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The relation between a developmental and social-emotional screening test used in public child daycare centers in Brazil

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Abstract

Background: Two developmental screening instruments for infants and young children, the Ages & Stages Questionnaires-Third Edition (ASQ-3) and the Ages & Stages Questionnaires: Social-Emotional (ASQ:SE), are widely used in the US and internationally. Both tools are sometimes used concurrently but the relation between children's scores on the two tools is seldom investigated.

Methods: The Brazilian versions of ASQ-3 and ASQ:SE, known as the ASQ-BR and ASQ:SE-BR, were used for assessing 13,470 children ages one to four in public child daycare centres in Rio de Janeiro, Brazil. Four groups were defined according to children's ages as one, two, three, and four year-olds. Correlation and multiple regression were employed to explore the relation between children's scores on the ASQ-BR and the ASQ:SE-BR.

Results: Results indicated that the domain scores of ASQ-BR, including communication ($r = -0.38$ to -0.44), gross motor ($r = -0.19$ to -0.32), fine motor ($r = -0.33$ to -0.45), problem solving ($r = -0.36$ to -0.42), and personal-social ($r = -0.38$ to -0.51) were significantly correlated with ASQ:SE-BR scores. Regression analyses suggested that the communication and personal-social domains were significant predictors of social-emotional scores in most of the age groups.

Conclusion: General developmental assessment is suggested to be conducted with social-emotional screening. If the workload is heavy for administrators to use both screeners concurrently, social-emotional screening is recommended for children who fail communication or personal-social domains on developmental screening tests.

Key Words: development, developmental screening, social-emotional competence

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Introduction

The quality of development in infancy and early childhood lays the foundation for children's well-being throughout their lives (Falk, 2010). A significant amount of effort has been devoted to ameliorating the developmental challenges children encounter in their early years (Pretti-Frontczak & Bricker, 2004). Research demonstrates early intervention services enhance developmental outcomes for young children at risk for, or with developmental delays (Guralnick, 2011). Therefore, early identification is a key first step in connecting children with these important services (Bricker, 2013).

Theoretically, development in each domain is related to and influenced by development in other domains (Berk, 2012). For example, a child with communication delay may experience challenges in social-emotional areas, because a difficulty in speaking and expressing thoughts may frustrate the child and resulting in behavioural problems (Sigafos, 2000). Early identification of both developmental delays and social-emotional problems has been recommended by the American Academy of Pediatrics and researchers as the importance (Briggs et al., 2012; American Academy of Pediatrics, 2001, 2006).

The Ages & Stages Questionnaires-Third Edition (ASQ-3) (Squires & Bricker, 2009) is reported to be one of the most frequently used developmental screening measures by pediatricians in the United States (Radecki, Sand-Loud, O'Connor, Sharp & Olson, 2011), with five domains targeting children's general development including communication, gross motor, fine motor, problem solving, and personal-social. The Ages & Stages Questionnaires: Social-Emotional (ASQ:SE) (Squires, Bricker, & Twombly, 2002) is a companion screening instrument by the same developers, specifically targeting social-emotional competence. The ASQ:SE is widely used in Head Start, Early Head Start, home visiting, and pre-kindergarten programs across the United States (Baggett, Warlen, Hamilton, Roberts, & Staker, 2007; Beeber et al., 2010). Although both instruments have been used for

measuring children's development concurrently (Alkheraiej & Squires, 2016; Jee et al., 2010; Sheldrick, Neger & Perrin, 2012), previous studies seldom examined the relationships between the ASQ domain scores and the ASQ:SE scores.

