without multiple imputation. Multiple imputation did not change any statistical conclusions, nor alter estimated effects. For this reason the following analyses are reported on a pairwise deletion basis (i.e. maximising the amount of available information).

Parents' and educators' responses (*yes vs. a little vs. no*) regarding the eight specific areas of concern from the PEDS are found in Table III (along with 95% confidence intervals) and Figure II. Parents and educators indicated that question (a) Expressive Speech and Language was of concern for more children than any other aspect of children's development. The other areas were less frequently reported: (b) Receptive Language, (c) Fine Motor, (d) Gross Motor, (e) Behaviour, (f) Social-Emotional, (g) Self-Help, and (h) School Skills (see Table III). Parents' responses regarding their concerns about (a) Expressive Speech and Language were significantly different from their responses to the other questions (b, c, d, e, f, g, h), according to analyses using the McNemar-Bowker test ($p < .001$) and triangulated using the Sign test ($p < .001$). Similarly, responses from educators, showed a high percentage of concerns about (a) Expressive Speech and Language compared with the concerns on all other domains (b, c, d, e, f, g, h) and these higher levels of concern achieved statistical

significance using the McNemar-Bowker test and using the binomial Sign test ($p < .001$, in all cases).

Insert Table III and Figure II here

Agreement between Parents and Educators on Each Area of Concern

Overall parent and educator agreement on each of the eight questions of the PEDS (Glascoe, 2000b) was determined. There was 100% agreement in 35.8% of cases; agreement for seven out of eight questions in 20.6% of cases, agreement for six out of eight questions in 13.2% of cases, and less agreement for the remaining permutations. Analysis using the Goodman and Kruskal gamma statistic showed that parent and educator responses significantly correlated on seven of the eight questions (a, b, c, e, f, g, h) with $\gamma_a = .648$ ($p < .001$), $\gamma_b = .564$ ($p < .001$), $\gamma_c = .408$ ($p = .003$), $\gamma_e = .444$ ($p < .001$), $\gamma_f = .432$ ($p < .001$), $\gamma_g = .562$ ($p < .001$), and $\gamma_h = .536$ ($p < .001$). Similarly, analysis using Cohen's kappa indicated statistically significant levels of agreement between parent and educator on the same seven questions (a, b, c, e, f, g, h) with $\kappa_a = .316$, $\kappa_b = .172$, $\kappa_c = .092$, $\kappa_e = .137$, $\kappa_f = .123$, $\kappa_g = .159$, $\kappa_h = .166$, respectively, and with $p < .001$ in all seven instances. In both analyses, there was no significant correlation, nor above chance agreement, between parent and educator concern on question (d) Gross motor. Simple percentage levels of agreement were $p_a = 64\%$, $p_b = 74.1\%$, $p_c = 82.4\%$, $p_d = 86.6\%$, $p_e = 69.3\%$, $p_f = 70.6\%$, $p_g = 81.0\%$, $p_h = 76.1\%$.

Analysis using the McNemar-Bowker test was completed to investigate the sources of the differences between parents and educators. No significant differences were found on either question (a) concerns about Expressive Speech and Language ($p = .265$) nor on question (f) concerns about Social-Emotional ($p = .093$). However, there was a significant difference on question (b) Receptive Language ($p < .001$) and on question (c) Fine Motor (p

< .001) with educators, in both instances, more inclined to report *a little* concern with greater frequency than parents. There were statistically significant differences on question (e) concerns about Behaviour ($p < .001$), and on question (g) concerns about Self-help ($p < .001$) with parents more likely to respond *yes* than educators. Parents and educators significantly differed in their responses to question (d) concerns about Gross Motor ($p < .001$) but with no obvious systematic trend.

Agreement Between Parents' and Educators' Concern with Direct Assessment

Direct screening assessment data regarding speech and language skills were available for participants who participated in stage 2 (i.e. those whose parents and/or educators had concerns about children's speech and language skills). Data from stage 2 of the Sound Start Study were available to compare parents' and educators' concerns regarding Expressive Speech and Language skills with direct clinical assessment of speech using the DEAP ($n = 275$) and language skills using the PLS-5S ($n = 266$). Data from stage 3 of the Sound Start Study ($n = 132$) were available to compare parents' and educators' concerns regarding Receptive Language skills with direct clinical assessment of receptive vocabulary (PPVT-4).

Parents' and educators' concern and direct assessment of speech

A comparison was made between parents' and educators' concern about Expressive Speech and Language was made with children's standard score for PCC on the DEAP (Dodd et al., 2002). The children's standard score for PCC ranged from 3 to 13, and the manual indicates that "normal performance" (p. 31) is denoted by standard scores between 7 and 13 (i.e. within 1 standard deviation of the mean). That is, some children had lower PCC scores than expected for their age; whereas, others fell within the expected range for their age.

Parents' concerns. The mean PCC standard score on the DEAP for parent rated responses for Expressive Speech and Language were: *no* ($M = 5.72, SD = 2.93$), *a little* ($M = 5.18, SD = 2.55$), *yes* ($M = 4.73, SD = 2.57$). Analysis using the Kruskal-Wallis test statistic

indicated statistically significant differences between at least two levels of parents' ratings ($H = 6.24, df = 2, p = .044$). Pairwise comparisons using the Mann Whitney test statistic showed statistical significance between *no* and *yes* ($p = .016$) but not *no* and *a little* ($p = .283$) or *a little* and *yes* ($p = .115$).

Educators' concerns. The mean PCC standard scores on the DEAP for educator-rated responses for Expressive Speech and Language skills were: *no* ($M = 6.48, SD = 2.79$), *a little* ($M = 5.61, SD = 3.07$), *yes* ($M = 4.39, SD = 2.09$). Analysis using the nonparametric Kruskal-Wallis test showed that PCC scores significantly differed between at least two groups ($H = 21.30, df = 2, p < .001$). A pairwise analysis using the nonparametric Mann Whitney test showed that the median for *yes* was significantly lower than the median for *a little* ($p = .007$), and *no* ($p < .001$), but with no significant difference between *no* and *a little* ($p = .078$).

