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Routledge
Taylor & Francis Group

ORIGINAL ARTICLE

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Abstract

Background As a comprehensive measure for children with autism spectrum disorder (ASD), the Psychoeducational Profile – Third Edition (PEP-3) has been validated and widely used in the United States. This study attempted to investigate the psychometric properties of the Chinese version of the PEP-3 (CPEP-3) Caregiver Report.
Method A total of 455 Chinese children diagnosed with ASD in Hong Kong and their parents participated in the study. Internal consistency, test–retest reliability, content validity, and concurrent validity of the CPEP-3 Caregiver Report were examined.
Results The internal consistency and test–retest reliability of the subtests were good to excellent. Item discrimination and item difficulty findings were satisfactory. The measure also correlated well with the observer-rated Performance Test of the CPEP-3 and the Hong Kong Based Adaptive Behavior Scale.
Conclusion The CPEP-3 Caregiver Report can be used as an objective supplementary assessment tool for early identification and intervention programing for children with ASD in the Chinese context.

Keywords: *autism spectrum disorder, caregiver, Chinese, Hong Kong, Psychoeducational Profile – Third Edition, validation*

Introduction

In recent years, with increased media coverage and a growing body of knowledge published in academic journals, autism spectrum disorder (ASD) is now a familiar term not only to helping professionals but also to the general public. Children with ASD are characterised by deficits in three core areas: reciprocal social interaction, communication, and repetitive behaviours and interests. The presence and intensity of symptoms in ASD vary widely across individuals (Johnson & Myers, 2007). According to the fourth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (*DSM-IV*; American Psychiatric Association, 1994), ASD is comprised of three pervasive developmental disorders: autistic disorder, Asperger syndrome, and pervasive developmental disorder not otherwise specified. Researchers have

proposed that there are additional subtypes of ASD (Beglinger & Smith, 2001). In *DSM-5* (American Psychiatric Association, 2013), different subtypes are collapsed into one single diagnosis, "autism spectrum disorder," because scientific evidence has shown that a single spectrum may better reflect the symptom presentation, time course, and response to treatment (Kamp-Becker et al., 2010; Volkmar & Klin, 2005). In other words, subtypes of ASD are no longer used to avoid confusion about different labels given to children on the same autism spectrum, although there are still controversies and some researchers have argued for additional research to provide further evidence (Baron-Cohen, 2009; Kite, Gullifer, & Tyson, 2013; Lord et al., 2012; Volkmar, State, & Klin, 2009).

Despite the advances in understanding the biological and genetic basis of ASD (Betancur, 2011; Bill &

Geschwind, 2009; Geschwind & Levitt, 2007), its exact etiology is largely unknown, and therefore no medications are currently available that can fundamentally cure ASD or completely treat the core symptoms. However, appropriate intervention in early childhood, such as special education and behavioural programs, can be effective in improving the functioning of children with ASD in important developmental aspects, including communication skills, social interaction skills, cognitive skills, and academic skills (Johnson & Myers, 2007). Numerous studies have supported better outcomes in children whose symptoms are identified early and who participate in early intervention programs that target their unique deficits (Kasari, Freeman, & Paparella, 2006; Kelley, Paul, Fein, & Naigles, 2006; Sallows & Graupner, 2005).

In different Chinese contexts, relatively little research has been conducted on ASD as compared to the West. The majority of the available studies have focused on the prevalence of ASD in children and the findings have been inconsistent. In Hong Kong, Wong and Hui (2008) reported a prevalence rate of 16.1 per 10,000 for children under 15 years old, which was generally consistent with the epidemiological findings in other areas in the world (Matson & Kozlowski, 2011). However, the Hong Kong Government's estimation of the prevalence rate of ASD was on the low side (The Rehabilitation Advisory Committee, 2005). Based on a meta-analytic study, Sun et al. (2013) concluded that there was a potential underdiagnosis and underdetection of ASD in Chinese societies. It has also been argued that the available studies suffered methodological weaknesses, such as small sample size, divergent conceptual principles, and inconsistent measurement tools (Sun et al., 2013). This has pointed to the need to use more advanced methods to study ASD in Chinese contexts.