The direct relationship between cognition and behaviour problems has been strongly supported (Baker, Blacher, Crnic & Edelbrock, 2002; Borthwick-Duffy & Eyman, 1990), and communication and language development also have been noted as highly related to children's social-emotional competence/behavioural problems (Gilliam & de Mesquita, 2000; Sigafos, 2000). In the studies of the Developmental Assessment of Young Children-Second Edition (DAYC-2) and Bayley Scales of Infant and Toddler Development-Third Edition (Bayley-3), relatively higher inter-correlations were found between social-emotion domain and domains (e.g. communication, cognition, adaptive behavior) than motor domains (Bayley, 2006; Voress & Maddox, 2013;). Furthermore, the relation between the social-emotion domain of the DAYC-2 and other domains (e.g. communication, cognition, adaptive behaviour, social) of the Battelle Developmental Inventory Second Edition (BDI-2) also presented correlation coefficients that were relatively higher than the correlation with motor skills (Voress & Maddox, 2013). Cognition may help children to learn how to understand their social context or distinguish others' emotions. When children express their emotions to their parents in a conversation, they often need communication skills including using facial expressions (e.g. smile, frown), non-verbal signs, and/or vocabulary to support their intention. Therefore, in the current study, we hypothesised that social-emotional competence as measured by ASQ:SE would have stronger correlations with communication, problem solving (measuring cognitive skills), and personal-social (measuring adaptive and social behaviours) domains than with motor skill domains (e.g. gross motor and fine motor) on the ASQ:3.

This study attempts to explore the relation between the ASQ-3 and the ASQ:SE in young

children ages 1–4 years by analysing an existing large-scale dataset collected on developmental outcome data on the entire preschool children population receiving in public child daycare centres in Rio de Janeiro, Brazil. Understanding this relationship will inform the practice of early identification by providing information about when and whether the assessment of social-emotional competence should be conducted together with general developmental assessment for infants and young children. Research questions included: (1) What are the correlations between the domain scores of the ASQ-3 and the scores of the ASQ:SE in young children ages 1–4?; (2) To what extent do the domain scores of the ASQ-3 predict the ASQ:SE scores?

Method

Participants

Between 2010 and 2012, a child development project called the Development of Indicators for Monitoring Public Child Daycare Centers was conducted in the City of Rio de Janeiro (Filgueiras & Landeira-Fernandez, 2014). The purpose of this project was to translate and adapt selected assessments for use in Brazilian public child daycare centres and to explore their psychometric characteristics for future use. Children attending Rio municipal public daycare centres and preschools were included in this project and were measured continuously from 2011 to 2012.

Beginning in 2011, the Office of the Education Secretary of the City of Rio de Janeiro conducted 8-hour training sessions for the directors of the city's public daycare centres and preschools. Approximately 30 directors participated in each training session. Information about the ASQ-BR and ASQ:SE-BR (i.e. The Brazilian version of the ASQ:3 and ASQ-SE) was presented and explained by professionals familiar with the screening. Directors were responsible for taking the ASQ-BR and ASQ:SE-BR protocols to their daycare centres and training their teachers and classroom assistants on their use.

Participating teachers completed the ASQ-BR and ASQ:SE-BR on five or six children in their

classrooms based on their daily experiences and observations of the children. Each child was assessed by one specific teacher once only. If there were items that the teacher was unable to observe in the classroom, he or she attempted to interview parents to answer the questions, in a collaborative process as recommended by the ASQ developers, to facilitate communication between a parent and a teacher about a child's behaviour (Squires et al., 2002). The current data from children ($N = 13,470$) from ages 1–4 on both questionnaires were extracted from the original dataset collected by the project.

Demographic information (e.g. family income, ethnicity) was not collected as it was considered a burden for preschool teachers to retrieve from parents. However, due to the preference given low income families by the State of Rio de Janeiro Constitution (Constituição do Rio de Janeiro, 1988), it is likely that participating families mainly represented low-income families in the City of Rio de Janeiro. The portion of low income families in Rio de Janeiro is 23.3%, which is defined as earning less than one half the minimum wage per month; R\$622.00 was the minimum wage in 2012 in Brazil (Indicadores de Dados Básicos, 2012).

Measures

ASQ:3. The ASQ:3 is a screening instrument for assessing general development in young children during the first 5 years of life, composed of a series of 21 questionnaires at different age intervals (Squires & Bricker, 2009). Each interval has five domains: communication, gross motor, fine motor, problem solving, and personal-social skills. Each domain has six items, and each item is scored as “Yes” (10 points), “Sometimes” (5 points), or “Not Yet” (0 points). The items are written at a fourth- to sixth-grade reading level so that most parents are able to complete the questionnaires independently. Cut-off scores derived from a normative sample are used to determine whether a child's development appears to be typical (scores above cut-off), whether there is a need for monitoring (scores above but near the cut-off), or further

assessment is recommended (scores below cut-off).