Parents' and educators' concern and screening of language

A comparison was made between parents' and educators' concern about Expressive Speech and Language was made with children's total language score on the PLS-5S (Zimmerman et al., 2013) using stage 2 data ($n = 275$).

Parents' concerns. The mean total language scores for parent rated responses for Expressive Speech and Language were: *no* ($M = 2.47, SD = 1.60$), *a little* ($M = 3.14, SD = 1.44$), *yes* ($M = 2.50, SD = 1.71$). Analysis using the nonparametric Kruskal-Wallis test statistic showed that there were statistically significant differences in distributions of PLS-5S for parent concerns ($H = 9.035, df = 2, p = .011$). A post hoc pairwise application of the Mann Whitney test showed that mean PLS-5S was significantly higher in *a little* than in *no* ($p = .017$), and significantly higher in *a little* than in *yes* ($p = .007$), but with no significant difference between *no* and *yes* ($p = .905$). Note that combining the group *a little* and *yes* and comparing this combined group to the *no* group did not result in a significant comparison ($p = .203$). The percentage of children within normal limits for the parents *no* concern group

(34.0%) was lower than the corresponding percentage in the *yes* concern group (36.8%) but this difference, when examined using the chi-square test of association, did not achieve statistical significance ($p = .701$).

Educators' concerns. The mean total language scores for educator rated responses for Expressive Speech and Language were: *no* ($M = 3.38, SD = 1.62$), *a little* ($M = 2.86, SD = 1.59$), *yes* ($M = 2.57, SD = 1.61$). Analysis using the nonparametric Kruskal-Wallis test showed that there were statistically significant differences in the distribution of PLS-5S between at least two groups (*no, a little, yes*), $H = 7.893, df = 2, p = .010$. (The Jonckheere-Terpstra test for a monotonic change, rather than a general difference, also achieved statistical significance, $p = .008$). A post hoc analysis using the nonparametric Mann Whitney test showed that median PLS-5S was significantly lower in the *yes* group compared to the *no* group ($p = .006$), but the difference between *a little* and *no* ($p = .077$) and *a little* and *yes* ($p = .242$) did not achieve statistical significance. If the *no* group was compared to a group where *a little* and *yes* were combined ($M = 2.68, SD = 1.60$) then statistical significance was achieved ($p = .01$). The percentage of children within normal limits for the educators no concern group (*no*) (47.6%) was higher than the corresponding percentage in the educators' concern group (*yes + a little*) (36.1%) but this difference, when examined using the chi-square test of association, did not achieve statistical significance ($p = .161$).

Parents' and educators' concern and direct assessment of receptive language

A comparison between parents' and educators' concern about Receptive Language was made with children's standard score on the PPVT-4 (Dunn & Dunn, 2007) using stage 3 data ($n = 132$).

Parents' concerns. The mean PPVT-4 standard scores for parent rated responses for Receptive Language were: *no* ($M = 96.52, SD = 14.42, n = 106$), *a little* ($M = 87.08, SD = 13.46, n = 12$), *yes* ($M = 92.93, SD = 13.91, n = 14$). To avoid problems with small sample

inference and consequently have robust conclusions, the *a little* and *yes* data were combined into a concern group ($M = 90.23$, $SD = 13.76$, $n = 26$). Analysis using the nonparametric Mann Whitney test indicated significantly lower scores in the concern group than the no concern group on PPVT-4 ($p = .031$). 97.2% of those in the no concern group were within normal limits compared with 92.3% of those in the concern group; however, analysis using the chi-square test of association indicated that differences in observed percentages did not achieve statistical significance ($p = .245$).

Educators' concerns. The mean educator rated responses for Receptive Language were: *no* ($M = 97.52$, $SD = 14.50$), *a little* ($M = 98.23$, $SD = 15.12$), *yes* ($M = 86.00$, $SD = 10.96$). Analysis using the nonparametric Kruskal-Wallis test showed that there was a statistically significant difference between at least two of these groups ($H = 12.93$, $df = 2$, $p = .002$). A post hoc analysis using the Mann Whitney test indicated significant distributional differences between the *yes* group and *a little* group ($p = .005$), and between the *yes* group and the *no* group ($p < .001$), but not between the *no* group and *a little* group ($p = .903$). Analysis using the chi-square test of association indicated that the percentages within normal limits for *no* (97.1%), *a little* (100%), and *yes* (91.3%) did not significantly differ ($p = .204$).

DISCUSSION

This paper reports on parents' ($n = 1,205$) and educators' ($n = 1,064$) concerns regarding the communication, motor and social skills of 4- to 5-year-old children transitioning to school using the PEDS (CCCH, 2005; Glascoe, 2000b). Differences were examined between parents' and educators' reports of concern, and children's performance as measured by clinical tools for a subset of the participants who underwent direct assessment. In the following sections, the findings are discussed in relation to the study aims.

Most Common Areas of Concern

The PEDS (Glascoe, 2000b) has been used internationally as a measure of parental

concern, and has been recommended as a useful tool for screening, facilitating parent discussion, and communication between service providers (Armstrong & Goldfeld, 2008). In the current study, parents and educators identified children's Expressive Speech and Language as the most common area of developmental concern (P=35.1%; E=36.8%) followed by Behaviour (P=24.3%; E=18.5%), Social-Emotional (P=22.6%; E=18.4%), School Readiness (P=19.0%; E=15.0%), Receptive Language (P=15.4%; E=21.6%), Self-help (P=14.6%; E=12.5%), Fine Motor (P=10.5%; E=11.9%), and Gross Motor (P=8.7%; E=6.8%) skills.

