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The Identification of Early Signs of Autism Spectrum Disorders in Young Children of Taiwan

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UNIVERSITY OF NORTHERN COLORADO

Greeley, Colorado

The Graduate School

THE IDENTIFICATION OF EARLY SIGNS OF
AUTISM SPECTRUM DISORDERS IN
YOUNG CHILDREN OF TAIWAN

A Dissertation Submitted in Partial Fulfillment
of the Requirements for the Degree of
Doctor of Philosophy

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College of Education and Behavioral Sciences
School of Special Education

May, 2015

This Dissertation by: Feng-Chen Lin

Entitled: *The Identification of Early Signs of Autism Spectrum Disorders in Young Children of Taiwan*

has been approved as meeting the requirement for the Degree of Doctor of Philosophy in
College of Education and Behavioral Sciences, School of Special Education

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ABSTRACT

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Early identification and intervention have been shown to be effective in reducing disability severity caused by autistic spectrum disorder (ASD). In Taiwan, the lack of a culturally appropriate and validated autism screening tool for Taiwanese children has significantly impeded the effectiveness of identifying children who might benefit from early intervention services.

The present study employed a cross-sectional survey to investigate the cultural appropriateness, reliability and validity of the translated Chinese Modified Checklist for Autism in Toddlers (M-CHAT) for young children in Taiwan. The M-CHAT is a parent-report, free, and widely used autism screening instrument in the United States. A total of 138 participants including 100 parents of typically developing children, 20 parents of children with autism, and 18 professionals completed the questionnaires designed based on the 23 items of the translated Chinese M-CHAT. The analyses showed significant and positive findings in both quantitative analysis and qualitative evaluation of rationales and comments. As a result, the Chinese M-CHAT was a culturally appropriate autism screening instrument for young children in Taiwan and demonstrated satisfactory test-retest reliability, internal consistency, criterion validity, and content validity. However, some issues raised by parents and professionals regarding additional examples for some

test items and modification for the meaning of words in specific items may be necessary to overcome cultural differences for parents in Taiwan.

Future researches should include a broader range of participants from more diverse areas of Taiwan to provide more sound and impartial information about Taiwanese perceptions of the translated Chinese M-CHAT. In addition, a more precise diagnosis by validated diagnostic tool and careful interpretation of the test result by well-trained professionals can avoid research bias. Overall, this study contributes to the issues related to cross-cultural assessment and has important ethical and practical implications for early identification and early intervention of children with ASD in Taiwan.

Keywords: autistic spectrum disorder (ASD), early identification, culturally appropriateness, reliability and validity, M-CHAT

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TABLE OF CONTENTS

CHAPTER

I.	INTRODUCTION	1
	The Importance of Early Identification for Young Children with Autism	
	Current Status of Early Identification for Young Children with Autism in Taiwan	
	Purpose of the Study	
	Statement of the Problem	
	Research Questions	
II.	REVIEW OF LITERATURE	9
	Early Identification and Early Intervention of Autistic Spectrum Disorder in the United States	
	Early Identification and Early Intervention of Autistic Spectrum Disorder in Taiwan	
	The M-CHAT as a Screening Tool	
	Summary	
III.	METHODOLOGY	36
	Introduction	
	Instruments	
	Participants	
	Procedures	
	Data Analysis	
	Summary	
IV.	RESULTS	54
	Sample Demographic Characteristics	
	Cultural Appropriateness of the Translated Chinese M-CHAT	
	Reliability of the Translated Chinese M-CHAT	
	Validity of the Translated Chinese M-CHAT	

V. DISCUSSION AND CONCLUSION	82
Cultural Appropriateness of the Translated Chinese M-CHAT	
Reliability of the Translated Chinese M-CHAT	
Validity of the Translated Chinese M-CHAT	
Limitations and Recommendations for Future Research	
Implications for Prevention and Intervention	
Conclusion	
REFERENCES	103
APPENDIX A: Demographic Questionnaire	114
APPENDIX B: Expert Survey	117
APPENDIX C: Instructions and Permissions for the M-CHAT	124
APPENDIX D: M-CHAT Measure	126
APPENDIX E: M-CHAT Scoring	129
APPENDIX F: M-CHAT-R/F	133
APPENDIX G: Institutional Review Board Approval	139
APPENDIX H: Consent Forms for Parents	141
APPENDIX I: Consent Forms for Professionals	145

LIST OF TABLES

Table

1. Summary of Procedures	43
2. Data Analysis Plan	48
3. Demographic Characteristics of Children	57
4. Demographic Characteristics of Parents	59
5. Demographic Characteristics of Professionals	60
6. Percent of Agreement for Each Item of the Translated Chinese M-CHAT on Three Dimensions	63
7. Test-retest Reliability of Translated Chinese M-CHAT Calculated on Each Item by Pearson's Correlation Coefficient	68
8. Internal Consistency Reliability of Translated Chinese M-CHAT Calculated on Each Item by Cronbach's Alpha Coefficient	70
9. Numbers of Failed Items in Chinese M-CHAT Based on the Two Cutoff Criteria	73
10. Content validity ratio (CVR) for each item of the translated Chinese M-CHAT on three dimensions	76
11. CVR Value on Three Dimensions in Expert Survey	77
12. Suggestions for Item Modification	92

LIST OF FIGURES

Figure

1. Flow chart of screening and diagnosis of children with developmental delays in Taiwan 20
2. Comparison of criterion I and the number of failed items for each child on the Translated Chinese M-CHAT 74
3. Comparison of criterion II and the number of failed items for each child on the Translated Chinese M-CHAT 74

CHAPTER I

INTRODUCTION

Autism spectrum disorder (ASD; also known as classic autism) is a complex developmental disability that typically appears during the first three years of life and impacts development in the areas of social interaction and communication skills (Landa & Garrett-Mayer, 2006; Matson, 2007). Although the etiology of ASD is uncertain, researchers recognize ASD as a highly variable neurodevelopmental disorder with genetic risk factors (Dawson, 2008; Matson, 2007). Autism spectrum disorder was once considered a low incidence disorder; however, currently, it is more common than childhood cancers in the United States (Landa & Garrett-Mayer, 2006). In 2014, the prevalence rate of ASD was estimated at as many as one in 68 children reported by the Centers for Disease Control and Prevention (CDC; 2014). The increase in the number of children with ASD has impacted families and policy makers in providing and accessing effective interventions and services. Although there is currently no known cure for ASD, the earlier that intervention begins, the better the developmental outcomes for the child (National Research Council, 2001). With standardized screening and diagnostic tools, expert clinicians are now able to diagnose children with autism by age three, and even age two years (Zwaigenbaum et al., 2009). Thus, high-quality early intervention can be provided in a timely manner.

The Importance of Early Identification for Young Children with Autism

In the United States, developmental screening and diagnostic tools for young children with autism have been formulated based on the screening of large populations of children with standardized test items, however, these tools do not identify all children with autism, and they continue to be refined to improve their accuracy and implementation (Pizur-Barnekow, Erickson, Johnston, Bass, & Lucinski, 2010). Landa (2008) suggested that public awareness resources for professionals and families that include warning signs for earlier identification should lead to timely access to effective interventions and services. The American Academy of Pediatrics (AAP; 2001) also stresses that a flexible, continuous surveillance process should be incorporated into every well-child visit. The academy further recommends valuing parental concerns, examining each developmental domain, and observing each child (Butter, Wynn, & Mulick, 2003). A multidisciplinary consensus panel endorsed by the American Academy of Neurology and the Child Neurology Society reviewed the existing research on the screening and diagnosis of ASD and made recommendations on practice parameters (Wetherby et al., 2004). The panel pointed out that the majority of children with autism exhibit early warning signs before three years old, which may include: (a) no babbling by 12 months, (b) no gesturing (pointing, waving bye-bye) by 12 months, (c) no single words by 16 months, (d) no two-word spontaneous phrases by 24 months; and (e) loss of any language or social skills at any age.

In the past, many professionals have had a “wait and see” attitude regarding the early screening and diagnosis of ASD because of the lack of validated measures. However, valid screening and diagnostic tools are available currently, and clinicians

should use them more often in their day-to-day practice (Johnson & Myers, 2007). Based on the policy statement of the American Academy of Pediatrics (AAP; 2001), Johnson and Myers (2007) also recommend that screening for autistic spectrum disorder should occur at the 18- or 24-month well-child visit, regardless of the screening results; and at any other visit, if the screening indicates risk for ASD. Moreover, a multidisciplinary consensus panel pointed out that the majority of children with autism exhibit early warning signs before three years of age (Wetherby, Brosnan-Maddox, Peace, & Newton, 2008). In the United States, research and federal funding has emphasized the identification of early warning signs of autism in infants and toddlers with ASD or at risk for ASD, in order to reliably predict the onset of the disorder. Earlier identification will allow children to receive more timely access to early intervention services.

Current Status of Early Identification for Young Children with Autism in Taiwan

Although the benefits of early identification of ASD include a great likelihood of receiving specialist services and appropriate educational support and treatment (Johnson & Myers, 2007), most parents and primary caregivers in Taiwan have limited abilities to recognize the early signs of ASD for young children. An increasing number of cross-national marriages during the past decade also impacts parents' beliefs and understandings of early identification and early intervention for children with developmental delays (Lin, Shieh, & Wang, 2008). Studies (e.g., Chou, 2010; Tung, Chen, & Liu, 2006) have indicated that in a comparison of immigrant mothers from mainland China or South Asia and mothers in Taiwan, the former had less parenting and child-rearing knowledge than the latter. Lin, Shieh, and Wang (2008) conducted a study that compared the knowledge and attitudes toward pregnancy, prenatal care behaviors,

and medical service experiences between pregnant Southeast Asian immigrant and Taiwanese women. The result of the study indicated that immigrant mothers utilized medical resources and educational services less than did Taiwanese mothers. Based on cultural and background differences, several studies have indicated that children of immigrant mothers may be a population at high risk for developmental delay because they demonstrate less knowledge of the healthcare, prenatal care behavior, and education service system (Chou, 2010; Lin, Shieh, & Wang, 2008).

On the other hand, primary care pediatricians also play an important role in the detection and management of ASD in children. They are responsible to check the items on screening instruments as well as spend time with parents reviewing their concerns. However, parents are often asked to complete the screening alone without support from health care providers (Zhong, 2000). Despite efforts by advocacy organizations to promote greater awareness of ASD, gaps remain in parents' and health care providers' knowledge and detection efforts for ASD. Furthermore, one survey of autism assessment in a children's hospital (Tsau, 2009) indicated that few pediatricians used effective measures to screen children with autism, and many pediatricians reported lacking time to conduct these assessments.

According to Lin et al. (2011), the registered number of people with autism spectrum disorder in Taiwan dramatically increased 250% from 2000 to 2007, particularly children between six and 11 years of age, comprising about 45% of the population with autism. Based on the result of the study (Lin et al., 2011), the lower occurrence of autism under age six may reflect that the screening and diagnosis system are not yet developed comprehensively. The low identification rates for young children

with autism in Taiwan are also due to the absence of an autism screening and diagnostic instrument that is reliable and valid for Taiwanese children. For those pediatricians who actually carry out well-child health and developmental screenings, the most often used methods are the Denver Developmental Screening Test (Denver II; Frankenburg & Dodds, 1992), the Chinese Children Development Inventory (CCDI; Ko et al., 2008), and professional knowledge (Wong, 2006). However, the Denver II and CCDI for Taiwanese Children are not specifically designed for ASD, and professional knowledge alone accounts for little autism screening validity.

Purpose of the Study

Early identification is considered essential for children with autism based on findings of clinical studies that have shown that early intervention, subsequent to early detection, can enhance young children's potential and lead to optimal outcomes (Dawson, & Rogers, 2010). In general, parental report instruments have been found to be reliable and low cost, have adequate psychometric properties, and require less time to screen for ASD than screening instruments that are administered by professionals (Siegel, 2004). The Modified Checklist for Autism in Toddlers (M-CHAT) is an example of a parent-report, free, and easy to use autism screening instrument in the U. S. that is one of the most frequently selected screening instruments (Bryson, Zwaigenbaum, & Roberts, 2004). Further, M-CHAT is validated for screening toddlers between 16 and 30 months of age to assess risk for ASD. The reliability and validity of M-CHAT has been well established for over 10 years for the U.S. population (Robins, Fein, Barton, & Green, 2001). The M-CHAT was translated into Chinese, and tested on a sample of 212 children in Hong Kong, China (Wong et al., 2004) to examine the effectiveness of CHAT-23, integrating the

CHAT and the M-CHAT. However, the use of valid early identification tools for young children with ASD, especially for children under age 3, has not been universalized in Asian countries such as Taiwan.

The purposes of this study were: (1) to examine the cultural appropriateness of the Chinese M-CHAT version as an autism screening instrument for toddlers in Taiwan, and (2) to investigate the reliability and validity of the Chinese M-CHAT version for toddlers in Taiwan.

Statement of the Problem

According to the estimate of the World Health Organization (WHO, 2010), 6%-8% of children of ages 0-6 in the world have developmental problems and delays in one or more areas of development. However, only 0.5-1% of children under age six with developmental delay was reported in Taiwan (Wong, 2006). The low prevalence rate of children under age six with developmental delays suggests that the screening and diagnosis systems for young children are still at an early stage in Taiwan. Experts in the Social Welfare Department, Ministry of the Interior, who establish consensus in procedures for the early intervention system in Taiwan, indicated that the ideal procedure should be set through case detection, referral, assessment, and placement (Taiwan Ministry of the Interior, 2011). On the other hand, several studies (e.g., Lin et al., 2011; Zhong, 2000) found that most professionals in Taiwan emphasize referral and intervention, but lack training related to early screening and diagnosis for young children with developmental delays, not to mention the specific population of children with a diagnosis of ASD.

The prospects for identifying children with autism during the first two years of life have become more promising than in past years in the U.S. Scientific knowledge about early warning signs of ASD has increased and researchers have developed effective screening and diagnostic instruments. However, as mentioned previously, there are great challenges in implementing early identification for children with autism in Taiwan, due to the lack of (a) parental awareness regarding early identification; (b) a systematic screening process, including standard screening procedure for ASD and training for professionals; and (c) culturally valid developmental screening instruments.

As mentioned previously, one of the purposes of this study were to investigate the validity of the Chinese M-CHAT version for toddlers in Taiwan. However, It should be noted that due to the lack of a validated assessment tool for diagnosing autism in Taiwan, a diagnostic procedure is conducted by psychiatrists or pediatric neurologists based on the Diagnostic and Statistical Manual of Mental Disorders, 4th edition (DSM-IV-TR, American Psychiatric Association, 2000). In addition, an evaluation team (consisting of physicians, occupational therapists, psychologists, social workers, and special educators) is assigned to give a comprehensive evaluation. As a result of this limitation, attempting to establish criterion validity was a challenge in this proposed study.