Effective early intervention programs for children with ASD must be tailored to the individual child's needs (Hayward, Gale, & Eikeseth, 2009), which make it necessary to have a complete and accurate evaluation of the child's developmental strengths and deficits. Comprehensive assessment helps to meet this requirement. An ideal assessment should provide results that can guide the development of a structured treatment program and monitor children's development in key areas. According to Gould, Dixon, Najdowski, Smith, and Tarbox (2011), an effective assessment for early intervention programs should have the following critical components. First, the assessment should be comprehensive, addressing all of the major areas of the child's development, which would assist professionals to develop a fully individualised program without overlooking important developmental areas. Second, the assessment should be age-normed for use in early childhood to indicate the typical progression of skill development. Preferably, the assessment could be used for children of 6 months or less and extending until they are able to be included in regular education. Third, the assessment items should be directly linked to specific program targets, so that sufficient information can be yielded to guide the design of the program. Fourth, the assessment should be able to track the child's development over time. As such, researchers would be able to obtain a comprehensive picture of changes in children's development and learning by using the assessment at different time points.

With reference to the above characteristics, the Psychoeducational Profile (PEP) developed by the TEACCH (Treatment and Education of Autistic and related Communication handicapped CHildren) division at the University of North Carolina (Schopler & Reichler, 1979; Schopler, Reichler, Bashford, Lansing, & Marcus, 1990) can be regarded as an appropriate assessment tool for use in early intervention programs for children with ASD. The PEP was developed as a comprehensive measure for preschool- to elementary-age children with ASD, and was intended to be used primarily as a tool for planning individualised educational programs within the TEACCH program. In 2005, the research team further revised the instrument into the Psychoeducational Profile – Third Edition (PEP-3). Similar to previous versions, the PEP-3 measures the developmental strengths, weaknesses, and learning style of children with ASD aged between 6 months to 7 years old. Apart from evaluating key developmental areas, including early cognitive abilities, language and communication, and motor skills, the instrument also measures maladaptive behaviours related to an ASD diagnosis, such as affective expression, social reciprocity, and characteristic motor and verbal behaviours. The results constitute a more comprehensive evaluative profile of the child with ASD, which helps professionals to plan and design highly individualised educational programs (Schopler, Lansing, Reichler, & Marcus, 2005).

Another important feature of the PEP-3 is the newly added Caregiver Report, a questionnaire completed by a caregiver (e.g., parents, guardian, or teacher) based on their daily observations of the child's performance. This part is usually conducted before the administration of the assessment by professional workers. Caregivers are asked to estimate the child's developmental level in different areas

and rate the applicability and severity of several diagnostic labels by filling in the measure independently (Schopler et al., 2005). There are three subtests in the Caregiver Report: behavioural problems (the children's behavioural problems associated with ASD), personal self-care skills, and adaptive behaviours (adaptability and responses to the environment). Children are rated as mild or severe, as appropriate, on each item. As it is known that the performance of children with ASD is impacted by environmental influences, such as people, places, and things with which the child interacts (Shriver, Allen, & Mathews, 1999), the extra information generated from this Caregiver Report assists the professionals to obtain a more complete picture about the child's overall development. Moreover, the results obtained from the Caregiver Report can be used to predict the performance scores of the child for cross-validation.

There are several advantages to obtaining the assessment by the caregivers. First, as parents, guardians, or teachers usually spend more time with the children concerned, their evaluation would be based on real-life experience over a longer period of time. This is in sharp contrast to assessment carried out by professional psychologists who usually conduct the assessment within a short period of time. As a result, the caregiver's findings can give more weight as far as the ecological validity of the findings is concerned. Second, information on behavioural problems, personal self-care skills, and adaptive behaviour is important as far as the holistic understanding of children with ASD is concerned. Finally, the related information is important as far as the development of an intervention plan is concerned.

In the test manual, the PEP-3 developers reported good psychometric properties of the Caregiver Report based on a normative sample comprising 407 children and adolescents with ASD and 148 typically developing children. Internal consistency indexed by Cronbach's alpha coefficient for Caregiver Report subtests ranged from 0.90 to 0.93; test–retest reliability ranged from 0.98 to 0.99; and interrater reliability (father-report and mother-report) calculated by polychoric correlation coefficients ranged from 0.52 to 1.00. A significant positive correlation was found between the PEP-3 Caregiver Report Personal Self-Care subtest and the Vineland Adaptive Behavior Scales (VABS; Sparrow, Balla, & Cicchetti, 1984), another parent-report measure of child adaptive behaviour and self-care skills, on a sample of 45 children with ASD, which supports the concurrent validity of this instrument (Schopler et al., 2005).