ASQ:SE. The ASQ:SE is a screening instrument for detecting social-emotional problems during the first 6 years of life, and includes a series of eight intervals, each targeting a specific age range (i.e. 6, 12, 18, 24, 30, 36, 48 and 60 months) with total scored items ranging from 18 at 6 months to 32 items at 48 and 60 months (Squires et al., 2002). Items ask about a child's social-emotional performance such as, "Can your child settle himself down after periods of exciting activity?" Three response options are included ("Often or Always," "Sometimes," or "Rarely or Never"). Answers receive numeric values reflecting competence (0 points) or problem behaviours (5 or 10 points). Cut-off scores derived from a normative sample are used to determine whether a child's development appears to be typical (scores lower cut-off) or further assessment is recommended (scores above cut-off).

Brazilian adapted versions. The Brazilian version of the ASQ:3 and ASQ:SE, called the ASQ-BR and the ASQ:SE-BR, were study outcome measures. A translation-back-translation process (International Test Commission, 2005) was adopted to translate the ASQ-3 and the ASQ:SE from English to Portuguese.

Psychometric information. The psychometric study of Brazilian version of the ASQ:3 is described in a separate publication (Filgueiras, Pires, Maissonette & Landeira-Fernandez,

2013). The internal structure, reliability, invariance across years, and item difficulty of the Brazilian version of the ASQ:SE was examined using Rasch Partial Credit Model (Chen et al., 2017). Cut-off scores for the ASQ-BR and ASQ:SE-BR have not been determined as yet because evidence was limited regarding concurrent validity.

Data Analysis

The present study focused on the relation between children's scores of social-emotional competence and their scores on five domains of general development for children 1-4 years. Children were assessed by their preschool teachers using the ASQ-BR and the ASQ:SE-BR, completing the age interval corresponding to each child's chronological age, as shown in Table 1. For each age group, descriptive statistics (e.g. *M* and *SD*) were calculated for each of the five domains of the ASQ-BR, the total scores of the ASQ:SE-BR, and the two behavioural areas of the ASQ:SE-BR, Emotion and Sociality, as suggested by a factorial analysis of the ASQ:SE (Chen, Filgueiras, Squires & Landeira-Fernandez, 2016). Bivariate correlations were calculated to explore the relation between the ASQ-BR and the ASQ:SE-BR using Pearson *r*. Next, multiple regression analyses were conducted to examine what extent that the five domains of general development predicted social-emotional competence. The analysis was conducted using SPSS Version 18.

Table 1

Intervals of the ASQ-BR and corresponding age intervals of the ASQ:SE-BR

Age group	<i>n</i>	ASQ:3 intervals (Children's age)	ASQ:SE intervals
12m	500	13 m 0 day – 14 m 30 day	9 m 0 day – 14 m 30 day
24m	1,374	23 m 0 day - 25 m 15 day	21 m 0 day - 26 m 30 day
36m	4,994	34 m 16 day - 38 m 30 day	33 m 0 day - 41m 30 day
48m	6,602	45 m 0 day – 50 m 30 day	42 m 0 day - 53m 30 day

Results

A total of 13,470 children in the age range of 12

to 48 months were included in the current analysis. Descriptive statistics are presented in Table 2.