A comparison was made between the ranked data collected in the present study and the ranked data reported in two previous studies: (1) McLeod and Harrison (2009) who reported concerns regarding Expressive Speech and Language and Receptive Language and (2) Coghlan et al. (2003) who reported parents' and carers' regarding the eight developmental domains of the PEDS. When ranked, Expressive Speech and Language and Behaviour were the most frequently-reported concern for both parents and educators across the studies. Gross Motor and Fine Motor skills were the least frequently-reported areas of concern for both parents and educators. The high level of concern expressed by parents and educators in the present study regarding expressive language skills are similar to findings reported by reported by McLeod and Harrison (2009) in their population study (P=25.2%) of 4- to 5-year-old Australian children and Coghlan et al. (2003) in their community study of toddlers and preschool children (P=20.6%, C=18.7%). Such findings accord with reports that speech and language disorders are amongst the most common of developmental disorders (Restall & Borton, 2010). However, the present study finds a point of difference in the reported concerns of educators about children's Receptive Language. Educators in the present study reported a higher frequency of concern for children's Receptive Language (E=21.6%) than parents (P=15.4%), and these findings were higher than for parents in McLeod and Harrison (2009)

(P=9.5%) and parents and educators in the Coghlan et al. (2003) study (P=6.5%; C=5.0%).

However, there are a number of factors that need to be considered when interpreting the findings including the nature of the sample, the nature of the difficulties identified, and the nature of the tool.

In their systematic review of studies that have used the PEDS, Woolfenden et al. (2014) suggested that “where community samples were used, parents most concerned about their children may be over-represented and this could lead to an overestimation of prevalence” (p. 11). In the current study, parents and educators were recruited for a study that focused on children’s speech production and pre-literacy skills. They were provided with information about the study prior to participation, and may have agreed to participate due to existing concerns about their child’s communication skills (parents) or the skills of children within their early childhood centre (educators); hence, the higher reports of concern regarding speech/language skills would not be unexpected. Furthermore, Chung et al. (2011) has suggested that language/communication difficulties may be more noticeable than other difficulties (such as cognitive problems), resulting in more concern reported for this area. Certainly, expressive speech and language difficulties may be more overt than difficulties with some areas of development, which may contribute to the frequency with which they were reported. However, in the current study, expressive speech and language concerns were more commonly reported than behavioural and motor concerns, both of which are also concrete, observable areas of development. In their study, Chung and colleagues (2011) examined clinical reports from 273 children and found that motor, language, and global developmental delay were the most common patterns of developmental delay in children. Their study differs from the current study in the nature of the sample (clinical versus community). It may be that their study reflects the types of concerns for which parents seek help, rather than the concerns that may exist. Thus, more overt difficulties may be over-

represented in their sample.

Other researchers have identified some limitations of the PEDS tool that could contribute to findings from this study (Cox et al., 2010; Macy, 2012; Restall & Borton, 2010). For instance, Cox et al. (2010) examined PEDS reports from parents of 752 children, and reported frequent mismatches between responses to checklist items and comments written by parents on the PEDS form. Consequently, they suggested that using responses to checklist items as the sole measure of parent/caregiver concern may lead to under/over-identification of children's difficulties, and recommended that written comments be used to assist in evaluating children's development, and/or guiding dialogue with parents/caregivers about the nature of their concerns. Furthermore, they recommended a need to evaluate the health literacy of those with whom the PEDS is used to ensure they understand the items/terminology in the same way as those interpreting the results. Similarly, Macy (2012) identified a need for research that explores the fidelity of implementation research on screening measures and practices to ensure that measures such as the PEDS are used consistently (across participants and sites) when used to evaluate developmental concerns. In the current study the PEDS was used consistently across sites; however, parents and educators were not provided with additional information about the PEDS items or how to interpret them. The second and third aims of the current study (i.e. examining similarities and differences across informants, and between PEDS reports and clinical screening/assessment) were intended as a way of exploring the usefulness of implementing the PEDS as a way to identify concerns, particularly with regards to communication skills.

Inter-rater reliability between parents' and educators' concerns

Results from the current study indicated parents' and educators' responses were significantly correlated on seven of the eight PEDS items with the exception of gross motor skills. Educators were more concerned about children's receptive language than parents, but

this difference was against a background of significant agreement between parents and educators. Although previous reports suggest that the PEDS questions may be unreliable due to the potential for misinterpretation of the questions (e.g. Cox et al., 2010), the results of this analysis suggest that parents and educators were consistent in their reporting of concerns for children.

Differences between level of concern and clinical screening and assessment

Speech skills (as measured by PCC on the DEAP, Dodd et al., 2002) significantly differed between levels of concern for both parents and for educators. That is, parents and educators were not concerned about children who had higher PCC; however, they were concerned about children who had lower PCC. There were significant differences in children's language skills (as measured by total language score on the PLS-5S (Zimmerman et al., 2013) between educators' levels of concern about communication, but not for parents' level of concern. Children's receptive vocabulary (as measured on the PPVT-4, Dunn & Dunn, 2007) also significantly differed between the levels of concern about receptive language expressed by parents, and expressed by educators. These results demonstrate distributional differences in performance on speech and language tasks between different levels of parent/educator concern with the exception of parents' concern regarding language skills and the total language score on the PLS-5S.

Macy (2012) recognised the value of screening tools (such as the PEDS) and clinical assessments, but recommended that they be used for the purposes for which they are designed. Thus screening tools, such as the PEDS and the PLS-5S, are useful for enabling providers "to decide when to refer, screen, counsel, reassure, watch and wait or simply monitor apparently normal development and behaviour" (Glascoe, 2000a, p. 147). Furthermore, they provide a means for showing parents that their concerns are important, and their contributions to decision-making about their child's health are valued (Tervo, 2005).

Collection of parent/educator concerns also assists in identifying additional resources or information that they may require in order to better understand their child's development or to better support their child.