Although the PEP-3 has been validated and used in the United States for multiple clinical and educational purposes, the cross-cultural application of this instrument has not been thoroughly examined, particularly for the Caregiver Report. Mushquash and Bova (2007) warned that:

> researchers have ensured the reliability and validity of measures within the dominant culture and have developed many instruments that work very well for the assessment of many constructs … however, measurement instruments are utilized with cultural groups for which proper normative or psychometric research has not been conducted. (p. 53)

For PEP-3, apart from the findings reported in the test manual, only one study investigated the psychometric properties of the Caregiver Report in a different cultural context. Fu, Chen, Tseng, Chiang, and Hsieh (2012) translated the PEP-3 into Chinese and administered the questionnaire to 66 children with ASD in Taiwan. In their study, the translated version of the PEP-3 Caregiver Report demonstrated good reliability in terms of internal consistency (Cronbach's alpha ranged from 0.83 to 0.85) and interrater reliability (intraclass correlation coefficient of two parents ranged from 0.66 to 0.79). To test convergent and divergent validity, three criterion measures were used: the Childhood Autism Rating Scale (CARS; Schopler, Reichler, & Renner, 1988), the Vineland Adaptive Behavior Scale – Classroom Version (VABS; Wu, Chang, Lu, & Chiu, 2004), and the PEP-3 Performance Test.

The study by Fu et al. (2012), however, has several limitations. First, the study was conducted on a small sample of children with ASD ($N = 66$), with the majority of participants being diagnosed with high-functioning ASD. For the examination of validity, only 20 children were rated with the CARS and VABS. Such a small sample size could lead to inadequate statistical power and generate unstable research findings. Second, probably because of the study's small sample size, unexpected findings were observed. Participants' scores on the Problem Behaviour subtest measuring children's behavioural problems associated with ASD were unrelated to the CARS total score, an index that reflects the severity of symptoms characteristic of ASD. This finding is also inconsistent with the results reported in the test manual based on American samples (Schopler et al., 2005). Third, as Taiwan is a Chinese community, it is not clear whether the related findings can be generalisable to other Chinese societies.

Against this background, and after obtaining formal approval from the test publisher, the current

study was designed to examine the reliability and validity of the Caregiver Report of an adapted Chinese version of PEP-3 (CPEP-3) translated by the Heep Hong Society using a representative sample of children with ASD in Hong Kong. The Heep Hong Society is the biggest organisation providing services for children with developmental disorders in Hong Kong, and has organised several working groups to translate and validate the previous versions of PEP (e.g., PEP-R) on Chinese populations (Shek, Tsang, Lam, Tang, & Cheung, 2005; Tsang, Shek, Lam, Tang, & Cheung, 2007). The validated PEP instruments have been well used in the assessment and design of educational programs for children with ASD in Hong Kong. In the present study, the psychometric properties of the Chinese version of the PEP-3 Caregiver Report were investigated using a large normative sample of children with ASD in Hong Kong. It was expected that sound evidence could be yielded for the cross-cultural utility of the CPEP-3 Caregiver Report in evaluating the development of Chinese children with ASD.

Methods

Participants

The present study is part of the validation research on both the Performance Test and Caregiver Report of the CPEP-3 (Shek & Yu, 2014). A total of 455 children who were diagnosed as having autistic disorder or other pervasive developmental disorders (PDDs) in 25 service units in the Heep Hong Society participated in the validation study. Professionals rated each child with the Performance Test and his/her parents were invited to complete the Caregiver Report. The diagnoses of children were made based on ICD-10 (World Health Organization, 2010) or *DSM-IV* criteria by consultant psychiatrists and endorsed by a multidisciplinary team consisting of clinical psychologists, special educators, and other helping professionals. Ethics approval for the study was obtained from the Review Board of the Heep Hong Society. The primary caregivers of the participating children gave their written informed consent to the research team, and were assured that the data collected in the study would be kept confidential.