Table 2

Descriptive statistics for the ASQ-BR and ASQ:SE-BR

Domains	12m (<i>n</i> = 500)		24m (<i>n</i> = 1,374)		36m (<i>n</i> = 4,994)		48m (<i>n</i> = 6,602)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
ASQ-BR								
Communication	37.02	16.80	49.59	15.12	50.93	10.16	53.16	11.49
Gross motor	50.71	15.57	55.77	8.21	57.44	7.17	57.08	7.52
Fine motor	42.02	16.40	50.90	10.15	51.39	13.41	47.24	14.74
Problem solving	42.13	16.18	48.26	11.42	53.48	10.66	49.20	12.74
Personal-social	36.88	17.59	46.75	12.15	53.40	8.90	53.94	9.14
ASQ:SE-BR								
Emotion	11.67	11.71	10.64	12.27	14.08	16.65	15.52	20.36
Sociality	10.20	11.97	10.36	12.89	11.27	13.64	9.31	13.62
Total scores	21.87	19.83	21.00	20.44	25.34	25.54	24.84	28.92

Correlation. The correlation between ASQ-BR domains and ASQ:SE-BR areas and total scores can be found in Table 3. Scores on all dimensions of the ASQ-BR and the ASQ:SE-BR were significantly negatively correlated, indicating that as children's ASQ-BR scores

increased, their ASQ:SE-BR scores decreased. In addition, the correlations between all domains of the ASQ-BR and the ASQ:SE-BR Sociality factor were higher than the correlations between the ASQ-BR and the ASQ:SE-BR Emotion factor across all ages.

Table 3

Correlations between ASQ-BR domains and ASQ:SE-BR areas and total scores

ASQ:SE-BR	ASQ-BR dimensions				
	Communica- tion	Gross motor	Fine motor	Problem solving	Personal- social
12m (<i>n</i> = 500)					
Emotion	-0.24	-0.11	-0.31	-0.29	-0.23
Sociality	-0.49	-0.21	-0.44	-0.41	-0.43
Total scores	-0.44	-0.19	-0.45	-0.42	-0.39
24m (<i>n</i> = 1,374)					
Emotion	-0.13	-0.12	-0.15	-0.10	-0.17
Sociality	-0.48	-0.39	-0.38	-0.47	-0.44
Total scores	-0.38	-0.32	-0.33	-0.36	-0.38
36m (<i>n</i> = 4,994)					
Emotion	-0.18	-0.12	-0.23	-0.17	-0.34
Sociality	-0.55	-0.36	-0.42	-0.50	-0.55
Total scores	-0.41	-0.27	-0.38	-0.38	-0.51
48m (<i>n</i> = 6,602)					
Emotion	-0.24	-0.16	-0.25	-0.23	-0.22
Sociality	-0.56	-0.40	-0.42	-0.47	-0.48
Total scores	-0.43	-0.30	-0.37	-0.38	-0.38

Note. All values were significant (*p* < .001).

Regression. Analyses were conducted using three dependent variables respectively: (a) ASQ:SE-BR total scores, (b) the ASQ:SE-BR Emotion area scores, and (c) the ASQ:SE-BR Sociality factor scores, compared to the five

domains of the ASQ-BR for each age group (see Table 4). The five domains of the ASQ-BR explained 20% - 29% of the variance for the ASQ:SE-BR total scores; 3% - 13% of the variance of ASQ:SE-BR Emotion factor, and

27% - 39% of the variance for the ASQ:SE-BR

Sociality factor.

Table 4

Summary of multiple regression analyses for ASQ-BR scores predicting ASQ:SE-BR scores