Research Questions

The majority of children under three years of age with autism are not identified for early intervention services in Taiwan currently. This study sought to examine the cultural appropriateness and effectiveness of a screening instrument for ASD in toddlers in Taiwan. The M-CHAT screening tool was chosen for this study because it is a validated, systematic, and cost-effective ASD screening tool in the United States designed

for young children 16-30 months of age. The screening tool is also available in a number of different languages (including Chinese) for free download for clinical, research, and educational purposes. In addition, the reliability and validity of the Japanese version of the M-CHAT was recently published (Inada, Koyama, Inokuchi, Kuroda, & Kamio, 2011). With standardized screening tools, early identification of ASD allows for early intervention to promote children's optimal development.

To accomplish the research goals, the following research questions served as a guide for this study:

- Q1 Are the items on the translated Chinese M-CHAT instrument culturally appropriate for use with toddlers in Taiwan?
- Q2 Is the translated Chinese M-CHAT a reliable and valid instrument for identifying the early signs of autism spectrum disorder for toddlers in Taiwan?

CHAPTER II

REVIEW OF LITERATURE

Autism spectrum disorder (ASD) is a group of complex disorders of brain development. The term "spectrum" refers to the wide range of symptoms, skills, and levels of impairment, or disability. Some children are mildly impaired by their symptoms, but others are severely disabled. ASD typically appears during the first three years of life and impacts development in the areas of social interaction and communication skills. The prevalence rate of ASD is estimated at as many as one in 68 children (CDC, 2014). The burden and cost to families can be reduced by increasing the awareness of early identification and early intervention. However, most parents and primary caregivers have limited abilities to recognize the early signs for young children of ASD. Developmental screening and diagnostic tools for young children with autism have been formulated based on the screening of large populations of children with standardized test items in the United States. However, these tools do not identify all children with autism, and they continue to be refined to improve their accuracy and implementation (Pizur-Barnekow, Erickson, Johnston, Bass, & Lucinski, 2010).

Early Identification and Early Intervention of Autistic Spectrum Disorder in the United States

In the United States, remarkable progress has been made in identification of children with autism earlier in life, and evidence has accumulated about the stability of

diagnoses that occur around two years of age (Hume & Odom, 2007). Because of the increase in prevalence, public awareness and knowledge of characteristics of infants and toddlers with autistic spectrum disorders are also raised. Specifically, national organizations, including the Centers for Disease Control and Prevention, have emphasized the public awareness campaigns on early indicators of ASD (CDC, 2010). In this section, validated screening and diagnosis tools for infants and toddlers with ASD are reviewed and evidence-based early intervention strategies are presented with current practices.

Current Status and Recommended Practices for Children with Autism

In recent studies, the estimates of the prevalence of ASD have varied. For instance, in epidemiological studies, the population of ASD has been suggested to range from two in 1,000 to nine in 1,000 (Rice, 2009). Fombonne (2005) suggested that the apparent increase in the prevalence of ASD reflects changes in definition and screening procedure. Moreover, the impact of the increase in the rate of ASD is expanding rapidly. Volkmar, Lord, Bailey, Schultz, & Klin (2004) investigated the societal economic consequences of ASD, and found that the societal economic cost of ASD was approximately \$50,000 a year per child in some countries. Parents of children with the disorder spent an average of 1000 hours annually caring for and supporting their child. These studies demonstrated that autism is becoming an urgent public health and economic issue affecting approximately one in every 110 children. Thus, it is critical to make more efforts on early identification of ASD in order to ensure that children with autism can benefit from effective early intervention programs.

Recent progress has been made in the early identification of children with autism, and most children are now identified in the early preschool years (Landa, 2008). Primary healthcare providers and other professionals who interact with very young children have more information available to them about the early characteristics of autism. Although not all parents may be aware that their child is showing delays in their development or demonstrating unusual behaviors, parental concerns have been shown to be an important early indicator for children later diagnosed with autism (Johnson & Myers, 2007).

Given the increasing number of children with autism in the community and the cost of intensive services provided by many agencies, earlier identification and diagnosis is important. Research indicates that experienced clinical judgment using information from a variety of sources is more reliable for determination of diagnosis in very young children than the use of standard assessment instruments alone (Zwaigenbaum et al., 2009). Several reports have concluded that appropriate assessment should consist of a formal multidisciplinary evaluation (MDE) of social behavior, language and nonverbal communication, adaptive behavior, motor skills, atypical behaviors, and cognitive status by a team of professionals experienced with autistic spectrum disorder (Zwaigenbaum et al., 2009; National Research Council, 2001). This can typically include an experienced psychologist, a speech/language pathologist, an occupational therapist, and a special educator. Recent research on the early identification and diagnosis of ASD conceived an essential implication that early intervention professionals should be aware of the early warning signs of the disorder (Landa, 2008). Public awareness resources for professionals and families that include warning signs for earlier identification could lead to timely access to effective interventions and services.

Early surveillance and screening. A study conducted by Hertz-Picciotto and Delwiche (2009) indicated that approximately 25% of children in any primary care practice demonstrate developmental issues. However, fewer than 30% of primary caregivers conduct standardized screening tests at well-child visits. The American Academy of Pediatrics (AAP; 2001) stresses that a flexible, continuous surveillance process should be incorporated at every well-child visit, and recommends valuing parental concerns, examining each developmental domain, and observing each child carefully (Butter, Wynn, & Mulick, 2003).

Based on the policy statement of the Council on Children with Disabilities, Johnson and Myers (2007) recommend that ASD screening occur: (a) at the 18- or 24-month well-child visit, regardless of the surveillance results; and (b) at any other visit, if the surveillance indicates risk for ASD. Moreover, a multidisciplinary consensus panel pointed out that the majority of children with autism exhibit early warning signs before three years of age (Wetherby, Brosnan-Maddox, Peace, & Newton, 2008), and that further developmental evaluation is required whenever a child fails to meet any of the following milestones: (a) babbling by 12 months; (b) gesturing (e.g., pointing, waving bye-bye) by 12 months; (c) single words by 16 months; (d) two-word spontaneous (not just echolalic) phrases by 24 months; and (e) loss of any language or social skills at any age.

Clinically, identifying children with autism requires two levels of investigation. The first level, routine developmental surveillance and screening specifically for autism, should be performed on all children and involves early identification of any type of atypical development, including ASD. The second level, diagnosis and evaluation of

autism, involves a more in-depth investigation of already identified children and differentiates autism from other developmental disorders. In-depth diagnosis and evaluation are important in determining optimal intervention based on the child's strengths and weaknesses (Matson, 2007).

Reliable and valid screening tools for the early detection of autism can help parents and primary caregivers detect the early warning signs of autism. Some frequently used tools include the Ages and Stages Questionnaire: Social-Emotional (ASQ-SE; Squires, Bricker, & Twombly, 2002), the Checklist for Autism in Toddlers (CHAT; Baron-Cohen, Allen, & Gillberg, 1992), the Modified-CHAT (M-CHAT; Robins, Fein, Barton, & Green, 2001), the Screening Tool for Autism in Two-Year-Olds (STAT; Stone & Ousley, 2004), and the Pervasive Developmental Disorders Screening Test-II (PDDST-II; Siegel, 2004). Although Bryson, Rogers and Fombonne (2003) indicated that two primary screening tools (i.e., ASQ-SE and M-CHAT) were the most often reported, the majority of states acknowledged that multiple tools were used within their states (Matson, 2007).

Although ASD can be detected earlier than was previously possible, these instruments should be used with caution in any setting to ensure that children are not missed and excluded from services that might improve their outcomes (Johnson & Myers, 2007). In addition, because current methods of screening for autism may not identify children with mild disorders and children without mental retardation or language delay (i.e., high functioning autism and Asperger's disorder), additional tools are needed to help identify and evaluate these children (Wetherby, Brosnan-Maddox, Peace, & Newton, 2008). It is also important for ongoing research studies on early screening and diagnosis

to provide guidance to help identify and use evidence-based strategies and treatments for this important goal.

Early diagnosis and assessment procedures. While educators, parents, and professionals (e.g., speech and language pathologists, occupational therapists) can identify signs and characteristics of autism, a licensed clinician (i.e., physicians and psychologists) experienced in the diagnosis and treatment of autism is usually necessary for accurate and appropriate diagnosis. The diagnostic features of ASD should be apparent in very young children because they involve abilities that typically develop in the first few years of life. With the standardized diagnostic tools, expert clinicians are now able to diagnose children with autism by age three, and even by age two years (Zwaigenbaum et al., 2009). Research has demonstrated that a clinical diagnosis of ASD at 24 months of age was associated with the same diagnosis at 36 months of age or older (Landa, 2008).

To make accurate and authentic diagnosis, clinicians must rely on their professional judgment aided by validated assessment tools, such as Diagnostic and Statistical Manual of Mental Disorders, 4th edition, text revision (DSM-IV-TR; American Psychiatric Association, 2000), the Childhood Autism Rating Scale (CARS; Schopler, Reichler, Rochen Renner, 1999), the Autism Diagnostic Observation Schedule (ADOS; Lord, et al., 2012), and Autism Diagnostic Interview-Revised (ADI-R; Rutter, Le Couteur, & Lord, 2003) as well as by the results of various assessment instruments, rating scales, and checklists (Matson, 2007).

In recent research, Zwaigenbaum and colleagues (2009) indicated that most children are not diagnosed prior to age 4 years; which is typically at least two years after

parents first seek professional advice regarding their concerns about children's development. In addition, before they receive the diagnosis, most children have been seen by at least three professionals, and parents experience significant distress and frustration. The long delay between parents' initial concerns and eventual diagnosis also postponed appropriate intervention, and left parents with the sense that precious time has been lost. Landa (2008) strongly suggested that the use of validated ASD screening and diagnostic tools should be part of standard training for related professionals and licensed clinicians. Further, several reports have concluded that the proper assessment should consist of a formal multidisciplinary evaluation by a team of professionals experienced with ASD to reduce bias in assessment procedures (Johnson & Myers, 2007; National Research Council, 2001). However, any increased emphasis on early screening and diagnosis is necessary but not sufficient for high-quality service provision and must be combined with evidence-based early intervention services for infants and toddlers with ASD and their families.

Evidence-based practices in early intervention. Under Part C of the Individuals with Disabilities Education Act (IDEA, 2004), early intervention services (EIS) are granted for infants and toddlers with disabilities, from birth through two years of age, and their families. The purpose is to enhance the development of infants and toddlers with disabilities, reduce educational costs by minimizing the need for special education through early intervention, maximize independent living, and enhance the capacity of families to meet their child's needs (Dawson, 2008). Children eligible for EIS are entitled to a multidisciplinary evaluation. The National Research Council (2001) has stated that multidisciplinary evaluation is necessary to assess the status of the child's physical,

cognitive, communication, social-emotional, and adaptive development; identify areas of developmental strengths and needs; and understand the parent's priorities and concerns related to their child's development.

To best serve infants and toddlers with disabilities as well as provide effective evidence-based intervention, Part C of IDEA (2004) mandates the provision of early intervention services within natural environments. According to the regulation, natural environments are defined to “include the home and community settings in which children without disabilities participate,” and would not include settings designed for treatments or therapy, such as clinics, hospitals, or segregated special education programs. An explanation must be written on the child's individualized family service plan (IFSP) if services are provided outside of the natural environment. Butter, Wynn, and Mulick (2003) emphasized that all intervention and services for children with autism should be family focused, well structured, and based on research evidence. Research shows that intensive early intervention for children with autism is most effective, and different children with autism respond in different ways to interventions. There is no single approach that will suit all children and their families (Dawson, 2008).

Current research-based practices of early intervention for infants and toddlers with autistic spectrum disorders include Behavioral Intervention Strategies (Butter et al., 2003; Odom, Rogers, McDougle, Hume, & McGee, 2007), Developmental, Individual-Difference, Relationship-Based/Floortime Model (DIR/Floortime; Greenspan & Wieder, 1999), Naturalistic Interventions (McGee, Morrier, & Daly, 1999; Koegel, Koegel, Fredeen, & Gengoux, 2008), Picture Exchange Communication Systems (PECS; Bondy & Frost, 1994), Pivotal Response Training (PRT; Koegel, Koegel, Harrower, & Carter,

1999), Treatment and Education of Autistic and related Communication Handicapped Children (TEACCH; Hume & Odom, 2007), and Early Start Denver Model (ESDM; Rogers & Vismara, 2008). These intervention practices are specific teaching procedures that professionals or parents use to promote young children's learning and development or to decrease challenging behaviors.

Providing early intervention is critical to maximizing outcomes for a child with autistic spectrum disorder because evidence suggests that the earlier an intervention can begin, the better the outcome may be (Butter, Wynn, & Mulick, 2003; Dawson, 2008). Early intervention service providers select specific focused intervention practices to address individual goals and objectives for infants and toddlers as well as their families (Odom, et al., 2007). It may be challenging for parents and professionals to identify effective interventions to use with children who have ASD, however, the emphasis on implementing evidence-based interventions can lead parents and professionals to seek out programs supported by data from empirical research.

Early Identification and Early Intervention of Autistic Spectrum Disorder in Taiwan

As the prevalence of autism spectrum disorders increases around the world, the population of ASD is also raising rapidly in Taiwan in the past decade. However, most studies regarding the screening system and intervention strategies still emphasize children above three years of age with developmental delay (Chang, 2004; Zhong, 2000; Zhou, Zheng, & Lin, 2001). Early identification and intervention for infants and toddlers with ASD have not been valued specifically. Additionally, many treatments for children with autism are based on western models which are not supported by evidence-based research for cultural appropriateness. This section presents current practice and perspectives,

assessment systems and procedures, and intervention strategies in Taiwan for children with autism.

Current Practice in Taiwan for Children with Autism

Based on the Physically and Mentally Disabled Citizens Protection Act in Taiwan, the Ministry of the Interior (MOI) has designated autism as one of the 13 officially registered disabilities in Taiwan. A recent study examined the longitudinal reported prevalence of ASD severity based on a nationwide population-based ten years of registered data in Taiwan (Lin et al., 2011). The study indicates that the registered cases with ASD significantly increased from 2062 to 9160, and the reported prevalence increased from 0.93 to 3.96 per 1,000 people from 2000 to 2009 in Taiwan. Lin and his colleagues (2011) also revealed that the registered number of people with ASD dramatically increased 250% from 2000 to 2007 in Taiwan, particularly in children between six and 11 years of age, who comprised about 45% of the population with autism. Based on the results of the study, the lower autism prevalence rate under age six may reflect that the screening and diagnosis systems for ASD in young children have not yet developed comprehensively.

To improve assessment systems and procedures for children with developmental delays, the Department of Health in Taiwan established the Interdisciplinary Assessment Center for children with developmental delays at each county since April 1, 1997. However, most children at high risk of developmental delay are not referred to the assessment center until they are above the age of three years. The early detection and intervention for infants and toddlers with developmental delay still have not received proper attention (Shu, Lung, & Chang, 2000). Additionally, studies related to ASD in

Taiwan mostly focus on the issues of intensive treatment, follow-up education, and neuro-cognitive and behavioral problems for school-age children (Ben-Itzhak, & Zachor, 2007; Fan, Decety, Yang, Liu, & Cheng, 2010; Zhou et al., 2001). Few studies refer to how to develop an effective and systematic early screening and diagnostic system for young children with developmental delays, not to mention the specific population of children with a diagnosis of ASD.