Implications

Children need effective communication skills in order to support good educational and social outcomes (e.g. Harrison et al., 2009; Lewis, Freebairn, & Taylor, 2000; McCormack et al., 2011; Snowling, Adams, Bishop, & Stothard, 2001). The results of this research support the consultation of parents as well as early childhood educators when evaluating children's readiness for school. Given the time and costs associated with universal screening, gathering the views of those who have most contact with the child (i.e. parents and educators) may enable professionals to obtain quick, cost-effective and useful insights about children's strengths and concerns that can then be followed up with more formal testing (Roulstone, 2015). As Williams (2006) stated, parents and educators "are in a position that provides them with privileged information about their own children, and it is important that health professionals harness this knowledge for the long-term benefit of the child" (p. 289). Williams has suggested a need to empower parents [and educators] to recognise their knowledge and their contribution to the healthcare process so that they may advocate for their children and families to receive the follow-up support they need.

This study highlights the importance of using tools for the purposes for which they are intended, so that when screening (using a tool such as the PEDS) is undertaken, it is for screening, not diagnosis. However, there is also a need to follow-up on parents' and educators' concerns with clinical assessment. In this study, when parents and educators identified concern about children's expressive speech and language, 159 (73.6%) children whose parents were concerned demonstrated speech skills outside the typical range (PCC on the DEAP) and 134 (63.2%) also failed a language screening task (PLS-5). Children

identified with concerns then need to be provided with resources and support to address their difficulties. Thus, screening is an important step, but only one step in the process of assessment, monitoring, referral, intervention, or education.

Limitations

A limitation of this study is that while every attempt was made to obtain screening information from parents and educators of every 4- to 5-year-old child within the targeted early childhood centres, it is possible that more data were collected from parents and educators who were concerned about children's speech and language. The advertisement indicating that the stage 1 screening questionnaire was a "speech and language questionnaire" may inadvertently have biased the results. Agreement between parents' and educators' concern and clinical screening could only be examined for the subsample of children whose parents expressed concern about their speech and language and who met other inclusionary criteria (i.e. those who participated in stage 2 and 3 of the Sound Start Study, see Figure I). Children whose parents and educators were not concerned were not assessed by the speech-language pathologists. Additional limitations were that the direct assessment of language used measures that were designed as general expressive and receptive language screening tools (PLS-5S, Zimmerman et al., 2013), and that the PPVT-4 (Dunn & Dunn, 2007) examined vocabulary, only one aspect of receptive language. Further, children's performance on the language-screening task (PLS-5) may have been influenced by their phonologically-based speech sound disorder due to the inclusion of word-final morphophonemes as a measure of language acquisition (e.g. possessive 's').

CONCLUSION

This study provides evidence regarding parents' and educators' concerns about children's development at the time children are transitioning to school. Parents and educators were more concerned about children's "talking and making speech sounds" (Glascoe, 2000b)

than any other area of development. Parents' and educators' responses were significantly correlated. There were significant correlations between parents' and educators' level of concern about expressive speech and language, and children's speech accuracy on direct assessment. There were significant correlations between educators' (but not parents') level of concern and a screening measure of the children's overall language. Scores on a test of receptive vocabulary significantly differed between those with concern and those without. This research supports the need for discussion between parents, educators and speech-language pathologists regarding areas of concern at the time of children's transition to school.

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REFERENCES

- Anderson, C. A., & van der Gaag, A. (2000). An examination of the pattern of preschool referrals to speech and language therapy. *Child Language Teaching and Therapy*, 16, 59-71.
- Antoniazzi, D., Snow, P. & Dickson-Swift, V. (2010). Teacher identification of children at risk for language impairment in the first year of school. *International Journal of Speech-Language Pathology*, 12, 244-252.
- Armstrong, M. F. & Goldfeld, S. (2008). Systems of early detection in Australian communities: The use of a developmental concern questionnaire to link services. *Australian Journal of Advanced Nursing*, 25, 36-42.
- Australian Institute of Family Studies (2015). *Growing Up in Australia: The Longitudinal Study of Australian Children*. Retrieved from <http://www.growingupinaustralia.gov.au/>

- Bennet, D. A. (2001). How can I deal with missing data in my study? *Australian and New Zealand Journal of Public Health*, 25, 464-469.
- Bishop, D. V. & Baird, G. (2001). Parent and teacher report of pragmatic aspects of communication: Use of the children's communication checklist in a clinical setting. *Developmental Medicine and Child Neurology*, 43, 809-818.
- Bishop, D. V. M., & McDonald, D. (2009). Identifying language impairment in children: Combining language test scores with parental report. *International Journal of Language and Communication Disorders*, 44, 600-615.
- Botting, N., Conti-Ramsden, G., & Crutchley, A. (1997). Concordance between teacher/therapist opinion and formal language assessment scores in children with language impairment. *International Journal of Language and Communication Disorders*, 32, 317-327.
- Boynton Hauerwas, L. & Addison Stone, C. (2000). Are parents of school-age children with specific language impairments accurate estimators of their child's language skills? *Child Language Teaching and Therapy*, 16, 73-86.
- Bricker D., & Squires J. (1999). *Ages and Stages Questionnaires: A parent completed, child-monitoring system* (2nd ed.). Baltimore, MD: Paul H. Brookes.
- Cabell, S. Q., Justice, L. M., Zucker, T. A., & Kilday, C. R. (2009). Validity of teacher report for assessing the emergent literacy skills of at-risk preschoolers. *Language, Speech, and Hearing Services in Schools*, 40, 161-173.
- Centre for Community Child Health (2005). *Parents' Evaluation of Developmental Status authorised Australian version: Brief administration and scoring guide*. Melbourne, Australia: Royal Children's Hospital.