The participating children's age ranged from 2.0 to 7.9 years. Table 1 provides a summary of the characteristics of the sample in terms of age and gender. The ratio of boys to girls is 6:1, which reflects the gender bias evident in epidemiological studies of ASD (Baron-Cohen et al., 2011; Fombonne, 1999) and is consistent with the findings reported by Wong and Hui (2008) in which the male to

female ratio was found to be 6.58:1 in Hong Kong children.

Procedure

As PEP-3 is in English, it was necessary to obtain appropriate permission from the test's publisher, Pro-Ed, to translate the instrument into Chinese. Our understanding is that the Heep Hong Society is the only agency that has been authorised by the test's publisher to translate PEP-3 from English to Chinese. Once permission was obtained from the PEP-3 developers, the Heep Hong Society organised a working group to translate the PEP-3 items into Chinese. The translation procedure strictly followed the guidelines proposed by Wild et al. (2005) on cross-cultural adaptations of instruments. Specifically, two independent psychologists first translated the items into Chinese separately. The translated draft was then reviewed and modified by the working group after discussion. Adaptation and modifications of items were made by considering cultural and language factors. For example, Chinese words were used to replace the English ones in the items for letter matching, naming and sorting, and a few more culturally suitable pictures and stories were used to replace the original ones. The revised version was then back-translated into English by a third translator who has expertise in both Chinese and English. Finally, the English version was reviewed and compared with the original items by the working group to guarantee the conceptual equivalence.

The final version of the CPEP-3 Caregiver Report was completed by either the mother or father of the participating children. The researchers explained the procedure and purpose of the test and gave clear instructions on how to fill in the report to parents. Throughout the process of completing the report, one researcher was present and gave explanations when parents had any doubts regarding the questions. To investigate whether the participants' test performance was consistent over time, test–retest reliability was examined on a randomly selected subsample of 42 children with ASD. Six girls and 36 boys between 2.3 and 5.9 years of age were tested twice over a period of time that ranged from 6 weeks to 3 months. The variation of the interval was due to practical difficulties. For example, some participants were unable to come to the centre at the scheduled time for the second testing. To test the criterion-prediction validity of the CPEP-3 Caregiver Report, parents of another randomly selected subsample of 64 children with ASD (56 boys and 8 girls) aged 2–6 years also completed the Hong Kong Based Adaptive Behavior Scale

Table 1. Demographic characteristics of the sample

Age group	2	3	4	5	6	7	
Age range in years	2.0–2.9	3.0–3.9	4.0–4.9	5.0–5.9	6.0–6.9	7.0–7.9	Total
No. of participants	32	79	140	161	37	6	455
Percentage	7.0%	17.4%	30.8%	35.4%	8.1%	1.3%	100%
No. of girls	6	11	22	22	5	0	66
No. of boys	26	68	118	139	32	6	389

(HABS; Kwok, Shek, Tse, & Chan, 1989). Meanwhile, professional examiners rated the 64 children using the CPEP-3 Performance Test. The remaining 391 participating children were rated later with the CPEP-3 Performance Test in different centres of the Heep Hong Society and the data were not included for analyses in the present study.

Instruments
The Chinese version of the Psychoeducational Profile – Third Edition (CPEP-3). The CPEP-3 has two major parts: the Performance Test and Caregiver Report. The 172-item Performance section is made up of 10 subtests. Three subtests measure communication ability: Cognitive Verbal/Preverbal (34 items), Expressive Language (25 items), and Receptive Language (19 items). Another three subtests measure motor ability: Fine Motor (20 items), Gross Motor (15 items), and Visual-Motor Imitation (10 items). These six subtests focus on the child's developmental level. The remaining four subtests measure maladaptive behaviours, including Affective Expression (11 items), Social Reciprocity (12 items), Characteristic Motor Behaviours (15 items), and Characteristic Verbal Behaviours (11 items). Confirmatory factor analysis has provided support for the three-factor structure of the CPEP-3 Performance Test; that is, Communication, Motor, and Maladaptive Behaviour (Schopler et al., 2005; Shek & Yu, 2014). For the different subtests of the CPEP-3 Performance Test, the internal consistency ranges from 0.89 to 0.97 and the test–retest reliability ranges from 0.84 to 0.99 for the subtests (Shek & Yu, 2014).