Early surveillance and screening. In Taiwan, all children undergo the following procedures when they are evaluated during their first visit to clinic. Parents or caregivers first complete the Screening Scale of Developmental Delay-II (SSDD-II; Huang, Shieh, Chen-Yu, & John, 2002) to clarify whether there was any possible delay in five major developmental domains, including gross motor, fine motor, communication/language, cognition and social/emotional domains. SSDD-II is a convenient Chinese screening scale with established validity and is applied widely in clinical practice in Taiwan (Zhong, 2000). According to the outcome scores of parent-reported SSDD-II, if children were screen-positive cases, standardized cognitive tests are administered by child psychologists. Parents or primary caregivers are then interviewed in detail with a focus on early symptoms, associated disabilities and diseases, developmental milestones, family history, and other specific developmental concerns. Due to the fact that validated screening tools specifically designed for infants and toddlers with ASD are not yet developed or validated in Taiwan, children who are identified as being at high-risk for an ASD diagnosis by professionals are further evaluated by a pediatric psychiatrist or a pediatric neurologist. Figure 1 shows a flow chart of screening and diagnosis of children with developmental delays in Taiwan (Chang, 2004).

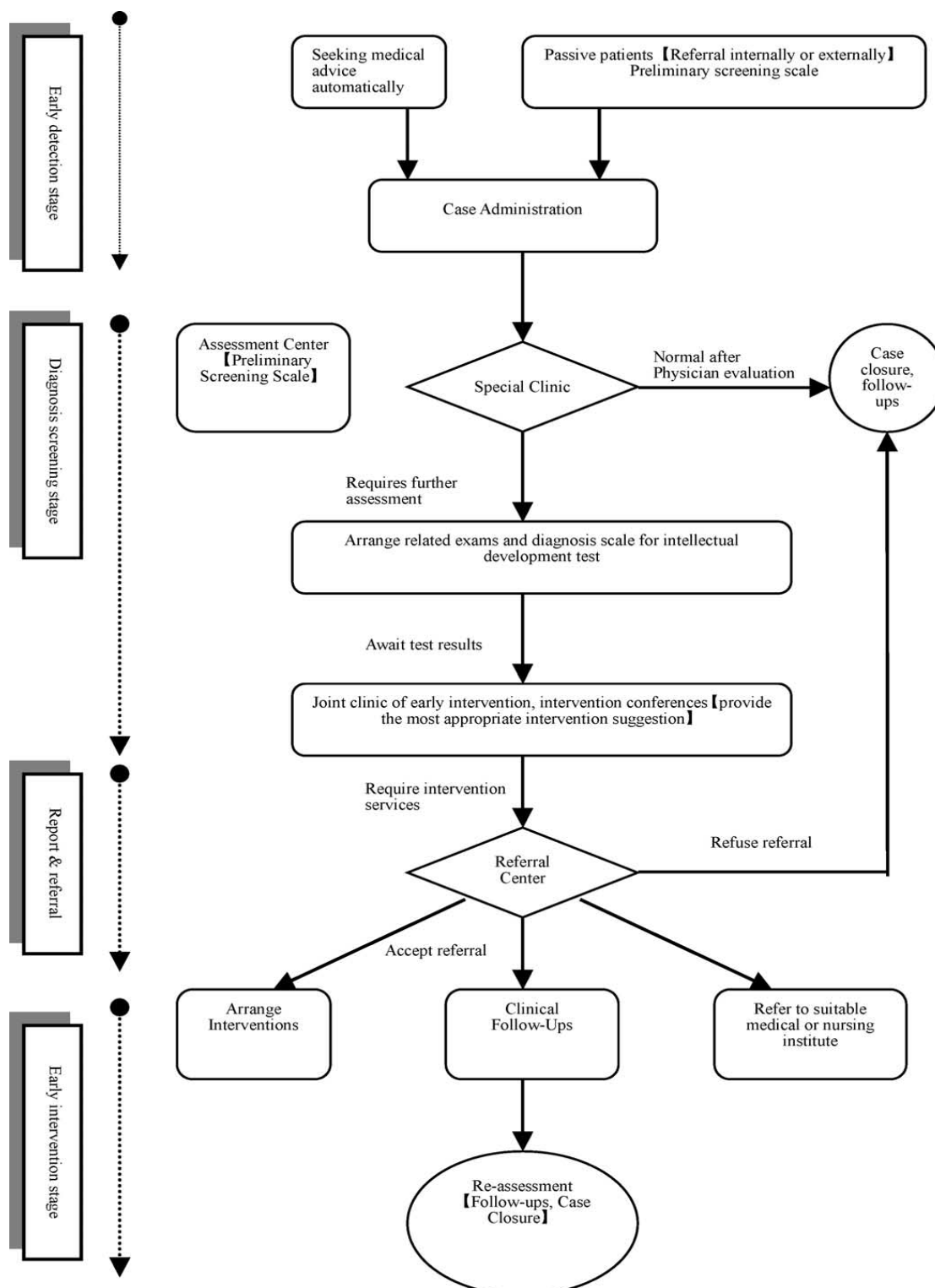


Figure 1. Flow chart of screening and diagnosis of children with developmental delays in Taiwan. Reprint from "Using case-based reasoning to diagnostic screening of children with developmental delays," by C. L. Chang, 2004, *Expert Systems with Applications*, 56, p. 5. Copyright 2004 by the Elsevier Ltd. Reprinted with permission.

Early diagnosis and assessment procedures. Autism is a complex developmental disability with negative impacts on an individual's emotional, social, physical, and financial domains. In Taiwan, the health authorities (i.e., Department of Health) are in charge of the identification procedure for autistic spectrum disorder, while social welfare authorities (i.e., Social Welfare Department, Ministry of the Interior) administer the registration procedure. A diagnosis of ASD is often determined by psychiatrists or pediatric neurologists who have experience and training in autism. In 1997, the health authorities set up "Center of Team Evaluation for Children's Development" in selected regional large hospitals of Taiwan and assigned an evaluation team (consisting of physicians, psychologists, occupational therapists, physical therapists, language pathologists, and special educators) to evaluate a child who is at risk for autism if necessary (Zhong, 2000; Chen, Lee, Yeh, Lai, & Chen, 2004). At the time of diagnosis, a comprehensive evaluation is typically arranged with a series of examinations on neuropathology, intelligence quotient (IQ), occupational function, physical function, and language and social skills. A variety of developmental and educational evaluations will also be conducted to establish a comprehensive diagnosis.

According to the criteria of the Department of Health (2006) in Taiwan, children with autism are characterized by impaired social interaction, problems with verbal and nonverbal communication, and unusual, repetitive, or severely limited activities and interests. During the evaluation, children with autism will be categorized by four levels (mild, moderate, severe, and profound) of disability according to their cognitive abilities. The degree of intellectual disability is assessed first based on IQ as a starting point to classify the disability level as either: (a) Mild disability – IQ above 70, able to live

independently; (b) moderate disability – IQ 50–70, may be able to live independently; (c) severe disability – IQ 30–50, poor motor development and little, if any, speech or communication skills; and (d) profound disability – IQ below 30, requires living in a closely supervised setting (Lin et al., 2011). Children identified with autism will be certified by the Social Welfare Department, and their parents can apply for a living allowance or related benefits from the government that may help to reduce their financial burden. According to the four levels of disability described above, children with profound or severe disabilities are likely to receive more benefits from social welfare and health insurance.

Currently, the most common diagnostic tool used by psychiatrists and pediatric neurologists in Taiwan is the Diagnostic and Statistical Manual of Mental Disorders, 4th edition (DSM-IV, American Psychiatric Association, 2000). Clinicians will be able to diagnose autism if a child's behavior is consistent with the DSM-IV criteria for autistic disorder, pervasive developmental disorder not otherwise specified (PDD-NOS), or Asperger disorder. Standard instruments for assessing autistic spectrum disorder, such as diagnostic tools of Autism Diagnostic Interview-Revised (ADI-R; Rutter et al., 2003) or Autism Diagnostic Observation Schedule (ADOS; Lord et al., 2012), are not available in Taiwan due to the lack of a valid Chinese version for the Taiwanese population.

Furthermore, a recent study of autism assessment in a children's hospital found that 92 percent of pediatricians surveyed said they regularly screened for developmental delays and only eight percent said they regularly screened for ASD. Lack of familiarity with the screening tools for ASD was the reason cited by 85 percent of those who reported not screening for ASD (Tsau, 2009). It indicated that few pediatricians use effective measures

to screen children with autism and many pediatricians need to be adequately trained in autism assessments.

Early intervention and related services. The main intervention models for children with autism in Taiwan include behavioral treatments based on western models, occupational therapies, and speech therapies (Chou, 2010). Because family-centered treatment and the concept of “assessment and early intervention in naturalistic environment” are not yet adapted in Taiwan, these treatments are provided in formal health care systems (i.e., hospitals and clinics) and are reimbursed by the Social Welfare Department. On the other hand, alternative therapies (e.g., acupuncture, diet therapy, and Chinese medicine) are paid by parents. Pediatric psychiatrists in Taiwan usually recommend only traditional medical therapy to families and seldom recommend alternative therapies.

One study found that the most common treatments for children with autism in Taiwan, in addition to behavioral intervention strategies, were acupuncture, sensory integration, and music therapy (Wong, 2006). However, many parents in the study did not use or stopped using acupuncture out of concern for the pain it would cause the child. Another study indicated that one-third of parents of children with autism used both conventional western medicine and complementary alternative medicine, and many of them did not want their doctors to know that they used alternative medicine at the same time as they were receiving traditional medical treatment, because alternative therapies are not usually recommended by clinicians (Chen, Lin, Wen, & Wu, 2007).

Acupuncture has been widely practiced in Taiwan and China and is increasingly being practiced in many Western countries. Acupuncture is the piercing of fine needles at

acupoints to give therapeutic effect. Through acupuncture, specific body areas are pierced with fine needles for therapeutic purposes. It results in the feeling of soreness, numbness, heaviness, or a sensation of electric impulse at the acupuncture points by patients, and a sensation of tenseness around the needles by acupuncturists. Although some research has suggested that acupuncture resulted in improvements in social initiation, receptive language, motor skills, coordination, and attention span (Yuan et al., 2004), it was not possible to confirm these findings with a criterion test. In addition, there is no consensus about the best type of acupuncture for children with autism (Zhang & Jin, 2005).

In Taiwan, early intervention service is defined as a professional service that provides for children from birth to age six who have special needs and their families (Chang, 2004). Services include screening, diagnosis, medical needs, rehabilitation, special education, health insurance, and other benefits. It is a comprehensive service system that provides medical and educational treatments to help young children reach their potential, and to effectively reduce long-term additional costs to society (Wong & Hui, 2008). However, because early identification systems are limited, most children with disabilities and their families do not receive the benefits from the service before children turn age three. Moreover, because of the lack of evidence-based intervention, one study (Shyu, Tsai, & Tsai, 2010) also found that applying a variety of intervention strategies created time/energy pressures and a financial burden for parents. Many parents mentioned that they were exhausted by attending different treatments and were burdened with the cost of treatments.

Barriers to Autism Identification in Taiwan

Children with developmental disabilities carry a greater burden of diseases/disorders and require more attention in medical and educational services than the general populations (Chen et al., 2004). Therefore, an early identification surveillance system based on standard screening and diagnosis procedures is important for decision making regarding services and can provide valuable and cost-effective epidemiological information. However, there are some barriers to autism identification in Taiwan due to (a) parental unawareness regarding early identification, (b) the lack of a systematic screening process, including standard screening procedure for ASD and training for professionals, and (c) the lack of culturally validated autism screening instruments. As a result, there is a low identification rate of children with autism in Taiwan. Without a clear picture of the population with autism, efforts to improve their quality of services will be impossible (Lin et al., 2011). In order to effectively identify children with autism in Taiwan, it is urgent to develop a systematic and cost-effective early identification screening system using culturally valid and reliable instruments.

Parental unawareness regarding early identification. The traditional prejudice against individuals with disabilities is an obstacle to identifying children with autism. With the prevailing belief in reincarnation in Taiwan, some people think that individuals with disabilities are cursed because of their family's wrong doing in their past lives (Hsiao, Klimidis, Minas, & Tan, 2006). Because of this belief, many Taiwanese people think that providing services for people with disabilities is a waste of time and money. This explains why the majority of young children still do not accept children with special needs and the majority of individuals with ASD are still kept in their homes and not

registered for services (Chen, Lin, Wen, & Wu, 2007). Moreover, there is a Taiwanese proverb that states “Great minds mature slowly,” which means that the brains of gifted children take a longer time to develop. This incorrect traditional belief has influenced most parents’ beliefs from generation to generation and provides an explanation for parents and caregivers not accessing educational and intervention services for their children in a timely manner (Zhou et al., 2001).

The population transition in Taiwan also impacts Taiwanese beliefs and understandings of early identification and early intervention for children with developmental delays. Close to 10% of Taiwanese parents are marriage immigrants, and approximately 8.7% of the mothers were from mainland China and Southeast Asia within the past seven years (Taiwan Ministry of the Interior, 2011). One study found that immigrant mothers from mainland China and South Asia had less knowledge on parenting and child-rearing compared with mothers in Taiwan (Chou, 2010). Based on cultural and background differences, several studies indicated that children of immigrant mothers may be a population at high risk for developmental delay because they demonstrate a lower rate of accessing medical and educational services (Chou, 2010; Lin, Shieh, & Wang, 2008).

Lack of a systematic screening process. One of the barriers to identifying children with autism in Taiwan is the lack of a systematic screening process to evaluate children for ASD. According to the estimate of the World Health Organization (WHO, 2010), there are 6%-8% of children at age 0-6 in the world who are diagnosed with developmental delay. However, only 0.5-1% of children under age six with developmental delay was reported in Taiwan (Wong, 2006). The low prevalence rate of

children under age six with developmental delays may suggest that the screening and diagnosis systems for young children are still at an early stage in Taiwan.

Under the health care system in Taiwan, pediatricians must screen children for developmental delays during well-child visits. However, in reality, parents are often asked to complete the screening checklist instead of pediatricians completing the checklist themselves. The screening and diagnosis systems are not implemented completely by trained professionals. Moreover, without standardized autism screening procedures, professionals might overlook subtle differences in certain domains of development and delay the timing for referral or make misidentification, especially for children with high functioning autism or Asperger's Syndrome.