- Chung, C-Y., Liu, W-Y., Chang, C-J., Chen, C-L., Tang, S. F-T., & Wong, A. M-K. (2011). The relationship between parental concerns and final diagnosis in children with developmental delay. *Journal of Child Neurology*, 26, 413-419.
- Coghlan, D., Kiing, J. S. H., & Wake, M. (2003). Parents' Evaluation of Developmental Status in the Australian day-care setting: Developmental concerns of parents and carers. *Journal of Paediatrics and Child Health*, 39, 49-54.
- Cox, J. E., Huntington, N., Saada, A., Epee-Bounya, A., & Schonwald, A. D. (2010). Developmental screening and parents' written comments: An added dimension to the Parents' Evaluation of Developmental Status questionnaire. *Pediatrics*, 126, Supplement 3, s170-176.
- Dodd, B., Hua, Z., Crosbie, S., Holm, A., & Ozanne, A. (2002). *Diagnostic Evaluation of Articulation and Phonology (DEAP)*. London, UK: Psychological Corporation.
- Dunn, L. M., & Dunn, L. M. (2007). *Peabody Picture Vocabulary Test* (4th ed.). Minneapolis, MN: Pearson.
- Feinstein, A. R. & Cicchetti, D. V. (1990). High agreement but low kappa: I. The problems of two paradoxes. *Journal of Clinical Epidemiology*, 43, 543- 548.
- Glascoe, F. P. (1994). It's not what it seems. The relationship between parents' concerns and children with global delays. *Clinical Pediatrics*, 33, 292-296.
- Glascoe, F. P. (1998). The value of 'Parents' Evaluations of Developmental Status' in detecting and addressing children's developmental and behavioral problems. *Assessment for Effective Intervention*, 23, 185-203.
- Glascoe, F. P. (2000a). Evidence-based approach to developmental and behavioural surveillance using parents' concerns. *Child: Care, Health and Development*, 26, 137-149.
- Glascoe, F. P. (2000b). *Parents' Evaluation of Developmental Status: Authorized Australian*

- version. Parkville, Australia: Centre for Community Child Health.
- Glascoe, F. P. (2003). Parents' Evaluation of Developmental Status: How well do parents' concerns identify children with behavioral and emotional problems? *Clinical Pediatrics*, *42*, 133-138.
- Graham, J. W. (2009). Missing data analysis: Making it work in the real world, *Annual Review of Psychology*, *60*, 549-576.
- Hall, N. E. & Segarra, V. R. (2007). Predicting academic performance in children with language impairment: The role of parent report. *Journal of Communication Disorders*, *40*, 82-95.
- Harrison, L. J., & McLeod, S. (2010). Risk and protective factors associated with speech and language impairment in a nationally representative sample of 4- to 5-year-old children. *Journal of Speech, Language, and Hearing Research*, *53*, 508-529.
- Harrison, L. J., McLeod, S., Berthelsen, D., & Walker, S. (2009). Literacy, numeracy, and learning in school-aged children identified as having speech and language impairment in early childhood. *International Journal of Speech-Language Pathology*, *11*, 392-403.
- Harrison, L. J., McLeod, S., McAllister, L. & McCormack, J. (2017, in press). Speech sound disorders in preschool children: Correspondence between clinical diagnosis and teacher and parent report. *Australian Journal of Learning Difficulties*. doi 10.1080/19404158.2017.1289964
- IBM (2013). *IBM SPSS Statistics for Windows* (Version 22.0) [Software]. Armonk, NY: IBM Corp.
- Jessup, B., Ward, E., Cahill, L., & Keating, D. (2008). Prevalence of speech and/or language impairment in preparatory students in northern Tasmania. *International Journal of Speech-Language Pathology*, *10*, 364-377.
- Lewis, B. A., Freebairn, L. A., & Taylor, H. G. (2000). Academic outcomes in children with

- histories of speech sound disorders. *Journal of Communication Disorders*, 33, 11–30.
- Limbos, M. M., & Joyce, D. P. (2011). Comparison of the ASQ and PEDS in screening for developmental delay in children presenting for primary care. *Journal of Developmental and Behavioral Pediatrics*, 32, 499-511.
- Macy, M. (2012). The evidence behind developmental screening instruments. *Infants and Young Children*, 25, 19–61.
- Massa, J., Gomes, H., Tartter, V., Wolfson, V., & Halperin, J. M. (2008). Concordance rates between parent and teacher clinical evaluation of language fundamentals observational rating scale. *International Journal of Language and Communication Disorders*, 43, 99-110.
- McCormack, J., Harrison, L. J., McLeod, S., & McAllister, L. (2011). A nationally representative study of the association between communication impairment at 4–5 years and children’s life activities at 7–9 years. *Journal of Speech, Language, and Hearing Research*, 54, 1328-1348.
- McCormack, J., McLeod, S., McAllister, L., & Harrison, L. J. (2009). A systematic review of the association between childhood speech impairment and participation across the lifespan. *International Journal of Speech-Language Pathology*, 11, 155-170.
- McLeod, S. & Harrison, L. J. (2009). Epidemiology of speech and language impairment in a nationally representative sample of 4- to 5-year-old children. *Journal of Speech, Language, and Hearing Research*, 52, 1213–1229.
- McLeod, S. (2011). Cultural and linguistic diversity in Australian 4- to 5-year-old children and their parents. *ACQuiring Knowledge in Speech, Language, and Hearing*, 13, 112-119.
- McLeod, S., Baker, E., McCormack, J., Wren, Y., Roulstone, S. Crowe, K., Masso, S., White, P., & Howland, C. (2017, in press). Randomized controlled trial evaluating the

- effectiveness of computer-assisted intervention delivered by educators for children with speech sound disorders. *Journal of Speech, Language, and Hearing Research*.
- McLeod, S., Crowe, K., Masso, S., Baker, E., McCormack, J., Wren, Y., Roulstone, S., & Howland, C. (2017, in press). Profile of Australian preschoolers with speech sound disorders at risk for literacy difficulties. *Australian Journal of Learning Difficulties*. doi: 10.1080/19404158.2017.1287105
- McLeod, S., Crowe, K., & Shahaian, A. (2015). Intelligibility in Context Scale: Normative and validation data for English-speaking preschoolers. *Language, Speech, and Hearing Services in Schools, 46*, 266-276.
- McLeod, S., Harrison, L. J., McAllister, L., & McCormack, J. (2013). Speech sound disorders in a community study of preschool children. *American Journal of Speech-Language Pathology, 22*, 503-522.
- McLeod, S., Harrison, L. J., Whiteford, C., & Walker, S. (2016). Multilingualism and speech-language competence in early childhood: Impact on academic and social-emotional outcomes at school. *Early Childhood Research Quarterly, 34*, 53-66.
- Nicholson, J. M., Lucas, N., Berthelsen, D., & Wake, M. (2012). Socioeconomic inequality profiles in physical and developmental health from 0–7 years: Australian national study. *Journal of Epidemiology and Community Health, 66*, 81-87.
- Restall, G. & Borton, B. (2010). Parents' concerns about their children's development at school entry. *Child: Care, Health and Development, 36*, 208–215.
- Roulstone, S. (2015). Screening for speech impairments. In C. Bowen (Ed.). *Children's speech sound disorders (2nd ed.)*. Chichester, UK: Wiley Blackwell.
- Sheskin, D. J. (2011). *Handbook of parametric and nonparametric procedures (5th ed.)*. Boca Raton, FL: Chapman and Hall.
- Shriberg, L. D., & Lof, G. L. (1991). Reliability studies in broad and narrow phonetic