Age	Predictor	ASQ:SE-BR Total scores			ASQ:SE-BR Emotion			ASQ:SE-BR Sociality		
		<i>b</i>	<i>SE</i>	β	<i>b</i>	<i>SE</i>	β	<i>b</i>	<i>SE</i>	β
12m (<i>n</i> = 500)	Constant	45.87***	2.89		20.77***	1.86		25.10***	1.72	
	Communication	-0.28***	0.07	-0.24	-0.06	0.05	-0.06	-0.22***	0.04	-0.31
	Gross motor	0.11	0.06	0.09	0.05	0.04	0.05	0.06	0.04	0.08
	Fine motor	-0.28**	0.08	-0.23	-0.16**	0.05	-0.16	-0.11*	0.05	-0.15
	Problem solving	-0.16*	0.07	-0.13	-0.08	0.05	-0.08	-0.08	0.04	-0.11
	Personal-social	-0.02	0.08	-0.02	0.02	0.05	0.02	-0.05	0.05	-0.07
24m (<i>n</i> = 1374)	Constant	68.70***	3.51		22.13***	2.31		46.56***	2.07	
	Communication	-0.25***	0.04	-0.18	-0.03	0.03	-0.04	-0.22***	0.03	-0.25
	Gross motor	-0.21**	0.08	-0.09	-0.05	0.05	-0.04	-0.16**	0.05	-0.1
	Fine motor	-0.12	0.07	-0.06	-0.10*	0.05	-0.08	-0.03	0.04	-0.02
	Problem solving	-0.13*	0.07	-0.08	0.08	0.04	0.07	-0.21***	0.04	-0.19
	Personal-social	-0.23***	0.06	-0.14	-0.13**	0.04	-0.13	-0.11**	0.04	-0.10
36m (<i>n</i> = 4994)	Constant	111.14***	2.63		43.11***	1.9		68.03***	1.3	
	Communication	-0.29***	0.04	-0.12	0.06	0.03	0.04	-0.35***	0.02	-0.26
	Gross motor	-0.01	0.05	0.00	0.10**	0.04	0.04	-0.10***	0.03	-0.06
	Fine motor	-0.19***	0.03	-0.10	-0.13***	0.02	-0.11	-0.05***	0.01	-0.05
	Problem solving	-0.09*	0.04	-0.04	0.09**	0.03	0.05	-0.17***	0.02	-0.13
	Personal-social	-1.06***	0.05	-0.37	-0.66***	0.03	-0.36	-0.40***	0.02	-0.26
48m (<i>n</i> = 6602)	Constant	105.27***	2.57		44.32***	1.97		60.95***	1.1	
	Communication	-0.59***	0.04	-0.23	-0.19***	0.03	-0.11	-0.40***	0.02	-0.33
	Gross motor	-0.21***	0.05	-0.05	-0.01	0.04	0	-0.20***	0.02	-0.11
	Fine motor	-0.18***	0.03	-0.09	-0.18***	0.02	-0.13	-0.01	0.01	-0.01
	Problem solving	-0.17***	0.04	-0.08	-0.06*	0.03	-0.04	-0.11***	0.02	-0.11
	Personal-social	-0.38***	0.05	-0.12	-0.13***	0.04	-0.06	-0.25***	0.02	-0.17

Note 1. All models are significant, $p < .001$.

Note 2. * $p < .05$. ** $p < .01$. *** $p < .001$.

Note 3. Total scores: 12m ($R^2 = .25$, $F = 33.47$), 24m ($R^2 = .20$, $F = 66.36$), 36m ($R^2 = .29$, $F = 402.54$), 48m ($R^2 = .23$, $F = 383.14$); Emotion: 12m ($R^2 = .11$, $F = 12.25$), 24m ($R^2 = .03$, $F = 9.62$), 36m ($R^2 = .13$, $F = 142.14$), 48m ($R^2 = .08$, $F = 112.77$); Sociality: 12m ($R^2 = .27$, $F = 37.36$), 24m ($R^2 = .30$, $F = 117.54$), 36m ($R^2 = .39$, $F = 645.42$), 48m ($R^2 = .36$, $F = 750.34$).

Discussion

This study is to examine the domain scores on ASQ-BR and ASQ:SE-BR and compare children's social-emotional and developmental status, providing useful information for practical use and psychometric study of these two instruments.

Research question 1: Correlations between the domain scores of the ASQ-3 and the scores of the ASQ:SE. The findings suggest that each of the five domain scores on the ASQ-BR was significantly negatively correlated with ASQ:SE-BR factors and total scores. The higher children's scores were on ASQ-BR domain scores (indicating greater developmental competence), the fewer social-emotional

problems (i.e. lower ASQ:SE-BR scores indicating fewer problem behaviours) they likely had.