Lack of culturally validated autism screening instrument. Low identification rates for ASD are also due to the absence of autism screening instruments that are reliable and valid for Taiwanese children. At first visit to a clinic, parents or caregivers are requested to complete the Screening Scale of Developmental Delay-II (SSDD-II; Huang et al., 2002) to clarify whether there was any possible delay in the five major developmental domains (i.e., gross motor, fine motor, communication/language, cognition, and social/emotional domain). For those pediatricians who actually carry out well-child visits and developmental screenings, the most often used diagnosis instruments are the Denver Developmental Screening Test (Denver II; Frankenburg & Dodds, 1992), the Chinese Children Development Inventory (CCDI; Ko et al., 2008), and professional knowledge. However, the SSDD-II, Denver II and CCDI for Taiwanese Children are not specifically designed for ASD. Furthermore, clinicians' professional knowledge needs to

be improved by training in order to increase the reliability and validity of autism assessment.

The M-CHAT as a Screening Tool

Based on the findings of clinical studies that have shown that early detection for autistic spectrum disorder can enhance young children's potential and lead to optimal outcomes (Johnson & Myers, 2007; Dawson & Rogers, 2010), a low-cost, easy to use, reliable, valid, and culturally appropriate instrument is necessary in the screening process for young children with autism. Screening instruments are not intended to provide diagnoses but rather to determine whether there is a need for further diagnostic evaluation (National Research Council, 2001). Several screening instruments have been developed for autism and further studied in recent years. As introduced previously, examples of these screening instruments are the M-CHAT (Robins, Fein, Barton, & Green, 2001), the CHAT (Baron-Cohen et al., 1992), the ASQ-SE (Squires et al., 2002), the STAT (Stone & Ousley, 2004), and the PDDST-II (Siegel, 2004). This study seeks to examine the cultural appropriateness and effectiveness of a screening instrument for ASD in toddlers in Taiwan. The M-CHAT screening tool is chosen for the present study because it is a validated, systematic, and cost-effective ASD screening tool in the United States designed for young children 16-30 months of age. The screening tool is also available in a number of different languages, including Chinese, for free download for clinical, research, and educational purposes.

Description and Tool Development

Although many autism-specific screens exist, the Modified Checklist for Autism in Toddlers (M-CHAT) is among the most accessible (Johnson & Myers 2007). The M-

CHAT (Robbins et al., 2001) is an expanded version of the Checklist for Autism in Toddlers (CHAT; Baron-Cohen et al., 1992); however, it does not include items that require observation by a physician. The original version of the CHAT was a simple screening tool for identification of children with autism at 18 months of age in the United Kingdom and the M-CHAT is specifically designed to target the early detection of ASDs for young children age 16 to 30 months. The goal of M-CHAT is to improve the sensitivity of the CHAT and position it better for an American healthcare system.

The M-CHAT is a 23-item yes/no parent report questionnaire. It was originally tested on 1,293 children with 10% of the sample screening positive (Robbins et al., 2001). The six critical questions of the M-CHAT addressed areas of social relatedness (interest in other children and imitation), joint attention (protodeclarative pointing and gaze monitoring), bringing objects to show parents, and responses to calling. A child fails the checklist when (1) two or more critical items are failed or (2) any three items are failed. It should be noticed that if a child fails it does not mean that the child has ASD, but rather means that a further diagnostic evaluation is suggested (Kleinman et al, 2008). An M-CHAT follow-up interview conducted by clinical professionals is also provided to help screen those who require further evaluation. The authors' initial report indicated that the M-CHAT has an overall internal reliability coefficient of 0.85 and sensitivity and specificity estimates of 0.87 and 0.99 (Robbins et al., 2001).

Applications in the United States

Eaves, Wingert, Ho, and Helena (2006) examined the performance of the M-CHAT with a group of 84 children referred for possible autism to a specialty clinic, of whom 64% were then diagnosed with ASD. It was reported that the sensitivity was 0.92 while

the specificity was 0.27. The differences of the performance of the M-CHAT between Robins et al. (2001) and Eaves et al. may be caused by the fact that the Robins et al. sample was aged 16 to 30 months whereas the Eaves et al. sample was aged 24 to 48 months. In addition, Robins et al. used a telephone follow-up to reduce false positives. Eaves and colleagues (2006) pointed out that sensitivity may be more important than specificity, but suggest that the M-CHAT may have insufficient specificity for identifying autism in high-risk samples already suspected of autism. Ventola and colleagues (2007) examined a group of children with autism and other developmental disorders that had all screened positive on the M-CHAT. It was reported that 11 of the 23 items differentiated the ASD and non-ASD groups; after controlling for language level, four items remained different between the groups, all relating to joint attention.

As applications of the M-CHAT have become more widespread in the literature, additional variations have arisen in the conditions under which the screen is administered. Repeated applications of the M-CHAT should emphasize its promise and current status as one of the most respected instruments available for early ASD screening (Snow & Lecavalier, 2008). To date, studies examining the properties of the M-CHAT have primarily focused on establishing the validity of the screen (Kleinman et al., 2008; Snow & Lecavalier, 2008; Eaves et al., 2006).

International Applications

Cross culture adaptations of the M-CHAT have been recently underway (Robins, 2008). The M-CHAT is also available in many languages, such as Spanish, Arabic, Chinese, and so on (Robins, 2008; Snow & Lecavalier, 2008). However, the use of valid early identification tools for young children with ASD, especially for children under age

3, has not been examined in Taiwan. The M-CHAT was translated into Chinese and tested on a sample of 212 children in Hong Kong ages 13–86 months (Wong et al., 2004). The objectives of Wong and colleagues' study were to examine the effectiveness of CHAT-23, integrating the CHAT and the M-CHAT, in discriminating autism cases from non-autism cases and to determine the best combination of questions to identify autism in a Chinese population. In conclusion, the high sensitivity (0.839) and specificity (0.848) of the criteria suggested that CHAT-23 may be used to identify children with autism. It is recommended by the authors that initial screening with the parent report (i.e., M-CHAT) items should be followed by clinician observation for children screening positive by using the CHAT observation items (Wong et al., 2004).

A recent study examined the reliability and validity of the Japanese version of the M-CHAT (Inada et al., 2011). This is also the first study to confirm that the M-CHAT has good inter-rater reliabilities of 0.93 (correlation among 24 mother-father pairs) and test-retest reliabilities of 0.99 (satisfactory with 22 mothers) for toddlers in the first 2 years of life. A sufficient discriminant validity (with 1167 reference children) was revealed and a good concurrent validity was shown in the significant correlations between the M-CHAT score and the Childhood Autism Rating Scale (CARS)-Tokyo version score in 25 children aged 23-26 months ($r = .581$). However, the low positive predictive value was consistent with the results of the original M-CHAT (Kleinman et al., 2008) that indicated that many false positives were demonstrated by using the M-CHAT in screening process and a follow-up telephone interview was highly suggested for reducing the false positives rate.

In the Arab world, a cross-country study used the M-CHAT to screen children for autism in nine Arabian countries, including Gulf region, eastern Mediterranean region,

Egypt, and Tunisia (Eldin et al., 2008). This is also the first known study merging the Arabian countries in the use of one tool for screening for a specific disorder. The study aimed to validate the M-CHAT as a screening tool for children in Arab countries by assessing the degree of sensitivity, specificity and predictive value. The final analysis included 228 children (122 screened positive for ASD) and the M-CHAT had a sensitivity of 0.86, a specificity of 0.80, and a positive predictive value of 0.88 that were very similar to Robins et al. (2001) study. It was pointed out that although these countries shared the same language and religion, they have a diversity of cultural, ethnic, political and social structure (Eldin et al., 2008). Further, despite the positive results with the M-CHAT, the study's limitation was that the sample size, though from several countries, was not large enough to generalize the results to all Arabian countries.

Canal-Bedia and colleagues (2011) indicated that due to the absence of a Spanish detection tool for children with autism, the M-CHAT was first translated into and culturally adapted to Spanish. The validity and reliability of M-CHAT were examined in two different samples (2,480 high- and low-risk children; and 2,055 low-risk children). The findings were similar to the original M-CHAT studies (Robins et al., 2001) with a sensitivity of 1 and a specificity of 0.98. Differences were found in positive predictive value (PPV=0.35), due to the low ASD frequency observed in the study. M-CHAT is still being studied in a large population-based screening program in Spain. The researchers specifically pointed out that exclusive reliance by pediatricians on clinical criteria has yielded very poor results in terms of the number of high-risk cases detected. Thus, when using the M-CHAT as a screening tool, professionals' knowledge and skills should be further reinforced.

A New Revision of Modified Checklist for Autism in Toddlers: M-CHAT-R

To improve the sensitivity of the M-CHAT and detect ASD at a higher rate, Dr. Robins and her colleagues modified some test items of the M-CHAT updating to a new revision, also known as M-CHAT-R (the M-CHAT, Revised) or M-CHAT-R/F (the M-CHAT, Revised with Follow-up), and reported the first published data by examining a large population ($n = 16,071$) in 2014 (Robins et al., 2014). As a result, the revised tool reduced the false positive rate and detected more children with ASD than the original M-CHAT. It was suggested in Dr. Robins' study that the M-CHAT-R did not appear to be much different than the initial version, and there was little urgency to replace the test items of the original M-CHAT with the revised version.

The changes in the new version M-CHAT-R include (a) deleting three M-CHAT items because they performed poorly; (b) reorganization of items to avoid agreement bias; (c) place items that best discriminated between children diagnosed with and without autism at the beginning of the test; (d) examples were added to clarify the items; and (e) simplifying the language of the items to gain a better understanding. It should be highlighted that the M-CHAT-R, Revised with Follow-Up (M-CHAT-R/F) is designed to be used with the M-CHAT-R. The M-CHAT-R/F contains the same items as the M-CHAT-R, but Yes/No has been replaced by Pass/Fail. Although the M-CHAT-R is a parent-report screening tool, the M-CHAT-R/F was administered by a trained health care professional to improve the positive predictive value (PPV). It should be aware that even with the Follow-Up, not all children who screen positive on M-CHAT-F/R will receive a diagnosis of ASD. However, these children may be at high risk for other developmental delays, and therefore, evaluation is necessary for any child who screens positive.

Summary

Autistic spectrum disorder can be viewed as a lifelong syndrome that is usually diagnosed in the first three years and continues through adulthood. Although there is currently no cure for ASD, long-term and quality of life outcomes can occur when signs and symptoms of autism are identified early and children receive evidence-based interventions as early as possible. The American Academy of Pediatrics (AAP; 2001) stresses that a flexible, continuous surveillance process for young children with autism should be incorporated at every well-child visit, and recommends valuing parental concerns, examining each developmental domain, and observing each child (Butter et al., 2003). It is also suggested that public awareness resources for professionals and families that include warning signs for earlier identification should lead to timely access to effective interventions and services (Landa, 2008).

The understanding of ASD and its diagnosis and treatment for children with autism has improved in Taiwan over the years. However, the low autism prevalence rate under age six may reflect that the screening and diagnosis system are not yet developed comprehensively (Lin et al., 2011). In order to effectively identify children with autism in Taiwan, it is urgent to develop a systematic and cost-effective early identification screening system using culturally valid and reliable instruments. The M-CHAT is a validated, parent-report, and easy to use autism screening instrument in the United States (Bryson, Zwaigenbaum, & Roberts, 2004) and cross culture adaptations of the M-CHAT have been recently underway (Robins, 2008). Nevertheless, the use of valid early identification tools for young children with ASD, especially for children under age 3, has not been examined in Taiwan. The present study aims to examine the cultural

appropriateness and the reliability and validity of the Chinese version of the M-CHAT for toddlers in Taiwan.

CHAPTER III

METHODOLOGY

This study employed cross-sectional survey research to investigate two goals: (1) to examine the cultural appropriateness of the Chinese M-CHAT version (Wong et al., 2004) as an autism spectrum disorder (ASD) screening instrument for children between the ages of 16 months to 30 months in Taiwan; and (2) to investigate the reliability and validity of the Chinese M-CHAT version (Wong et al., 2004) for screening children between the ages of 16 months to 30 months in Taiwan.

Introduction

A cross-sectional survey study is a powerful tool that captures data at a single point in time from a large pool of populations (Creasey, 2006). The research design is a useful way to gather information on people's knowledge, attitudes, perceptions, and practices. Researchers usually collect data about demographic and other relevant characteristics so that they can compare their findings to other groups (Miller, 2006; Teti, 2006).

This study employed the M-CHAT measure because it is a low-cost, easy to use, valid instrument for detecting ASD in children under 2 years of age. The questionnaire takes less than 10 minutes to complete and does not require specialized direct observation. To date, there has been no study of the application of the M-CHAT for a Taiwanese

population. However, as discussed in Chapter II, the 23 test items of original M-CHAT (Robins, Fein, Barton, & Green, 2001) were translated into Chinese by Wong and his colleagues (2004) measuring the sensitivity and specificity of M-CHAT for Chinese children in Hong Kong, China. The high sensitivity (.83) and specificity (.84) of the criteria of the Chinese M-CHAT version was noted in the study. In the present study, the research questionnaires were developed based on the translated Chinese M-CHAT to accomplish the research goals. An overview of the questionnaire design is indicated in the instruments section below.

Twenty settings, including registered nursery centers, were randomly selected from two special municipalities in north Taiwan (i.e., Taipei City and New Taipei City). Three groups of participants participated in the study, including (a) a team of professionals who are experts in child development ($n=18$); (b) parents of typically developing children ($n=100$); and (c) parents of children identified with autism spectrum disorder (ASD, $n=20$). Quantitative analysis and evaluation of the rationales and comments on three instruments were used to investigate the cultural appropriateness, reliability, and validity of the Chinese M-CHAT. These procedures are described in detail below.

The results of this study are structured along the two research questions: (a) Are the items on the translated Chinese M-CHAT instrument culturally appropriate for use with toddlers in Taiwan? (b) Is the translated Chinese M-CHAT a reliable and valid instrument for use to identify the early signs of ASD for toddlers in Taiwan?

Instruments

Three research instruments were used in this investigation, including the (a) demographic questionnaire, (b) the expert survey, and (c) the Chinese M-CHAT measure. The Chinese M-CHAT measure was completed by 120 participating parents to investigate the reliability and validity of the test itself. The expert survey was completed by 120 expert parents and 18 expert professionals to examine the cultural appropriateness of the Chinese M-CHAT. All the research participants completed the demographic questionnaire and all measures were administered in Chinese. Each instrument is described in detail below.

Demographic Questionnaire

The demographic questionnaires requested sixteen information items from participating parents and professionals. Questions about participants' age, gender, religion, education, and occupation were included. Additionally, questions about children were also included in the demographic questionnaire for participating parents. These questions referred to the category of primary care provider, general health condition of the children, and concerns about children's emotional or behavioral problems. Given the opportunity to collect data from participants based on demographic considerations, this study was able to categorize the overall survey response data into meaningful groups of respondents and compare subgroups to see how opinions varied among these groups. The demographic questionnaire (English and Chinese version) is included in Appendix A.