- transcription. *Clinical Linguistics and Phonetics*, 5, 225-279.
- Siegel, S. & Castellan, N. J. (1988). *Nonparametric statistics for the behavioural sciences* (2nd ed.). New York, NY: McGraw-Hill.
- Sim, J. & Wright, C. C. (2005). The kappa statistic in reliability studies: Use, interpretation and sample size requirements, *Physical Therapy*, 85, 257-351.
- Snowling, M. J., Adams, J. W., Bishop, D. V. M., & Stothard, S. E. (2001). Educational attainments of school leavers with a preschool history of speech-language impairments. *International Journal of Language and Communication Disorders*, 36, 173-183.
- Tervo, R. C. (2005). Parent's reports predict their child's developmental problems. *Clinical Pediatrics*, 44, 601-611.
- Wake, M., Gerner, B., & Gallagher, S. (2005). Does Parents' Evaluation of Developmental Status at school entry predict language, achievement and quality of life 2 years later? *Ambulatory Pediatrics*, 5, 143-149.
- Williams, J. (2006). Learning from mothers: How myths, policies and practices affect the detection of subtle developmental problems in children. *Child: Care, Health and Development*, 33, 282-290.
- Woolfenden, S., Eapen, V., Williams, K., Hayyen, A., Spencer, N., & Kemp, L. (2014). A systematic review of the prevalence of parental concerns measured by the Parents' Evaluation of Developmental Status (PEDS) indicating developmental risk. *BMC Pediatrics*, 14(231), 1-13.
- World Health Organization. (2007). *International classification of functioning, disability and health: Children and youth version: ICF-CY*. Geneva: World Health Organization.
- Zimmerman, I. L., Steiner, V. G., & Pond, R. E. (2013). *Preschool Language Scale-5 Screening Test*. San Antonio, TX: Pearson.

Table I.

Characteristics of children participating in stages 1, 2, and 3 of the Sound Start Study.

		Stage 1	Stage 2	Stage 3
Number		1,205	275	132
Sex	Male : Female	630 : 575	170 : 105	83 : 49
	%	52.3% : 47.7%	61.8% : 38.2%	62.9% : 37.1%
Age	Range	4;0 – 5;7	4;0 – 5;6	4;0 – 5;5
	Mean	53.2	54.3	55.0
	SD	3.9	4.3	4.3
IRSAD ^a	Range	1-10 ^b	1-10	1-10
	Mean	6.2	5.7	6.1
	SD	3.0	3.1	3.1
	Mode	10	8	8
Languages used ^b	Monolingual English	63.1% (<i>n</i> = 760)	74.5% (<i>n</i> = 205)	82.0% (<i>n</i> = 109)
	English and 1 other languages	33.8% (<i>n</i> = 407)	24.0% (<i>n</i> = 66)	16.5% (<i>n</i> = 22)
	English and 2-3 other languages	3.6% (<i>n</i> = 38)	1.5% (<i>n</i> = 4)	1.5% (<i>n</i> = 2)
English usage ^c	Very well	69.2% (<i>n</i> = 834)	53.1% (<i>n</i> = 146)	51.1% (<i>n</i> = 68)
	Somewhat well	22.7% (<i>n</i> = 273)	39.7% (<i>n</i> = 108)	39.8% (<i>n</i> = 53)
	Not very well	6.7% (<i>n</i> = 80)	6.5% (<i>n</i> = 18)	6.8% (<i>n</i> = 9)

^a Index of Relative Socioeconomic Advantage and Disadvantage (IRSAD, ABS, 2011) is a decile measure of socio-economic status determined using residential geographic location (postcode). Decile 1 represents areas of least advantaged/most disadvantaged and decile 10 represents areas of most advantaged/least disadvantaged; ^b data missing for eight participants. ^b Stage 1 missing data for 1 participant; ^c Stage 1 missing data for 18 participants, Stage 2 and 3 missing data for 3 participants.

Table II.

Characteristics of the Sound Start Study sample used in the current study ($n = 1,205$) and the sample from the Longitudinal Study of Australian Children (LSAC) of 4- to 5-year-old children.