The Caregiver Report consists of 38 items that are combined into three subtests: Problem Behaviour (10 items), Personal Self-Care (13 items), and Adaptive Behaviour (15 items). Based on daily observation, caregivers rate children's developmental level compared with typically developing children. Schopler et al. (2005) reported that Cronbach's alpha coefficients for the three subtests range from 0.84–0.90 and the test–retest reliability ranges from 0.94–0.99. According to the test manual, the PEP-3 Caregiver Report subtests are positively correlated with the CARS, the Autism Behavior Checklist – Second Edition (ABC-2; Krug, Arick, & Almond, in press), and the Brief Ability Rating Scale (BARS; Schopler et al., 2005).

Hong Kong Based Adaptive Behavior Scale (HABS). The HABS was modelled after the Vineland Adaptive Behavior Scale (VABS; Sparrow et al., 1984), which assesses the personal and social sufficiency of a child reported by a parent or caregiver. The norms of the HABS were based on over 1,000 children in Hong Kong (Kwok et al., 1989). The scale has four major domains of adaptive functioning: Communication, Daily Living Skills, Socialisation, and Motor Skills Domains. Both the VABS and HABS have been used widely by practitioners to provide additional information on children's social-cognitive functioning and to facilitate differential diagnosis and assessment of severity in ASD (Gillham, Carter, Volkmar, & Sparrow, 2000; Sparrow et al., 1984). High scores suggest normal adaptive behaviours. The HABS was used to examine the concurrent validity of the Caregiver Report subtests of the CPEP-3.

Results

Reliability

In the present study, the subtests of the CPEP-3 Caregiver Report were examined for both internal consistency and test–retest reliability. The Cronbach's alpha coefficients and mean inter-item correlation coefficients for the three subtests are presented in Table 2. Across the different age groups, the Cronbach's alpha coefficients ranged from moderate to large (0.65–0.89), while for the total sample the coefficients for the three subtests were between 0.84 and 0.87, and mean inter-item coefficients equalled to or exceeded 0.30. These findings suggest that the CPEP-3 Caregiver Report subtests have good internal consistency when applied to children from Hong Kong with ASD. The results are also comparable with the figures reported by the PEP-3 developers and with the results of the smaller study in Taiwan (Fu et al., 2012). It should

Table 2. Internal consistency of the CPEP-3 Caregiver Report subtests

	Cronbach's alpha								
Age group	2	3	4	5	6	7	Whole sample	*M* inter-item correlation coefficients	No. of items
PB	.71	.76	.88	.85	.83	.65	.84	.35	10
PSC	.84	.81	.80	.83	.73	–	.86	.31	13
AB	.85	.83	.88	.87	.89	.82	.87	.30	15

Note. PB = Problem Behaviour; PSC = Personal Self-Care; AB = Adaptive Behaviour.

Table 3. Test–retest reliability for the CPEP-3 Caregiver Report subtests

	First testing		Second testing		
PEP-3 Caregiver Report	*M*	*SD*	*M*	*SD*	*r*
PB	8.21	3.35	8.76	3.46	.82
PSC	16.50	4.29	16.98	4.14	.97
AB	16.71	5.72	17.21	5.24	.84

Note. PB = Problem Behaviour; PSC = Personal Self-Care; AB = Adaptive Behaviour.

be noted that Table 2 does not contain a coefficient for the Personal Self-Care subtest for 7-year-old children. This reflects the fact that the sample contained only six children aged 7 years or older, several of whom did not complete all items on the Personal Self-Care subtest, resulting in no variance. Although these children were included in other analyses, the outcomes of this study are restricted to children below the age of 7.

Test–retest reliability was examined on a random subsample of 42 parents of children with ASD. Means and standard deviations of participants' scores at the two time points are shown in Table 3. Correlation coefficients between test and retest raw scores of each of the subtests were calculated. As can be seen in the table, correlation coefficients ranged from 0.82 to 0.97, suggesting that the participants' test performance rated by caregivers is quite consistent over time. In other words, there is a good time-sampling reliability of the CPEP-3 Caregiver Report.