When inspecting the correlation coefficient r value between ASQ:SE-BR total scores and individual developmental domains, the correlations between ASQ:SE-BR total scores and the two motor domains (i.e. fine, gross motor) were not consistently lower than those between ASQ:SE-BR total scores and other domains (i.e. communication, problem-solving, and personal-social). The result is inconsistent with our hypothesis. For example, for the 12-month group, the correlation for fine motor ($r = -0.45$) was similar to that for problem solving ($r = -0.42$). The regression results also showed

similar inconsistencies, counter to our hypothesis. For example, the relation for fine motor ($b = -0.28, p < .01$) was greater than that for problem solving ($b = -0.16, p < .05$). The possible explanation for these inconsistencies might relate to the item content of the ASQ-BR problem solving domain, in that the items tend to ask about cognitive skills involving hand movements, rather than skills related to social cognition such as *social referencing* (i.e. the tendency to watch an adult respond to a new object and then act in a similar manner) (McDevitt & Ormrod, 2010) which is developing around 12 months. On the 12-month interval of the ASQ-BR, five out of six items included skills involving hands, such as “When holding a small toy...does your baby clap the toys together?”, “Does your baby drop two small toys, one after the other...?”, or “...does your baby copy you by scribbling?”. Therefore, the content of these items might explain one possible reason why the problem solving domain did not consistently have stronger correlations with ASQ:SE-BR scores than did the fine motor domain.

Our findings indicated that the communication domain was strongly related to the ASQ:SE-BR scores, which was consistent with Hardy and her colleagues’ study that children’s scores on the ASQ-3 communication domain were also found to be low for children with severe social-emotional problems (Hardy, Haisley, Manning & Fein, 2015).

The items testing communication skills in ASQ-BR such as “Does your child answer questions like: What do you do when you are hungry/tired?” and “Does your child follow three directions...?” were identified as supportive/similar to the skills tested in the ASQ:SE-BR items: “Does your child use words to tell you what she wants or needs?” and “Does your child do what you ask her to do?”. Furthermore, the ASQ:SE-BR included four to six adaptive items across intervals (Squires et al., 2002), which likely contributed to the strong relation with the ASQ-BR personal-social domain.

Our findings suggest possibly conducting a

follow-up social-emotional screening when children fail the communication or personal-social domains during general development screening. Universal social-emotional screening in a busy pediatric clinic is challenging (Briggs et al., 2012) and limiting follow up social-emotional screenings based on general developmental results may be more practical for pediatricians. Also, the interventionists (e.g. teachers, pediatricians, therapists) could design activities to improve social-emotional skills for children who had low scores on communication domain to prevent them from further difficulties. On the other hand, children with high social-emotional problems may occur communicative problems concurrently. It is not hard to imagine that young children with high frequencies of emotional/behavioural problems possibly have frustrated experience to communicate with others appropriately. Based on our findings, we encourage practitioners to be sensitive to either problem when found.

Research question 2: The extent that the domain scores of the ASQ-3 predict the ASQ:SE scores. Although the relation between the problem solving domain and ASQ:SE-BR total scores was not as strong as our expectation, communication and personal-social domains still significantly predicted social-emotional scores in regression results across most of the age intervals.

Social-emotional competence was considered a domain consisting of two highly related constructs - social competence and emotional competence (Squires et al., 2002). Social competence includes a series of abilities that enable one to have a positive relationship with others (Jones & Bouffard, 2012); emotional competence is considered an ability to regulate one’s emotion to achieve his/her goal (Campos, Mumme, Kermoian & Campos, 1994). Based on this rationale (Chen et al., 2016), we split ASQ:SE-BR items into two dependent variables for the regression analyses, as a way to more accurately explore the relation between developmental and social emotional abilities. Findings suggested that correlations between Sociality factor scores and each general

developmental domain scores were significantly stronger than the correlations between Emotion factor scores and each developmental domain. For example, there was a statistically significant difference between gross motor and Emotion correlations, ($r = -0.11$) and between gross motor and Sociality ($r = -0.21$) on the 12-month group, using the test suggested by Lee and Preacher (Lee & Preacher, 2013). The results of the multiple regression analyses also indicated that the five domains of the ASQ-BR were more highly correlated to social competence (27% - 39%) than the emotional competence (3% - 13%). These findings suggest that ASQ-BR scores were more strongly associated with the social dimension of the ASQ:SE-BR (e.g. expressing intention, peer interaction, exploring new environment) than with the emotional dimension (e.g. self-regulation, impulsivity, or depression). Thus, if children receive low scores (e.g. lower than cut-off or in monitor zone) on the ASQ-3, their social development may also be at risk and should be considered for further evaluation.