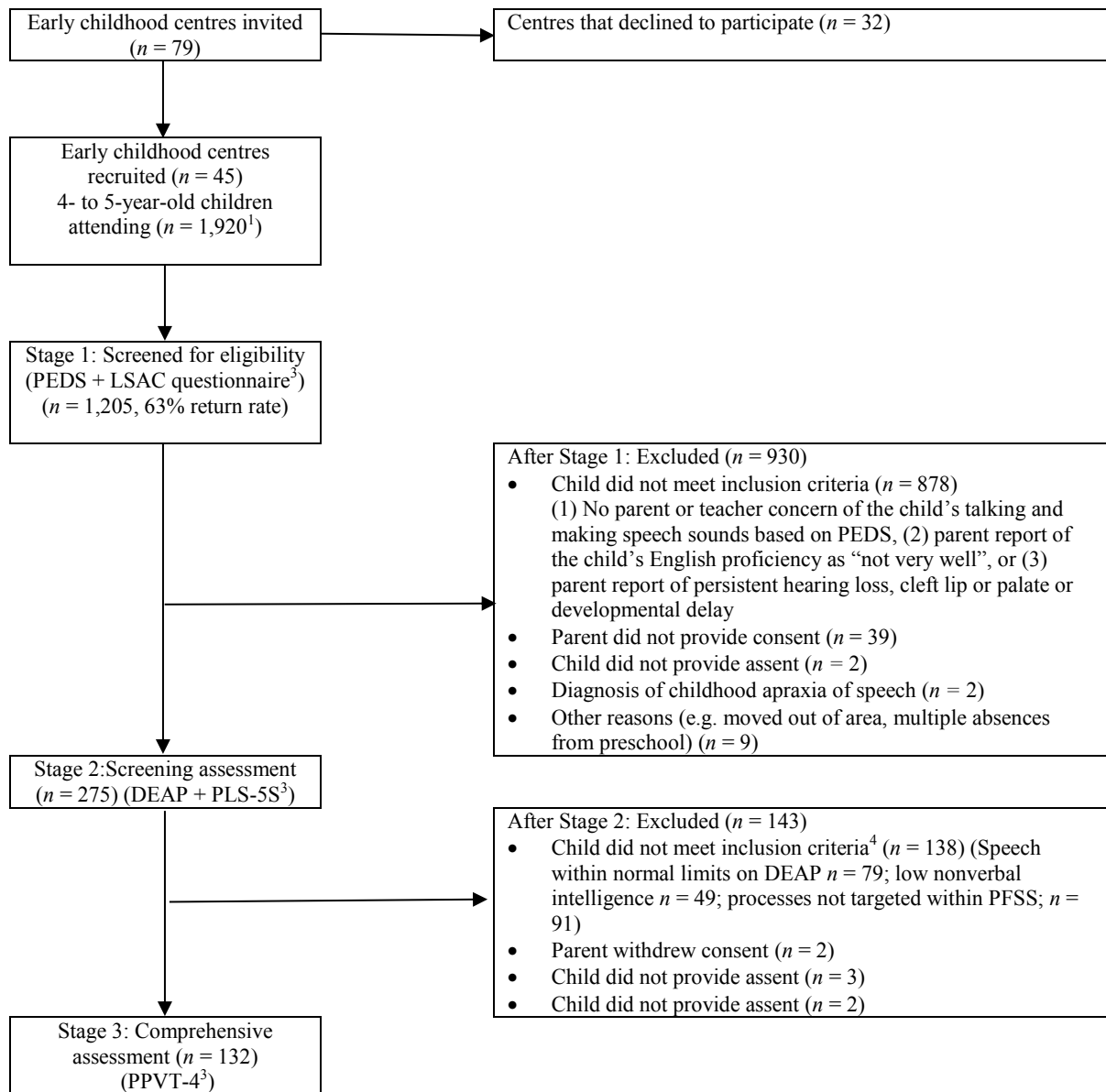
	Sound Start Study: Children with completed parent questionnaires (Stage 1: $n = 1,205$)		Nationally representative study (LSAC) ^a ($n = 4,386$)		Nationally representative study (LSAC) ^a : Sub-sample of children who attended early childhood centers ($n = 3,383$)	
	Mean	SD	Mean	SD	Mean	SD
Child age (months)	55.8	4.2	57.6	2.8	57.0	2.5
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Boys: girls	630:575	52.3:47.7	2251:2135	51.3:48.7	1782:1601	52.7:47.3
Language other than English spoken at home	407	33.8	413	9.4	292	8.8
Parental concern about how their child “talks and makes speech sounds” (<i>yes/a little</i>) ^b	421	35.1	1093	24.9	867	25.6
Parental concern that their child’s “speech [is] not clear to family” (<i>yes</i>) ^c	170	14.1	256	5.8	202	6.0
Parental concern that their child’s “speech [is] not clear to others” (<i>yes</i>) ^c	281	23.3	603	13.7	482	14.2

^a The LSAC data were taken from children in the wave 3 of the B cohort (for 4- to 5-year-old children). ^b Parents’ Evaluation of Developmental Status (PEDS) questionnaire (Glascoe, 2000b); ^c Questions from Growing up in Australia: The Longitudinal Study of Australian Children (LSAC).

Table III.

Parents' and educators' reported areas of concern on the Parents' Evaluation of Developmental Status (PEDS) (Glascoe, 2000b).

Area of concern	PEDS question: "Do you have concerns about how your child ..."	Parents' concern								Educators' concern							
		Yes + a little % (95% confidence interval)	Yes <i>n</i>	%	A little <i>n</i>	%	No <i>n</i>	%	Valid <i>N</i>	Yes + a little % (95% confidence interval)	Yes <i>n</i>	%	A little <i>n</i>	%	No <i>n</i>	%	Valid <i>n</i>
a	Expressive Speech and Language "talks and makes speech sounds"	35.1% (32.4 - 37.9)	227	18.9	194	16.2	778	64.9	1,199	36.8% (33.9 - 40.0)	209	19.8	180	17.0	668	63.2	1,057
b	Receptive Language "understands what you say"	15.4% (13.4 - 17.6)	112	9.3	73	6.1	1017	84.6	1,202	21.6% (19.2 - 24.3)	87	8.2	142	13.4	829	78.4	1,058
c	Fine Motor "uses his or her hands and fingers to do things"	10.5% (8.81 - 12.4)	85	7.1	41	3.4	1076	89.5	1,202	11.9% (10.0 - 14.0)	40	3.8	86	8.1	933	88.1	1,059
d	Gross motor "uses his or her arms and legs"	8.7% (7.11 - 10.3)	81	6.7	24	2.0	1097	91.3	1,202	6.8% (5.37 - 8.50)	24	2.3	48	4.5	985	93.2	1,057
e	Behaviour "behaves"	24.3% (21.9 - 26.9)	134	11.1	159	13.2	911	75.7	1,204	18.5% (16.1 - 20.9)	62	5.8	133	12.6	863	81.6	1,058
f	Social-Emotional "gets along with others"	22.6% (20.2 - 25.0)	110	9.2	161	13.4	930	77.4	1,201	18.4% (16.1 - 20.9)	68	6.4	127	12.0	865	81.6	1,060
g	Self-help "is learning to do things for himself/herself"	14.6% (12.6 - 16.6)	95	7.9	81	6.7	1028	85.4	1,204	12.5% (10.6 - 14.7)	33	3.1	100	9.4	928	87.5	1,061
h	School Readiness "is learning preschool or school skills"	19.0% (16.8 - 21.3)	115	9.6	113	9.4	973	81.0	1,201	15.0% (13.9 - 18.4)	45	4.3	115	10.8	900	84.9	1,060