Validity

Content validity of the CPEP-3 Caregiver Report was examined in terms of conventional item analysis. Item discrimination is indexed by the correlation between a specific item and the other items of the subtest. Adopting the method used by Schopler et al. (2005), item-total score correlation coefficients were calculated as the indicator of item discrimination of the instrument. Table 4 shows the median item discrimination coefficients for each subtest of the CPEP-3 Caregiver Report based on the current sample. According to Ebel (1972) and Pyrczak (1973), discrimination indices of 0.35 or higher are

acceptable. All items except one met this criterion, the exception being the small sample of children aged 7 years or older, noted earlier, whose median item-total correlation coefficient of –0.44 was not interpretable.

Item difficulty refers to the percentage of participants who can pass a given item, which helps to identify whether an item is too difficult or too easy. A commonly used criterion is that item difficulty ranging from 15 to 85% can be considered acceptable, with an average item difficulty of 50% (Anastasi & Urbina, 1997). The median item difficulty for each subtest of the CPEP-3 Caregiver Report was reported in Table 4. For the most part, the test items satisfy the requirements. Results showed that when age increased, the percentage of children who passed the item also increased. These results are consistent with the original PEP-3 validation study (Schopler et al., 2005) and provide evidence for the content validity of this instrument.

Two aspects of the concurrent validity of the CPEP-3 Caregiver Report were examined. First, the correlation coefficients between children's scores on the Caregiver Report and on the Performance subtests were computed. It was hypothesised that there would be positive correlations among the subtests. Second, the correlation coefficients between children's scores on the Caregiver Report and on the HABS were calculated. As the two instruments assess similar social-cognitive and behavioural functioning, it was hypothesised that the HABS subtest scores and the Caregiver Report subtest scores would be positively correlated. Descriptive statistics about participants' scores on CPEP-3 and HABS are summarised in Table 5. The results

Table 4. Item discrimination and difficulty for the CPEP-3 Caregiver Report subtests

Age group	2	3	4	5	6	7	Overall
Item discrimination							
PB	.37	.43	.59	.52	.52	.51	.54
PSC	.48	.45	.48	.52	.45	−.44	.59
AB	.53	.47	.53	.54	.53	.56	.55
Item difficulty							
PB	11.0%	11.4%	13.9%	13.4%	16.2%	16.7%	–
PSC	9.4%	29.1%	47.9%	67.1%	69.0%	66.7%	–
AB	21.9%	27.2%	36.1%	35.1%	47.3%	41.7%	–

Note. PB = Problem Behaviour; PSC = Personal Self-Care; AB = Adaptive Behaviour.

Table 5. Descriptive statistics on the CPEP-3 and HABS

	Subtests	M	SD	Range
CPEP-3	PB	9.86	3.71	0–20.00
Caregiver	PSC	17.56	4.51	2.00–26.00
Report	AB	19.21	5.45	4.00–30.00
CPEP-3	CVP	45.90	18.00	3.00–68.00
Performance	EL	23.49	15.23	0–48.00
Test	RL	25.60	11.84	0–38.00
	FM	33.31	6.87	5.00–40.00
	GM	26.28	5.26	3.00–30.00
	VMI	14.51	4.97	0–20.00
	AE	16.42	4.51	2.00–22.00
	SR	16.04	5.21	1.00–24.00
	CMB	23.70	5.87	3.00–30.00
	CVB	12.48	6.87	0–22.00
HABS	Communication	80.83	35.86	3.00–139.00
	Daily Living Skills	77.16	29.32	14.00–149.00
	Socialisation	51.27	20.44	8.00–100.00
	Motor Skills	67.16	13.52	25.00–81.00
	Total Score	163.49	71.48	6.00–278.00

Note. The data were based on the random subsample of 64 children with ASD for testing concurrent validity. PB = Problem Behaviour; PSC = Personal Self-Care; AB = Adaptive Behaviour; CVP = Cognitive Verbal/Preverbal; EL = Expressive Language; RL = Receptive Language; FM = Fine Motor; GM = Gross Motor; VMI = Visual-Motor Imitation; AE = Affective Expression; SR = Social Reciprocity; CMB = Characteristic Motor Behaviours; CVB = Characteristic Verbal Behaviours.