Expert Survey

One hundred parents of typically developing children, 20 parents of children identified with autism spectrum disorder, and 18 professionals were asked to respond to

the expert survey to investigate the cultural appropriateness of the Chinese M-CHAT. The design of the expert survey questionnaire is based on the items from the Chinese M-CHAT (Wong et al., 2004). All participants were asked the following three questions for each item of the 23 items on the Chinese M-CHAT version; (a) is this item easily understood; (b) is this item culturally appropriate; and (c) is this item developmentally appropriate for children between 16 to 30 months of age? Response choices were “yes” and “no”. A space for the rationale for a “no” response and written comments were also provided on the expert survey questionnaire. The expert survey (English and Chinese version) is included in Appendix B.

M-CHAT Measure

As described in Chapter II, Robins, Fein, Barton, and Green (2001) have investigated the psychometric properties of M-CHAT in English in the U.S. by screening 1,293 children who came into the physician’s office for an 18 or 24 month checkup. For children who failed the M-CHAT, a phone follow-up interview was conducted by clinical professionals to screen those who require further evaluation. Internal reliability was found to be adequate (.85) for both the entire checklist and for the critical items. The estimated sensitivity was 87%, specificity was 99%, and positive predictive power was 80%, but more accurate measures could not be determined until a follow-up study was conducted. Two cut-off criteria were used to measure the sensitivity of the M-CHAT: (a) 3 out of all the 23 items, or (b) 2 out of the 6 critical items that could be used to discriminate the group with autism from other groups.

To investigate the reliability and validity of the Chinese M-CHAT version in Taiwan, participating parents in the proposed study were requested to complete each item

based on their children's development. Examples of the test items include "Does your child take an interest in other children?" and "Does your child imitate you?" Parents are asked to check "yes" or "no" on the item according to their observation of the child's performance. The relative information and measures are presented in Appendix C, D, and E, including (a) Instructions and Permissions for Use of the M-CHAT, (b) the M-CHAT measure (English and Chinese version), and (c) M-CHAT scoring instructions (English and Chinese version).

Participants

To accomplish the goals of this proposed study, three types of participant groups were included: (a) a team of professionals who were experts in child development, (b) parents of typically developing children, and (c) parents of children with autism. All participants were required to sign a consent form that was formally approved by the University of Northern Colorado Institutional Review Board (IRB; Appendix G).

Appendix H and I presented the consent forms used for each participant group.

Team of Professionals who are Experts in Child Development

As mentioned in Chapter II, the Department of Health in Taiwan set up "Center of Team Evaluation for Children's Development" in selected regional large hospitals and assigned an evaluation team (consisting of physicians, psychologists, occupational therapists, physical therapists, language pathologists, and special educators) to evaluate a child who is at risk for autism (Zhong, 2000; Chen et al., 2004). In this study, a team of professionals was recruited from Mackay Memorial Hospital, which is one of the selected hospitals with Center of Team Evaluation for Children's Development in Taipei, Taiwan.

The professionals were familiar with the Taiwanese culture and language and were asked to verify cultural appropriateness and content validity of the Chinese M-CHAT. The 18 expert professionals was comprised of education and health experts who had specializations in child development and were engaged in active professional practices with children, including special education teachers/professors, child psychologists, language pathologists, occupational therapists, physical therapists, and pediatricians. Three expert professionals in each field were recruited to constitute the team of 18 professionals.

Parents of Typically Developing Children

Parents of typically developing children aged 16-30 months were recruited from 20 registered nursery centers which were randomly selected from a total of 215 registered nursery centers in Taipei City (109) and New Taipei City (106). Given a simple random sample, the researcher made a list of all registered nursery centers, assigning each a number and then drawing 20 random numbers to be sampled. There were 100 parents of typically developing children participating in the survey of cultural appropriateness, reliability, and validity of the Chinese M-CHAT.

Parents of Children with Autism

A purposive sample of twenty parents of children with autism was recruited from the Development Center for Children with Autism, New Taipei City, Taiwan. As parents of typically developing children, parents of children with autism also participated in the survey of culture appropriateness, the reliability and the validity of the Chinese M-CHAT. Further information related to recruitment of these parents is described below.

Procedures

The first goal of this study was to examine the cultural appropriateness of the M-CHAT in Taiwan. The investigation was conducted with all 138 participants. Eighteen expert professionals were asked to provide input regarding the cultural appropriateness of the Chinese M-CHAT and provide rationales and comments on the expert survey. Furthermore, 120 expert parents evaluated the Chinese M-CHAT from their Taiwanese perspectives to identify if the items on the Chinese M-CHAT were culturally appropriate for use with toddlers in Taiwan. A space for the rationale for a “no” response and written comments were also provided on the expert survey questionnaire.

The second goal of this proposed study was to examine the reliability and validity of the Chinese M-CHAT version in Taiwan. In order to accomplish this goal, test-retest reliability, internal consistency reliability, criterion validity, and content validity analysis were conducted on the M-CHAT measure and the expert survey. The procedure to investigate the research questions is described in detail below. Table 1 displays the steps of the procedure followed in this study.

Table 1

Summary of Procedures

Step	Procedure
1.	Submit IRB application for approval
2.	Contact directors of nursery centers randomly selected in Taipei City and New Taipei City to elicit cooperation in study
3.	Distribute consent forms with questionnaire packet to parents of typically-developing children through #2 above
4.	Contact the director of the Development Center for Children with Autism to elicit cooperation in study
5.	Distribute consent forms with questionnaire packet to parents of children with autism at Development Center for Children with Autism
6.	Contact and distribute consent forms to professionals in Center of Team Evaluation for Children's Development of Mackay Memorial Hospital
7.	Distribute M-CHAT/demographic questionnaire/expert survey/SAS envelope (measures) to consenting parents ($n = 100 + 20$)
8.	Distribute demographic questionnaire, expert survey, and SAS envelope to consenting professionals ($n = 18$)
9.	Assign identification numbers to measures as they are received
10.	Once 100 measures are received from consenting parents of typically-developing children, randomly select 30 for retesting the M-CHAT in a two-three week period ($n = 30$)
11.	Conduct data analysis: <ul style="list-style-type: none"> Are the items on the translated Chinese M-CHAT instrument culturally appropriate for use with toddlers in Taiwan? <ul style="list-style-type: none"> Analyze closed-ended questions on the expert survey using measures of central tendency ($n = 100 + 20 + 18$) Evaluation of the rationales and comments on the expert survey ($n = 100 + 20 + 18$) Is the translated Chinese M-CHAT a reliable and valid instrument to identify the early signs of ASD for toddlers in Taiwan? <ul style="list-style-type: none"> Assess test-retest reliability of the translated Chinese M-CHAT ($n = 30$) Assess internal consistency of the translated Chinese M-CHAT ($n = 100 + 20$) Assess criterion validity of the translated Chinese M-CHAT ($n = 20$) Assess content validity of the expert survey ($n = 100 + 20 + 18$)

Institutional Review Board (IRB)

All data gathered from participant resources were collected with explicit permission by written informed consent from the participants and in full compliance with University of Northern Colorado Institutional Review Board (IRB) guidelines. The participants' responses remained confidential and are not to be released to anyone or kept in any other records. Only the researcher has access to view any data collected during this research. Data are reported in aggregate only and will not be connected with individual participants.

Recruiting Participants

Currently Taiwan comprises five special municipalities which represent one of first-level divisions in Taiwan. This study was conducted in two special municipalities in Taiwan, namely, Taipei City and New Taipei City. Taipei City is the capital of Taiwan, and it is the educational, economic, and cultural center of Taiwan as well, while New Taipei City is the most populous city of Taiwan. All children of both genders aged 16–30 months, whose parents reside in the two geographical areas during the study period, comprised the target population.

The nursery centers in Taipei City and New Taipei City served children under three years of age. According to the feedback of the directors in the registered nursery centers in Taipei City and New Taipei City, the number of typically developing 16-30 months aged children in each center ranged from 15 to 30. Concerning the consequences of invalid responses and questionnaire response rate, the researcher contacted 20 randomly selected settings of nursery centers until 100 valid survey responses from parents of typically developing children were collected. The researcher contacted the directors of each setting by phone to get permission for the investigation and provided

information with the letter of consent to give to parents of all enrolled children whose age fell between 16 and 30 months.

To recruit parents of children with autism, the researcher contacted the director of the Development Center for Children with Autism in New Taipei City via phone. Twenty parents of children with autism who registered with the development center were recruited.

As mentioned previously, a team of professionals comprised of 18 expert professionals in six types of fields (3 professionals in each field) related to child development participated. Special education teachers were recruited from registered nursery centers and the Development Center for Children with Autism in Taipei and New Taipei City. Child psychologists, language pathologists, occupational therapists, physical therapists, and pediatricians were recruited from Mackay Memorial Hospital in Taipei City. The leader of the team in the hospital was contacted by phone and gave permission for the researcher to contact each expert professional by email.

Distributing and Collecting Instruments

After obtaining permission from the directors of 20 registered nursery centers in Taipei City and New Taipei City, each setting was provided with consent letters (Appendix H) to give to parents of all enrolled children whose age fell between 16 to 30 months. The letter explained the purpose of the study and stated that participation was voluntary. With the consent letter, parents were given a questionnaire packet consisting of the demographic questionnaire (Appendix A), the expert survey (Appendix B), and the translated Chinese M-CHAT (Appendix C). In order to increase participation, a small handbook related to child development, early identification of developmental delay, and

the resources of early intervention was provided to each participant. Parents who agreed to participate returned their completed questionnaire packet to the nursery centers. When parents returned completed packets to the nursery centers, the directors collected these and held them for the researcher to pick up. After distributing the packets to parents, the completed questionnaires were returned back between three weeks and two months. A total of 315 questionnaire packets were distributed to parents whose children were enrolled in one of the 20 registered nursery centers; and the researcher stopped collecting data once 100 valid packets were returned.

As described above, the questionnaire packets for parents of children with autism were distributed to the Development Center for Children with Autism in New Taipei City. Initially, this study attempted to recruit parents of children with autism aged 16-30 months to investigate the criterion validity of the translated Chinese M-CHAT. However, due to the lack of screening and diagnostic instruments for Taiwanese infant and toddler with autism, children with autism in Taiwan were not diagnosed until aged 3. As a result of the current barriers to autism identification in Taiwan, questionnaire packets were provided to parents of children with autism aged between 3 to 5 years in the Development Center for Children with Autism. Meanwhile, the participant parents were informed to respond the translated Chinese M-CHAT by looking back at the period of time when their children were 16-30 months. In conclusion, twenty-five packets were distributed to participant parents and twenty packets were returned in three weeks. The return rate for parents of children with autism was 80%. The challenge and limitation of data collection for parents of children with autism will be discussed in Chapter IV.

The team of professionals who were experts in child development was provided a similar consent letter (Appendix I), a demographic questionnaire (Appendix A), the expert survey (Appendix B), and a translated Chinese M-CHAT (Appendix C) by email. One week after the researcher distributed the questionnaire packets to the professionals, the researcher sent out another email to thank them for their time and remind them to return the completed packets. A total of twenty expert professionals were contacted and eighteen completed the study surveys. The response rate for professionals was 90%. It took four weeks to collect all the valid questionnaire packets from the team of professionals.

In sum, of 360 questionnaire packets distributed to parents and professionals, 138 valid packets were returned. The overall response rate was 38%. Additionally, thirty participants randomly selected from parents of typically developing children received the same M-CHAT measure again in two to three weeks after the first completion and were requested to retake the measure. The second survey was directly sent to each selected participant by email which was provided in his/her previous consent letter. Thirty completed M-CHAT measures were received in six weeks. Based on participant parents' responses to the first and second survey, the test-retest reliability coefficients were computed. Table 2 on the next page shows how the research procedure was conducted and how the data analysis, measures, and sample corresponded to the research questions.

Table 2

Data Analysis Plan

Research Question	Instrument	Data Analysis	Sample
Are the items on the translated Chinese M-CHAT instrument culturally appropriate for use with toddlers in Taiwan?	Demographic Questionnaire	Quantitative analysis of the close ended questions.	All participants: Parents of typically developing children ($n = 100$); Parents of children with autism ($n = 20$); Team of professionals who are experts in child development ($n = 18$)
	Expert Survey	Qualitative evaluation of the rationales and comments for the open ended questions	
Is the translated Chinese M-CHAT a reliable and valid instrument for identifying the early signs of autistic spectrum disorder for toddlers in Taiwan?	M-CHAT measure	Test-retest reliability (Pearson's correlation coefficient)	Randomly selected from parents of typically developing children ($n = 30$)
	M-CHAT measure	Internal consistency reliability (Cronbach's alpha coefficient)	Parents of typically developing children ($n = 100$) and parents of children with autism ($n = 20$)
	M-CHAT measure	Criterion validity	Parents of children with autism ($n = 20$)
	Expert Survey	Content validity: Content validity ratio (CVR) equation Qualitative evaluation of expert professionals' comments for the open ended questions	All participants: Parents of typically developing children ($n = 100$); Parents of children with autism ($n = 20$); Team of professionals who are experts in child development ($n = 18$)

Data Analysis

Quantitative analyses were carried out using SPSS Version 20.0 (SPSS IBM, New York, USA). Descriptive statistics were used to present subject characteristics. Thus the quantitative analysis and subsequent results of the Chinese M-CHAT were based on a data set consisting of the team of 18 professionals, the 100 participating parents of typically developing children and the 20 parents of children diagnosed with autism. In addition, qualitative evaluation of the rationales and comments on the expert survey was also analyzed to indicate the rationale and comments regarding the translated Chinese M-CHAT items.

It should be noted that most of the items within the expert survey and the M-CHAT measure are positively worded questions (e.g., item 2 “Does your child take an interest in other children?”), but some are negatively worded questions (e.g., item 18 “Does your child make unusual finger movements near his/her face?”). To demonstrate fairly consistent agreements, reverse scoring for the negatively worded item (i.e., items 11, 18, 20, and 22) were implemented for data analysis.

Cultural Appropriateness of the Chinese M-CHAT version

Quantitative analysis and qualitative evaluation of the rationales and comments were used to examine the cultural appropriateness of the M-CHAT Chinese version through the expert survey, which all 138 expert parents and expert professionals were asked to complete. Participants were asked to identify inappropriate items on the expert survey that was developed based on the original 23 items of M-CHAT (Appendix D). Three dimensions were reviewed for each item, including (a) is the test item easily

understood, (b) is the test item culturally appropriate, and (c) is the test item developmentally appropriate for children between 16 to 30 months of age. Response choices based on the three dimensions were “yes” or “no”. Thus, the percent of agreement across all 23 items in each dimension was presented in quantitative method by statistical analysis. Qualitative evaluation was employed to perform the written rationales and the additional comments. The table 2 provides details for the plan for analysis.

Reliability and Validity of the Chinese M-CHAT Version

In the proposed study, test-retest reliability, internal consistency reliability, criterion validity and content validity analyses were conducted on the M-CHAT measure and the expert survey. The types of reliability and validity, as well as further information related to data collecting and analysis is described below.