When examining four different age groups, any pattern of association was not identified. That is, in the regression analyses, the r^2 (i.e. the amount that ASQ:SE-BR scores predicted ASQ-BR domain scores) did not present a tendency to increase or decrease with age. Additionally, the amount that the personal-social domain (i.e. b value) predicted ASQ:SE-BR scores at 36-months ($b = -1.06$) was higher than at 24-months ($b = -0.23$) and 48-months ($b = -0.38$). The feasibility of explaining current results as part of chronological processes should be reserved, as the ASQ-BR and ASQ:SE-BR have unique items across age intervals, resulting in an inability to examine the effects of age.

Findings add to the existing literature in three important ways. First, few programmes and public policies have addressed issues regarding development in young children in Brazil (Filgueiras & Landeira-Fernandez, 2014), so that studies on early childhood assessments via large scale data sets are important for establishing a foundation for provision of care and early intervention. Second, the results provide solid information on the relation between the two

translated screening instruments used in public child daycare centres in Rio de Janeiro. Meanwhile, the results are also able to inform the studies about the original English version of the ASQ-3 and ASQ:SE. Finally, the process of adapting the Brazilian version of ASQ-3 and ASQ:SE, which followed specific guidelines proposed by the International Test Commission (International Test Commission, 2005), illustrates procedures for future research on adaptation of measurements for cultural/language groups.

Limitations

There are several limitations in the current study. First, the lack of cut-off scores for the ASQ-BR and ASQ:SE-BR limited us in drawing conclusions from the data concerning children's overall developmental status (i.e. risk, developing typically). Second, the completion of the two measures were based on adult reporting. The subjectivity of teachers who administered the questionnaires cannot be excluded, so that there is the possibility that teachers who rated children as having developmental concerns may also view them as having other behavioural problems.

This study explored the relation between the ASQ-BR and ASQ:SE-BR and findings indicated that children's scores on communication and personal-social domains are correlated with social-emotional competence, as was our hypothesis. Replicating the study with a longitudinal design might allow for more understanding of how ASQ-BR domains and ASQ:SE-BR scores work together over time. A random sampling with different cultural groups is also recommended to increase generalizability across populations, as this sample represented a specific population in Brazil.

Conclusion

This study described the process of cultural adaptation and translation of the Brazilian versions of the ASQ-3 and ASQ:SE. Findings from analysing developmental data from a sample of 13,470 Brazilian preschool children in public daycare settings indicated a statistically significant correlation between ASQ-BR and

ASQ:SE-BR in children between one and four years of age, suggesting that the general developmental screening assessment of infant and young children should be accompanied with social-emotional/behavioural competence, especially for children at risk for delays due to environmental factors such as poverty. Furthermore, ASQ-BR communication and personal-social domain scores were found to significantly predict greater concerns for children's social-emotional competence as measured by the ASQ:SE-BR scores. Thus, if using both screeners at one time is burdensome, completing the ASQ:SE-BR on children whose scores fall below the cut-off scores in communication or personal-social domains is recommended.

Effective and accurate developmental screening is critical for early identification of delays and optimising children's developmental outcomes. Preschool teachers from public daycare centres in Rio de Janeiro were able to complete questionnaires on children in their care that yielded important information related to social emotional and developmental status. Further research is needed to confirm these results with diverse populations and to establish cut-off scores that will assist in streamlining referral and evaluation processes.

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Conflict of interests

Jane Squires acknowledges a conflict of interest as she receives the royalties from publication of *Ages and Stages Questionnaires & Ages and Stages Questionnaires: Social-Emotional*.

Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of Human Research Committee of the Pontifical Catholic University

of Rio de Janeiro Ethical Committee, under the protocol number 20/2010, which were in accordance with the 1964 Helsinki declaration and its later amendments.

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