Table 6. Correlation coefficients between CPEP-3 subtests and HABS subscales

	Caregiver Report subtests		
	PB	PSC	AB
CPEP-3 Performance subtests			
CVP	.54**	.70**	.57**
EL	.53**	.62**	.53**
RL	.54**	.64**	.54**
FM	.49**	.69**	.51**
GM	.44**	.66**	.46**
VMI	.51**	.66**	.54**
AE	.45**	.50**	.46**
SR	.52**	.57**	.51**
CMB	.51**	.52**	.51**
CVB	.52**	.57**	.53**
HABS			
Communication	.46**	.60**	.52**
Daily Living Skills	.44**	.62**	.52**
Socialisation	.48**	.46**	.45**
Motor Skills	.40**	.62**	.48**
Total Score	.46**	.59**	.51**

Note. PB = Problem Behaviour; PSC = Personal Self-Care; AB = Adaptive Behaviour; CVP = Cognitive Verbal/Preverbal; EL = Expressive Language; RL = Receptive Language; FM = Fine Motor; GM = Gross Motor; VMI = Visual-Motor Imitation; AE = Affective Expression; SR = Social Reciprocity; CMB = Characteristic Motor Behaviours; CVB = Characteristic Verbal Behaviours.
**$p < .01$.

based on correlation analyses are reported in Table 6. Consistent with the hypotheses, correlation coefficients between the CPEP-3 Caregiver Report subtests and HABS subscales were all significant and positive. The correlation coefficients were moderate to large, ranging from 0.40 to 0.62. The three Caregiver Report subtests were also significantly correlated with the 10 Performance subtests, with correlation coefficients ranging from 0.44 to 0.70.

Discussion

In this study, we examined the psychometric properties of the Chinese version of the PEP-3 Caregiver Report, a measure utilising parent/caregiver's input to assess problem behaviour, personal self-care, and adaptive behaviour in children with ASD. The findings generally support the cross-cultural applicability of this instrument in assessing Chinese children with ASD. Internal reliabilities of the three subtests of the Caregiver Report were found to be "good" according to the criteria proposed by Clark and Watson (1995), indicating that the items of the subscales are internally consistent and measure the latent factor construct the scale is designed to measure. Although the results are consistent with the previous study in Taiwan (Fu et al., 2012), the much larger sample of

children with ASD in the current study provides a more robust conclusion of the generalisability of the findings to the population of Chinese children with ASD. The test–retest reliability of the instrument was also found to be high in this study. This suggests that children's performance can be rated by care-givers/parents in a relatively consistent way over time in spite of the varied time intervals between the first and second testing.

Both content validity and concurrent validity of the CPEP-3 Caregiver Report were examined in the present study. Results of item discrimination and item difficulty for each subtest have yielded support for the content validity of the instrument. It should be noted that the findings for the group of children aged above 7 years are uninterpretable because of the limited sample. As such, more studies should be conducted to further examine the application of the Caregiver Report on older children with ASD. Moreover, although the parents generally did not experience difficulties completing the Caregiver Report, their feedback and comments on the use of the instrument were not systematically collected. Such information would be useful for further refining the questionnaire and should be considered in future studies.

The CPEP-3 Caregiver Report also demonstrated good concurrent validity in this study. As predicted, caregivers' ratings on children's problem behaviour, personal self-care, and adaptive behaviour were posi-tively correlated with the ratings by professionals using the CPEP-3 Performance Test on children's development in communication, motor, and mala-daptive behaviours. Evaluative data on children's development obtained from different sources have a good convergence. In addition, positive relationships were found between the CPEP-3 Caregiver Report and HABS. Children who scored higher on the CPEP-3 Caregiver Report tended to have a better developmental profile in terms of their personal and social sufficiency measured by different HABS sub-tests, providing further evidence for the concurrent validity of the instrument.

The present study represents an initial attempt to examine the psychometric properties of the Chinese version of PEP-3 Caregiver Report in a large sample of children with ASD in Hong Kong. Parent- or caregiver-reported measures based on daily observation of the child's patterns of behaviour in different settings are warranted for a comprehen-sive and accurate evaluation of these children. Overall, the results of this study are promising and suggest that the CPEP-3 Caregiver Report would be a quite useful tool offering reliable and valid eva-luative information for researchers and practitioners

working with Chinese children with ASD. Neverthe-less, additional research to further examine the appli-cation of this instrument in Chinese populations is needed, including the clarification of its interrater reliability, factor structure, and discriminant validity, as well as the applicability of this assessment tool for children with ASD in other Chinese contexts.

Acknowledgements

Funding

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