Test-retest reliability. The first type of the reliability examined was test-retest reliability. Test-retest reliability is a measure of the consistency for tests and other instruments. This kind of reliability is used by administering a test twice at two different points in time (Teti, 2006). The correlation coefficient between such two sets of responses is often used as a quantitative measure of the test-retest reliability (Miller, 2006). Test-retest reliability of the translated M-CHAT was evaluated based on the responses of 30 participants who were randomly selected from the parents of typically developing children. Scores were calculated using the procedures described in the Instruction and Permission for the Use of the M-CHAT (Robins et al., 2001). Pearson’s correlation coefficient was calculated between the M-CHAT score of the first test and second test for each of the 23 items.

Internal consistency reliability. In addition to test-retest reliability, another important indicator of a reliable scale is internal consistency, which assesses the degree to which a scale's items measure the same phenomenon (Pedhazur & Schmelkin, 1991). The internal consistency reliability of the translated Chinese M-CHAT was computed on the responses of 100 parents of typically developing children and 20 parents of children with autism. Internal consistency was evaluated using the Cronbach's alpha coefficient for the total 23 items of the M-CHAT.

Criterion validity. Criterion validity addresses the issue of whether an instrument can be used to predict a relevant external outcome (Bryant, 2000). In order to investigate the ability of the Chinese M-CHAT to correctly identify children with autism, twenty parents of children with diagnosed autism were requested to complete the Chinese M-CHAT.

It should be noted that due to the lack of validated assessment tool for autism in Taiwan, a diagnostic procedure for autistic spectrum disorder is currently conducted by psychiatrists or pediatric neurologists based on the Diagnostic and Statistical Manual of Mental Disorders, 4th edition (DSM-IV-TR, American Psychiatric Association, 2000). In addition, an evaluation team (consisting of physicians, occupational therapists, psychologists, social workers, and special educators) is assigned to give a comprehensive evaluation. Although not an ideal method for establishing criterion validity, the diagnosis that results from this procedure is the only measure available in Taiwan at the present time.

The Instruction and Permission for the Use of the M-CHAT (Robins et al., 2001) indicated two cutoff criteria: (a) three or more of any 23 items failed, and (b) two or

more critical items (2, 7, 9, 13, 14, 15) failed. To analyze the content validity of the Chinese M-CHAT and the concordance between the diagnosis of ASD instruments obtained by DSM-IV-TR and the Chinese M-CHAT, the two cutoff criteria were used in this study.

Content validity. Content validity is a special type of face validity used to address the question of whether the full content of a definition is represented in a measure (Miller, 2006). For surveys and tests, each question is given to a panel of expert analysts and they give their opinion about whether the question is essential, useful or irrelevant to measuring the construct under study. Although content validity is qualitative in nature, the results can be statistically analyzed and the test modified to improve the rational validity (Neuman, 1997). In the proposed study, content validity data were examined by collecting information and suggestions from both expert parents and expert professionals. Content validity is established through a rationale or logical analysis (Pedhazur & Schmelkin, 1991). Therefore, qualitative evaluation of rationales and comments based on expert survey indicated the content validity of this study. In addition, Lawshe (1975) proposed the content validity ratio (CVR) equation to quantify the experts' degree of agreement on the content validity. The mean CVR across items was used as an indicator of overall test content validity.

Summary

The proposed study investigated the cultural appropriateness, reliability, and validity of the Chinese M-CHAT in Chinese for children between the ages of 16 months to 30 months in Taiwan. This study employed cross-sectional survey research with quantitative analysis and qualitative evaluation of rationales and comments. To

accomplish the goals of the study, the M-CHAT measure, expert survey and demographic questionnaire were analyzed.

The research participants were recruited from two special municipalities in Taiwan, Taipei city and New Taipei city. Three hundred and sixty questionnaires were distributed to the parents of typically developing children between the ages of 16-30 months. A valid sample size of 100 parents with children with typical development and 20 parents of children with autism was embraced in this study. Meanwhile, a team of 18 professionals who were experts in child development was asked to verify cultural appropriateness and content validity of the M-CHAT.

Data collection occurred after permission was granted by the UNC Institutional Review Board, and after consent letters were executed. The data collection was performed according to guidelines established by the Instruction and Permission for the Use of the M-CHAT (Robins et al., 2001). Quantitative analysis on the Chinese M-CHAT version indicated the test-retest reliability, internal consistency reliability, and criterion validity. Cultural appropriateness and content validity were examined through both quantitative analysis of the closed ended questions and evaluation of the rationales and comments on expert survey. Chapter IV describes the results of the analysis.

CHAPTER IV

RESULTS

The results of this study are structured along the two research questions: (1) Are the items on the translated Chinese M-CHAT instrument culturally appropriate for use with toddlers in Taiwan? (2) Is the translated Chinese M-CHAT a reliable and valid instrument for use to identify the early signs of autistic spectrum disorder for toddlers in Taiwan? To provide the answers to the two questions, the results of data analysis focused on four aspects: (a) sample demographic characteristics; (b) cultural appropriateness of the translated Chinese M-CHAT; (c) reliability of the translated Chinese M-CHAT; and (d) validity of the translated Chinese M-CHAT.

Three hundred and sixty questionnaires were distributed for this investigation and 138 valid questionnaires were returned, which represented 38% response rate. The sample was made up of three groups: (a) professionals who were experts in child development ($n = 18$); (b) parents of typically developing children ($n = 100$); and (c) parents of children with autism ($n = 20$). Descriptive statistics were used to identify subject characteristics. Quantitative analysis and qualitative evaluation of the rationales and comments were used to investigate the cultural appropriateness, reliability, and validity of the translated Chinese M-CHAT measure.

Sample Demographics

The demographic questionnaires were completed by 120 participating parents and 18 professionals. Background information included age, gender, religion, education, and occupation. Information about children were also requested in the demographic questionnaire for participating parents, such as the category of primary care provider, general health condition, and concerns about emotional or behavioral problems.

Child Characteristics

Table 3 shares demographic characteristics information of 120 Taiwanese children aged 16 to 30 months, including 100 typically developing children and the 20 children with ASD.

According to the data on child's gender, the ratio of boys to girls in the population of children with ASD was 4:1 (16 boys and 4 girls). The result showed good correspondence with the report of the Center for Disease Control and Prevention that autism prevalence remains 4 times more likely in boys than girls (CDC, 2010). The majority of typically developing children ($n = 79$, 79%) were from Taipei City; however, all children with ASD ($n = 20$, 100%) were recruited from the Development Center for Children with Autism, New Taipei City. Min Nan descent (commonly known as Taiwanese) is the major ethnic group in Taiwan. Among the 20 children with ASD, most children in the present study ($n = 14$, 70%) were of Min Nan descent, while 5% ($n = 1$) of children were born in Mainland China, 5% ($n = 1$) were of Hakka descent (Han Chinese migrants from north to south China), and 10% ($n = 2$) were New Inhabitants (Taiwanese men married to women who originated from different provinces in China).

Currently, there is no study investigating associations among ethnic groups in Taiwan and prevalence of autistic spectrum disorder. The high rate of ASD in children of Min Nan descent (70%, 14 out of 20 children with ASD) may be more relevant, as it represents the largest ethnic group in Taiwan. Mothers were identified as the primary care providers for both typically developing children ($n = 52$, 52%) and children with ASD ($n = 13$, 65%). Ninety-five percent ($n = 19$) of parents of children with ASD agreed that their child with ASD had emotional and behavioral problems and most of the children with ASD ($n = 18$, 90%) demonstrated significant developmental problems.

Table 3

Demographic Characteristics of Children

Characteristic	Typical (n = 100, %)	ASD (n = 20, %)
Gender		
Male	55 (55.0)	16 (80.0)
Female	45 (45.0)	4 (20.0)
Location		
Taipei City	79 (79.0)	0 (0.0)
New Taipei City	21 (21.0)	20 (100.0)
Ethnicity		
Min Nan	69 (69.0)	14 (70.0)
Hakka	9 (9.0)	1 (5.0)
Mainland China	14 (14.0)	1 (5.0)
New inhabitants	3 (3.0)	2 (10.0)
Aboriginals	0 (0.0)	0 (0.0)
Other	2 (2.0)	0 (0.0)
Primary care provider		
Mother	52 (52.0)	13 (65.0)
Father	2 (2.0)	3 (15.0)
Grandparent	0 (0.0)	1 (5.0)
Nanny	1 (1.0)	1 (5.0)
Mother and father	40 (40.0)	2 (10.0)
Other	4 (4.0)	0 (0.0)
Emotional/behavioral problem		
Yes	12 (12.0)	19 (95.0)
No	86 (86.0)	1 (5.0)
Health		
Poor	2 (2.0)	1 (5.0)
Fair	39 (39.0)	12 (60.0)
Good	49 (49.0)	7 (35.0)
Very good	8 (8.0)	0 (0.0)
Development		
Poor	0 (0.0)	18 (90.0)
Fair	15 (15.0)	2 (10.0)
Good	64 (64.0)	0 (0.0)
Very good	19 (19.0)	0 (0.0)

Parent Characteristics

In the present study, parents of typically developing children ($n = 100$) were recruited from 20 randomly selected nursery centers in Taipei City and New Taipei City. Parents of children with autism ($n = 20$) were recruited from the Development Center for Children with Autism, New Taipei City. As mentioned in Chapter III, both Taipei City and New Taipei City are special municipalities (a municipality directly under the Central Government) in Taiwan. The population in the two cities shares similar educational, economic, and medical systems of the Central Government. Thus, demographic characteristics of the 100 parents of typically developing children and the 20 parents of children with ASD were combined into a sample of 120 Taiwanese expert parents and analyzed based on the total sample.

As presented in Table 4, of the 120 parents responding to the demographic questionnaire, the majority of respondents were mothers ($n = 106$, 87.5%). Most parents' ages ranged from 35 to 45 years ($n = 69$, 57.5%) and over one third of parents ($n = 45$, 37.5%) held graduate-level degrees. Regarding employment status, almost ninety-three percent ($n = 13$) of fathers were employed, while seventy four percent ($n = 78$) of mothers held full-time or part-time jobs. One-fifth of parents ($n = 24$) were homemakers. Family monthly income indicated that nearly half of parents ($n = 56$, 46.7%) earned over \$100,000 NTD; nevertheless, 15.8% of parents ($n = 19$) earned less than \$50,000 NTD.

Table 4

Demographic Characteristics of Parents

Characteristic	n	Percent (n = 120)
Gender		
Male	14	11.7
Female	106	87.5
Age group		
25-29 years	1	0.8
30-34 years	48	40.0
>35 years	69	57.5
Education		
High school	15	12.5
Bachelor's	57	47.5
Master's	39	32.5
PhD	6	5.0
Occupation		
Agriculture/fishery/poultry	1	0.8
Labor	8	6.7
Business	37	30.8
Medical service	3	2.5
Military	3	2.5
Government	9	7.5
Educational service	12	10.0
Housemaker	24	20.0
Other	17	14.2
Family monthly income (NTD)		
Below \$20,000	1	0.8
\$20,001-\$30,000	0	0.0
\$30,001-\$50,000	18	15.0
\$50,001-\$100,000	39	32.5
\$100,001-\$150,000	44	36.7
\$150,001-\$200,000	4	3.3
Above \$200,000	8	6.7

Professional Characteristics

As shown in the previous chapter, the 18 professional experts comprised 3 special education teachers/professors, 3 child psychologists, 3 language pathologists, 3 occupational therapists, 3 physical therapists, and 3 pediatricians. Of the 18 professionals, there were 4 males and 14 females. Half of the professionals ($n=9$, 50%) had over 10 years of experience. Six professionals (33.3%) reported five to nine years of professional experiences, and the other three (16.7%) had two to five years of professional experiences (see Table 5).

Table 5

Demographic Characteristics of Professionals

Characteristic	n	Percent (n = 18)
Gender		
Male	4	22.0
Female	14	28.0
Age group		
25-29 years	3	16.7
30-34 years	3	16.7
>35 years	12	66.7
Education		
Bachelor's	11	61.1
Master's	7	38.9
Years of experience		
2-3	2	11.1
4-5	1	5.6
5-9	6	33.3
Above 10	9	50.0

Cultural Appropriateness of the Translated Chinese M-CHAT

The first goal of this study was to examine the cultural appropriateness of the translated Chinese M-CHAT as an autistic spectrum disorder screening instrument for children between the ages of 16 months to 30 months in Taiwan. To obtain initial information on the cultural appropriateness of the translated Chinese M-CHAT in Taiwan, the researcher analyzed quantitative and qualitative data from all participants ($n=138$), who were all of Taiwanese background, including 100 parents of typically developing children, 20 parents of children with autism, and 18 professionals. Participants were asked to identify any inappropriate item on the expert survey based on the original 23 items of M-CHAT. Three dimensions were reviewed for each item, including (a) is the test item easily understood, (b) is the test item culturally appropriate, and (c) is the test item developmentally appropriate for children between 16 to 30 months of age. Data analysis was performed in two ways in this study; that is, quantitative analysis of the closed ended questions and qualitative evaluation of the rationales and comments.

Quantitative Analysis of the Closed Ended Questions

In the expert survey, each item based on the three dimensions mentioned previously was offered as yes/no questions. Each question included spaces for written comments regarding the rationale for a “no” response and additional suggestions to make sure that the quantitative data and different perspectives of rationales and comments were collected entirely. The percent of agreement for each item of the translated Chinese M-CHAT on three dimensions is presented in Table 6.

For each dimension, the results showed moderate to strong levels of agreement across all items, that is, 72.5% to 99.3% agreement for dimension I; 77.5% to 96.4% for dimension II; and 76.1% to 97.1% for dimension III. Generally, it indicated that the translated Chinese M-CHAT test items were easily understood, culturally appropriate, and developmentally appropriate as well. It should be noted that within the three dimensions, the lowest percent of agreement across all the 23 items was item 18 “Does your child make unusual finger movements near his/her face?” The percentage of agreement in each dimension for item 18 was 72.5%, 77.5%, and 76.1% respectively. The result may be negatively affected by the unclear definition of the term “unusual finger movements.” Some issues regarding item 18 will be discussed in the next chapter. Further analysis regarding participants’ negative responses is discussed below in the qualitative evaluation of the rationales and comments section. Overall, the percent of agreement across all the items in this test was above eighty percent except for item 18, which demonstrates that the translated Chinese M-CHAT is culturally appropriate for use with infants and toddlers in Taiwan.