¹ Demographic data were obtained from 44 of the 45 participating sites. This number includes the demographic data for 44 sites plus an estimate of the attendance at the final site based on questionnaire returns.

² Two sites were deemed ineligible for further participation due to a caregiver questionnaire return rate of <10% of children attending the site. One of these sites returned 4 questionnaires; the other did not return any. Data for the 4 children from the excluded site were not included in Stage 1.

³ Measurement tools that are described within the current manuscript: PEDS, Parents' Evaluation of Developmental Status (CCCH, 2005; Glascoe, 2000b); LSAC, questions from the Longitudinal Study of Australian Children; DEAP, Diagnostic Evaluation of Articulation and Phonology (Dodd et al., 2002); PLS-5S, Preschool Language Scales, Fifth Edition - Australian and New Zealand Language Adapted Edition (Zimmerman, Steiner, & Pond, 2013); PPVT-4, Peabody Picture Vocabulary Test-4 (Dunn & Dunn, 2007).

⁴ Children may have been excluded from further participation based on one or more exclusionary criteria

Figure I. Participant recruitment and randomisation flow diagram for the Sound Start Study.

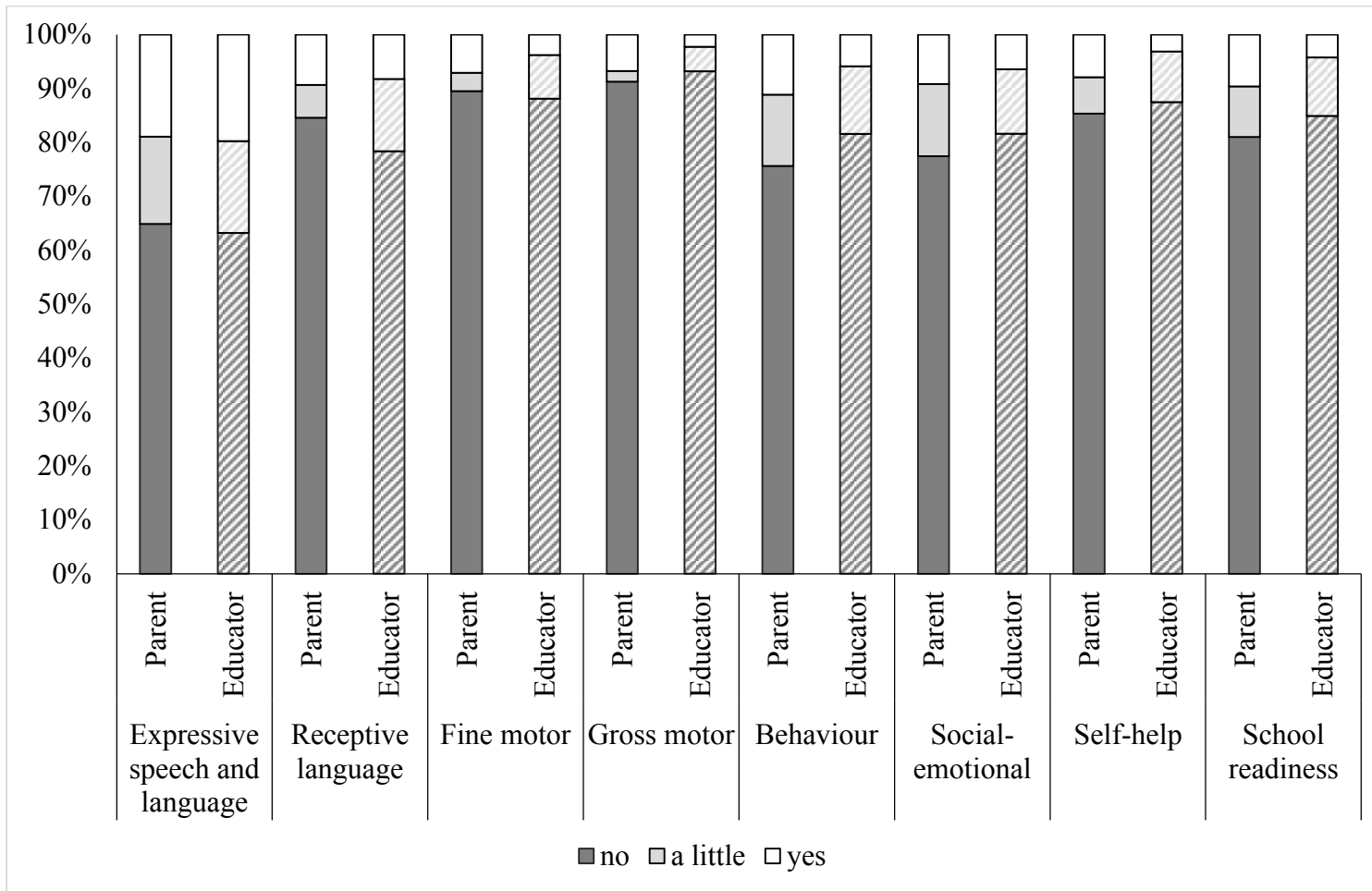


Figure II. *Parent and Educator Reported Areas of Concern on the Parents' Evaluation of Developmental Status (PEDS) (CCCH, 2005; Glascoe, 2000b).*