Table 6

Percent of Agreement for Each Item of the Translated Chinese M-CHAT on Three Dimensions (n = 138)

Item #	Item	Dimension I: Easily Understood (%)	Dimension II: Culturally Appropriate (%)	Dimension III: Developmentally Appropriate (%)
1	Enjoys being swung	99.3	94.9	93.5
2	Interest in other children	90.6	94.9	94.2
3	Climbs up stairs	96.4	93.5	93.5
4	Enjoys peek-a-boo	96.4	94.2	94.2
5	Pretend play	96.4	93.5	94.2
6	Imperative pointing	98.6	94.9	94.9
7	Declarative pointing	97.8	95.7	94.9
8	Functional play	95.7	94.2	93.5
9	Brings objects to show	97.8	95.7	94.9
10	Eye contact	98.6	96.4	94.9
11	Oversensitive to noise	84.8	87.7	88.4
12	Responds to smile	98.6	94.9	97.1
13	Imitation of action	97.1	94.2	95.7
14	Responds to name	97.1	94.9	97.1
15	Point-following	98.6	94.2	94.9
16	Walking	97.1	94.9	94.2
17	Gaze-following	97.1	94.2	94.9
18	Unusual finger movement	72.5	77.5	76.1
19	Gaining parent's attention	94.6	94.9	97.1
20	Wondering hearing	79.0	87.7	86.2
21	Understands what is said	97.8	93.5	94.2
22	Stares at nothing	83.3	88.4	84.8
23	Social reference	94.2	94.2	95.7

Besides the use of quantitative analysis of the closed ended questions to evaluate cultural appropriateness of the translated Chinese M-CHAT, the Content Validity Ratio (CVR; Lawshe, 1975) is another statistical method to achieve the goal. To calculate it, the data were entered into this equation: $CVR = (ne - N/2)/(N/2)$ (ne = number of essential ratings, N = number of raters). As a result, the CVR value across all three dimensions of the 23 translated Chinese M-CHAT items was 0.94, which indicated a high content validity. In other words, the responses of the 138 experts demonstrated that the test item was easily understood, culturally appropriate, and developmentally appropriate for children between 16 to 30 months of age. Further information and data results regarding CVR are presented in a later section of this chapter.

Qualitative Evaluation of the Rationales and Comments

Of the 18 professionals and 120 parents who answered the question about cultural appropriateness on the expert survey, 15 expert professionals and 23 expert parents provided written comments. Most of their disagreement was directed at items 2, 8, 11, and 18. Other minor modifications were also indicated to make the items more culturally appropriate. Rationales and comments are presented below. The expert professionals' comments regarding content validity are presented in the validity section.

In question 2 “Does your child take an interest in other children?” three parents and four professionals proposed a question: What does it mean by “take an interest in other children?” For question 8, “Can your child play properly with small toys (e.g., cars or bricks) without just mouthing, fiddling, or dropping them?” two parents and one professional asked: What does it mean to “play properly”? As to question 11, “Does your

child ever seem oversensitive to noise (e.g., plugging ears)?” three parents and one professional made comments: What does "oversensitive" mean? Regarding question 18, “Does your child make unusual finger movements near his/her face?” fifteen parents and five professionals questioned the meaning of "unusual finger movements.” These questions suggested that some specific terms should be more precisely defined or identified more clearly in the test. Moreover, additional examples may help parents understand and make their judgment correctly when using the test as a screening tool.

Other minor modifications were suggested to items 3, 6, and 16 according to the expert responses. In question 3: “Does your child like climbing on things, such as up stairs?” "Climbing on things" should be replaced by “climbing up and down" as it is more frequently used in spoken Chinese in Taiwan. In question 6, “Does your child ever use his/her index finger to point, to ask for something?” to avoid the restriction of the question, respondents suggested using the word "hands" or “fingers" instead of “index finger." In addition, "Does your child ever. . ." should be replaced by "Can your child. . ." to make it more colloquial. Regarding question 16, “Does your child walk?” experts suggested changing to “Does your child walk on his/her own?” or “Does your child walk by holding?” to make it more specific. Besides, for the third dimension (“the test item is developmentally appropriate for children between 16 to 30 months of age”), four parents considered that question 2, 5, 7, and 12 - 19 (refer to Table 6 for the items) may be demonstrated by children under 16 months of age, or even younger than 12 months. Other than above mentioned concerns, all other participants agreed that the translated Chinese M-CHAT was culturally appropriate for Taiwanese infants and toddlers. Further concerns regarding the cultural appropriateness will be discussed in Chapter V.

Reliability of the Translated Chinese M-CHAT

The second goal of this study was to investigate the reliability and validity of the translated Chinese M-CHAT for screening children between the ages of 16 months to 30 months in Taiwan. Test-retest reliability, internal consistency, criterion validity, and content validity were evaluated using data obtained from a Taiwanese sample which included 100 parents of typically developing children, 20 parents of children with autism, and 18 professionals who were experts in child development. Two aspects of reliability were evaluated in this study: test-retest reliability and internal consistency reliability. Test-retest reliability was determined by Pearson's correlation coefficient (r). Pearson's correlation coefficient was calculated between the M-CHAT score for each of the 23 items between the first test and the second test. Internal consistency reliability was evaluated using Cronbach's alpha coefficient (α) for the total 23 items of the M-CHAT.

Test-retest Reliability

Thirty parents of typically developing children were randomly selected to complete the Chinese M-CHAT a second time to evaluate the test-retest reliability using Pearson's correlation coefficients. The value of Pearson's correlation coefficient lies between -1 to +1. The criteria are as follows (Evans, 1996): Between 0.8 and 1 indicates very strong relationship; between 0.6 and 0.8 indicates strong; between 0.4 and 0.6 indicates moderate relationship; between 0.2 and 0.4 indicates weak; less than 0.2 indicates very weak relationship.

In this study, the minimum test-retest interval was 21 days, and the maximum was 36 days. The mean time interval between the two tests on each individual was 27.8 days (SD= 5.3 days). Pearson's correlation coefficients were calculated to examine the

consistency from time 1 to time 2 on the translated Chinese M-CHAT for the 23 items.

The correlations for each item between test and retest of the M-CHAT measure ranged from 0.72 to 0.97 (mean = 0.86), respectively. All test-retest coefficients were significant at $p < 0.01$ (bilateral). Overall, the Pearson's correlation coefficients for all 23 items ranged between strong and very strong and are presented in Table 7. The results indicate that there was a high test-retest reliability of the translated Chinese M-CHAT.

Table 7

Test-retest Reliability of Translated Chinese M-CHAT Calculated on Each Item by Pearson's Correlation Coefficient (r) (Total Items: $r = 0.86$)

Item #	M-CHAT Item	r (n = 30)
1	Enjoys being swung	0.72**
2	Interest in other children	0.78**
3	Climbs up stairs	0.96**
4	Enjoys peek-a-boo	0.80**
5	Pretend play	0.82**
6	Imperative pointing	0.94**
7	Declarative pointing	0.96**
8	Functional play	0.81**
9	Brings objects to show	0.97**
10	Eye contact	0.90**
11	Oversensitive to noise	0.88**
12	Responds to smile	0.86**
13	Imitation of action	0.86**
14	Responds to name	0.95**
15	Point-following	0.97**
16	Walking	0.75**
17	Gaze-following	0.74**
18	Unusual finger movement	0.84**
19	Gaining parent's attention	0.80**
20	Wondering hearing	0.94**
21	Understands what is said	0.89**
22	Stares at nothing	0.80**
23	Social reference	0.76**

Note. ** $p < 0.01$ (bilateral).

Internal Consistency Reliability

Further analyses were conducted to determine the internal consistency for the translated Chinese M-CHAT which was computed on the responses of 100 parents of typically developing children and 20 parents of children with autism. The total 23 items of the M-CHAT were evaluated using the Cronbach's alpha coefficient (α) for internal consistency reliability. Nunnally and Bernstein (1994) indicated that a reliability of 0.70 or higher is acceptable for instruments used in research.

This study found that the Cronbach's alpha statistic calculated for the M-CHAT measure when completed by 120 Taiwanese parents was 0.78 for the whole scale, indicating satisfactory internal consistency. However, alpha coefficients if item deleted indicated that deletion of some items may slightly improve the internal consistency. Specifically, the alpha coefficients exceeded 0.8 after deleting item 11 “Does your child ever seem oversensitive to noise? (e.g., plugging ears)” ($\alpha=0.81$), item 18 “Does your child make unusual finger movements near his/her face?” ($\alpha=0.81$), and item 22 “Does your child sometimes stare at nothing or wander with no purpose?” ($\alpha=0.82$). Internal consistency reliability calculated on each item by Cronbach's alpha coefficient (α) if item deleted are presented in Table 8.

Table 8

Internal Consistency Reliability of Translated Chinese M-CHAT Calculated on Each Item by Cronbach's Alpha Coefficient (α) if Item Deleted (Total Items: $\alpha = 0.78$)

Item #	M-CHAT Item	Cronbach's Alpha (α) if Item Deleted ($n = 120$)
1	Enjoys being swung	0.78
2	Interest in other children	0.76
3	Climbs up stairs	0.77
4	Enjoys peek-a-boo	0.76
5	Pretend play	0.76
6	Imperative pointing	0.76
7	Declarative pointing	0.75
8	Functional play	0.76
9	Brings objects to show	0.76
10	Eye contact	0.76
11	Oversensitive to noise	0.81
12	Responds to smile	0.75
13	Imitation of action	0.74
14	Responds to name	0.75
15	Point following	0.75
16	Walking	0.78
17	Gaze-following	0.75
18	Unusual finger movement	0.81
19	Gaining parent's attention	0.75
20	Wondering hearing	0.80
21	Understands what is said	0.75
22	Stares at nothing	0.82
23	Social reference	0.75

Validity of the Translated Chinese M-CHAT

After the reliability of the translated Chinese M-CHAT was examined, two aspects of validity were evaluated: criterion validity and content validity. Criterion validity was evaluated using data obtained from 20 parents of children with autism and determined based on the criteria of the original M-CHAT measure and the criteria of DSM-IV for children with autistic spectrum disorders. Content validity was evaluated using data obtained from all participants, including 100 expert parents of typically developing children, 20 expert parents of children with autism, and 18 expert professionals. The result of content validity was determined by both quantitative analysis with the content validity ratio (CVR) and qualitative evaluation of the expert professionals' comments from the expert survey.

Criterion Validity

As mentioned in Chapter II, due to the lack of valid assessment tools for autism in Taiwan, a diagnostic procedure for ASD is currently conducted by pediatric psychiatrists and an evaluation team (consisting of occupational therapists, psychologists, social workers, and special educators) based on DSM-IV criteria. To analyze the concordance between the diagnosis of ASD based on DSM-IV and the Chinese M-CHAT, two cutoff criteria in the Instruction and Permission for the Use of the M-CHAT (Robins et al., 2001) were used: (a) three or more of any 23 items failed, and (b) two or more critical items (2, 7, 9, 13, 14, 15) failed.

The M-CHAT scores of 20 Taiwanese children aged 16-30 months with a diagnosis of ASD were examined to assess the ability of the Chinese M-CHAT to identify children with ASD. As suggested in the Instruction and Permission for the Use of

the M-CHAT, “three or more of any 23 items failed” was one of the principal cutoff points for identification of possible ASD. Using this cutoff point in the present study, all 20 children with a diagnosis of ASD were correctly identified. In other words, all these children demonstrated significant association with ASD in many areas of functioning as rated by the translated Chinese M-CHAT. This would suggest a high degree of criterion validity in the translated Chinese M-CHAT. According to the test results completed by these children’s parents, the numbers of failed items for each child are shown in Table 9. Two cutoff criteria, criterion I and criterion II, are separately demonstrated in the following figures. For criterion I (see Figure 2), the number of failed items for each child is above criterion I, which means that all 20 children have three or more of any 23 items failed. For criterion II (see Figure 3), 5 children’s failed items are below criterion II, which means that 5 children have less than two critical items (2, 7, 9, 13, 14, 15) failed.

Table 9

Numbers of Failed Items in Chinese M-CHAT Based on the Two Cutoff Criteria

Child ID (n = 20)	Criterion I Number of Items Failed (Any 3 Items Failed)	Criterion II Number of Items Failed (2 of Items 2, 7, 9, 13, 14, 15)
1	10	2
2	8	4
3	5	1
4	10	5
5	13	4
6	9	1
7	14	6
8	8	2
9	12	4
10	4	0
11	11	5
12	14	6
13	8	2
14	5	0
15	12	2
16	12	3
17	3	0
18	12	3
19	4	2
20	8	4

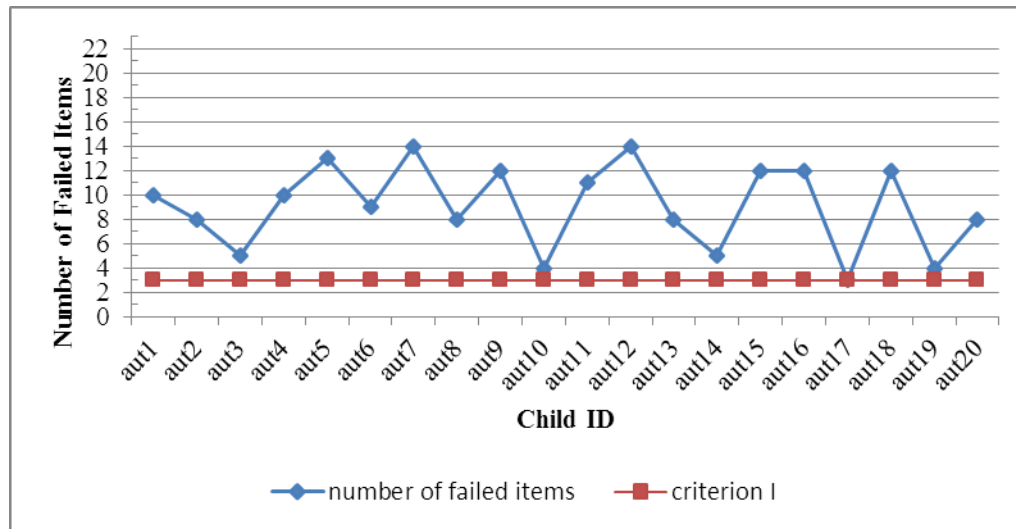


Figure 2. Comparison of criterion I and the number of failed items for each child on the Translated Chinese M-CHAT ($n=20$).

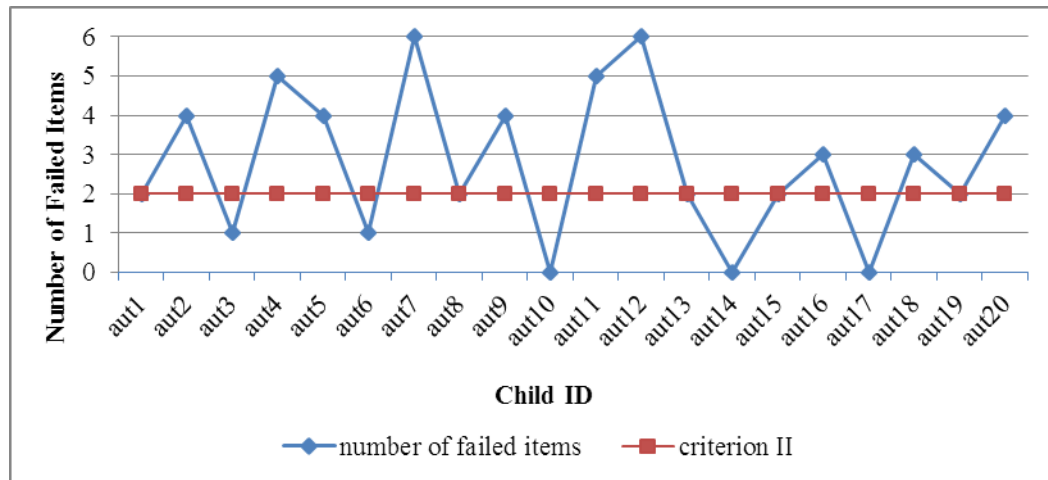


Figure 3. Comparison of criterion II and the number of failed items for each child on the Translated Chinese M-CHAT ($n=20$).

Content Validity

Content validity addresses the match between test questions and the content they are intended to assess. In other words, content validity refers to the correspondence between test items and the content being covered. In this study, both statistical analysis and qualitative evaluation of expert professionals' comments were applied to address the content validity of the translated Chinese M-CHAT. First, the content validity ratio

(CVR) equation was used to quantify the experts' degree of agreement on the content validity. Second, the qualitative evaluation of expert professionals' comments further explicated the content validity of this study.

Content validity ratio (CVR). Lawshe (1975) provided a quantitative equation for assessing content validity for individual test items. To calculate it, expert panelists independently judged each item as measuring content that was essential, useful, or not necessary. According to Lawshe, if more than half the panelists indicate that an item is essential, that item has some content validity. Items with low or negative CVRs can be deleted. Based on the assumptions, Lawshe developed an equation termed the content validity ratio:

$$\text{CVR} = (\text{ne} - N/2)/(N/2)$$

in which CVR = content validity ratio, ne = number of expert panelists indicating "essential," N = total number of expert panelists. The CVR values range from +1 to -1; positive values indicate that at least half the experts rated the item as essential (CVR > 0.49). The mean CVR across items may be used as an indicator of overall test content validity. In this study, content validity was evaluated using data obtained from all 138 participants who completed the expert survey. The CVR for each item of the translated Chinese M-CHAT on three dimensions ranged from 0.69 to 1. The mean CVR value of the 23 translated Chinese M-CHAT items was 0.94, which indicated a high content validity. The CVR for each item of the translated Chinese M-CHAT on three dimensions is shown in Table 10. The range and mean of CVR values on three dimensions of the expert survey are indicated in Table 11.

Table 10

Content validity ratio (CVR) for each item of the translated Chinese M-CHAT on three dimensions (n = 138)

Item #	M-CHAT Item	Dimension I: Easily Understand (%)	Dimension II: Culturally Appropriate (%)	Dimension III: Developmentally Appropriate (%)
1	Enjoys being swung	0.99	0.97	0.98
2	Interest in other children	0.82	0.97	0.97
3	Climbs up stairs	0.96	0.94	0.95
4	Enjoys peek-a-boo	0.94	0.98	0.97
5	Pretend play	0.94	0.94	0.97
6	Imperative pointing	0.99	0.98	0.98
7	Declarative pointing	0.99	0.98	0.98
8	Functional play	0.94	0.98	0.97
9	Brings objects to show	0.97	0.98	0.98
10	Eye contact	0.99	1.00	0.98
11	Oversensitive to noise	0.72	0.92	0.89
12	Responds to smile	0.97	1.00	1.00
13	Imitation of action	0.94	0.98	0.97
14	Responds to name	0.97	1.00	1.00
15	Point following	0.99	0.98	0.96
16	Walking	0.97	1.00	0.94
17	Gaze-following	0.96	0.98	0.96
18	Unusual finger movement	0.69	0.84	0.74
19	Gaining parent's attention	0.93	1.00	1.00
20	Wondering hearing	0.85	0.92	0.83
21	Understands what is said	0.96	0.97	0.94
22	Stares at nothing	0.82	0.89	0.80
23	Social reference	0.88	0.98	0.97

Table 11

CVR Value on Three Dimensions in Expert Survey (n = 138)

Dimension(s)	CVR Range	Mean CVR
Dimension I: The test item is easily understood	0.69-0.99	0.92
Dimension II: The test item is culturally appropriate	0.84-1	0.97
Dimension III: The test item is developmentally appropriate for young children	0.74-1	0.95
Across all three dimensions	0.69-1	0.94

Qualitative evaluation of the expert professionals' comments to establish content validity. After calculating the CVR, the comments from expert professionals were evaluated for content validity. As discussed previously with the results of the cultural appropriateness of the translated Chinese M-CHAT, the qualitative evaluation of the rationales and comments for all one hundred and thirty-eight expert parents and expert professionals indicates that some modification for the meaning of words in specific items may be necessary in order to overcome several cultural differences for parents in Taiwan. The expert professionals revealed some information and suggestions for these modifications.

The eighteen professionals who were experts in child development were asked to provide input if they disagreed on any of the items. Concerning the content validity for the translated Chinese M-CHAT, two themes emerged from the expert professionals'

comments: (a) additional examples were required for some test items, and (b) language modification of some items was needed to increase cultural appropriateness.

Additional examples required for some test items. Some items required an additional example to make the questions more precise and understandable. In addition, some of the included examples needed to be modified to conform to current use in the population. At the professionals' suggestions, the following changes should be made:

Question 2, "Does your child take an interest in other children?" did not have a clear meaning to 3 expert professionals. They suggested that an example should be added after the sentence to make the question more precise. The recommended replacement question should be "Does your child take an interest in other children, such as watching other children play?"

In question 3, "Does your child like climbing on things, such as up stairs?" One of the expert professionals suggested that the item be changed, as he claimed that the majority of people in Taiwan lived in apartments or large buildings. It was replaced by "Does your child like climbing on things, such as sofas or chairs?"

Three professionals also suggested that in question 8, "Can your child play properly with small toys (e.g., cars or bricks) without just mouthing, fiddling, or dropping them?" the word "bricks" should be replaced by "blocks," because in Chinese brick is a type of construction material, and not a toy. They also suggested replacing "e.g., cars or bricks" by "e.g., sliding cars or stacking blocks" as it represented more faithfully how children usually play.

For question 18, "Does your child make unusual finger movements near his/her face?" five experts felt the term "unusual finger movements" was not clearly defined. To

make it easier to understand, the experts felt that examples should be attached to the item. The item should be changed to “Does your child make unusual finger movements near his/her face, such as flipping the fingers repetitively in front of the eyes?”

Modifications of items for cultural appropriateness. The professional experts suggested that some terms in specific items should be replaced in order to make the questions more objective and culturally appropriate. In question 1, “Does your child enjoy being swung, bounced on your knee, etc.?” 2 expert professionals indicated that the term “knee” should be replaced by “leg” as it is more used in the population. As to question 6, “Does your child ever use his/her index finger to point, to ask for something?” and question 7, “Does your child ever use his/her index finger to point, to indicate interest in something?” it was proposed by 4 professionals that the term “index finger” should be replaced by “finger” only to avoid the restriction of its real meaning. Three expert professionals made comments on question 16, “Does your child walk?” might be revised as “Does your child walk on his/her own or by holding something?” to make it more specific.

In general, the 18 professionals who were experts in child development suggested that there were some concerns regarding the content appropriateness of the test items. Despite these issues, there was overall agreement about the content validity of the translated Chinese M-CHAT for Taiwanese children. A summary of the suggested modifications of items is listed in Table 12 in the next chapter, along with a discussion of how these suggested changes relate to the most recent revision M-CHAT-R.

Summary

The results of procedures designed to examine the cultural appropriateness, reliability, and validity of the translated Chinese M-CHAT for use with toddlers in Taiwan were encouraging. The analyses showed significant and positive findings in both quantitative analysis and qualitative evaluation of rationales and comments. A total of 138 participants including 100 expert parents of typically developing children, 20 expert parents of children with autism, and 18 expert professionals completed the expert survey which was developed from the M-CHAT. The percent of agreement on all items (except item 18) was above 80%, which demonstrated good evidence of cultural appropriateness for the translated M-CHAT. However, some modification for the meaning of words in specific items may be necessary to overcome cultural differences for parents in Taiwan.

The Pearson's correlation coefficients for each item between test and retest of the translated Chinese M-CHAT ranged from 0.72 to 0.97, which suggested high test-retest reliability of the translated Chinese M-CHAT. Internal consistency reliability calculated on each item by Cronbach's alpha coefficient was 0.78 for the whole scale, indicating satisfactory internal consistency.

To analyze criterion validity using the same criteria as the original M-CHAT measure, all 20 children who had been diagnosed with autism by a team of professionals using DSM-IV criteria demonstrated significant association with ASD in many areas of functioning as rated by the translated Chinese M-CHAT. The mean content validity ratio (CVR) value of 0.94 showed high expert agreement on content validity. In addition, the qualitative evaluation of the expert professionals' comments suggested that additional examples are required for some test items, and modifications for cultural appropriateness

may help to obtain a higher degree of content validity.

In general, the present results suggested that the translated Chinese M-CHAT has high reliability and validity and is culturally appropriate for use with infants and toddlers in Taiwan.

CHAPTER V

DISCUSSION AND CONCLUSION

This study investigated the cultural appropriateness, reliability, and validity of the translated Chinese M-CHAT as an early detection of autistic spectrum disorder screening tool for young children in Taiwan. The researcher collected and analyzed quantitative and qualitative data from professionals who were experts in child development, parents of typically developing children, and parents of children with autism. The results, based on 138 valid questionnaires, found that the translated Chinese M-CHAT showed cultural appropriateness and adequate reliability and validity when used with a sample of 16 to 30 months old young children in Taiwan. However, while the quantitative analysis demonstrated high test-retest reliability (ranging from 0.72 to 0.97) and internal consistency (0.78) of the translated Chinese M-CHAT, the qualitative evaluation of the rationales and comments indicated that some modification in specific items may be necessary to overcome cultural differences for parents in Taiwan. Furthermore, additional examples may help parents to better understand and make more accurate judgments when using the test as a screening tool. The following discussion reveals further concerns and recommendations regarding the cultural appropriateness of the translated Chinese M-CHAT, its reliability and validity, the study limitations, implications for future research, and conclusion.

Cultural Appropriateness of the Translated Chinese M-CHAT

The M-CHAT was translated into Chinese by Dr. Wong and his colleagues in 2004 to examine the effectiveness of CHAT-23, integrating the CHAT and the M-CHAT, in Hong Kong, China (Wong et al., 2004). Although people in Taiwan and Hong Kong use the same traditional Chinese characters, the medical screening system and educational policy in Taiwan is different from that in Hong Kong. As mentioned in a cross-country study of the Arabian M-CHAT version (Eldin et al., 2008), although different countries share the same language and religion, they have a diversity of cultural, ethnic, political and social structure. However, the results of an examination of the cultural appropriateness of the translated Chinese M-CHAT examined by 138 Taiwanese expert parents and expert professionals in this study supported previous research findings (Albores-Gallo et al., 2012; Inada et al., 2011) that detecting the early signs of ASD with the M-CHAT are not culturally dependent. In other words, based on the perceptions of Taiwanese experts in this study, the translated Chinese M-CHAT test items are easily understood, culturally appropriate, and developmentally appropriate.

To obtain a representative sample, participants in this study were recruited from Taipei City and New Taipei City, two of five first-level divisions in Taiwan. In general, both cities are located in the north of Taiwan and shared similar urban resources within the medical, educational, and economic system. The population of Taipei City and New Taipei City, both include persons of Min Nan descent, Mainland, Hakka descent, and New Inhabitants, used the same traditional Chinese characters and official Chinese language (Mandarin Chinese; Taiwan Ministry of the Interior, 2011). Based on this, the

data information forms completed by parents of children in Taipei City and New Taipei City were combined for purposes of this study.

In the present study, the cultural appropriateness of the translated Chinese M-CHAT was examined through quantitative analysis of the closed ended questions and qualitative evaluation of the rationales and comments. One hundred and thirty eight participants were asked to provide feedback on the expert survey in three dimensions: (a) was the test item easily understood, (b) was the test item culturally appropriate, and (c) was the test item developmentally appropriate for children between 16 and 30 months of age. The percent of agreement across the three dimensions ranged from 72.5% (item 18 “Does your child make unusual finger movements near his/her face?”) to 99.3% (item 1 “Does your child enjoy being swung, bounced on your knee, etc.?”). The lowest percentage of agreement in each dimension was item 18, indicating 72.5% (easily understood), 77.5% (culturally appropriate), and 76.1% (developmentally appropriate). It may relate to the issue revealed in the qualitative analysis of the rationales and comments, where 15 expert parents and 5 expert professionals questioned the meaning of “unusual finger movements.” Except for item 18, the overall proportion of agreement was above 80%, which suggested that the translated Chinese M-CHAT is culturally appropriate for children aged 16-30 months in Taiwan.

Qualitative evaluation of the rationales and comments revealed that 15 expert professionals and 23 expert parents provided written comments on items 2, 8, 11, and 18. The experts questioned the meaning of some terms that they felt were not identified clearly, such as the meaning of “take an interest in other children?” on item 2 (“Does your child take an interest in other children?”), “play properly” on item 8 (“Can your

child play properly with small toys (e.g., cars or bricks) without just mouthing, fiddling, or dropping them?”), and “oversensitive” on item 11 (“Does your child ever seem oversensitive to noise, e.g., plugging ears?”). In addition, some minor modifications were suggested to items 3, 6, and 16. For example, these reviewers suggested that “climbing on things” should be replaced by “climbing up and down” on item 3 (“Does your child like climbing on things, such as up stairs?”); “index finger” should be replaced by “hand” or “fingers” on item 6 (“Does your child ever use his/her index finger to point, to ask for something?”); and “walk” on item 16 (“Does your child walk?”) should be revised to, “Does your child walk on his/her own?” or “Does your child walk by holding on to furniture or your hand?”

It should be noted that item 6 is one of the items in the original M-CHAT designed to examine joint attention abilities. Joint attention behaviors are pivotal to the development of complex social skills and the development of autism. It can be measured by sharing attention through the use of alternating eye gaze and pointing the finger toward a stimulus of interest (Cheng & Huang, 2012; Swanson & Sillera, 2013). Similarly, infants and toddlers in Taiwan use their fingers to point out something they are interested in, but they do not always use the index finger. In Chapter II, it was highlighted that, in order to reduce the false positive rate while maintaining maximal sensitivity, some test items have been revised in the new revision of the M-CHAT (M-CHAT-R) by the original authors and the validation of the M-CHAT-R was examined by a large population in 2014 (Robins et al., 2014). Item 6 of the new M-CHAT-R replaces the term “index finger” with “one finger,” and the question now reads, “does your child point with one finger to ask for something or to get help?” The discussion of reliability and validity

below discusses the relationship between the modification of the translated Chinese M-CHAT and the new revised M-CHAT-R.

In general, the experts' rationales and comments suggested that some specific terms should be more precisely defined in order to help parents make their judgment correctly when using the Chinese M-CHAT as a screening tool. In spite of these suggestions, however, all other participants agreed that the translated Chinese M-CHAT was culturally appropriate for Taiwanese young children.

Reliability of the Translated Chinese M-CHAT

The test-retest reliability and internal consistency reliability in this study provided preliminary support for the psychometric qualities of the translated Chinese M-CHAT in Taiwan. Test-retest reliability data were collected from 30 randomly selected parents of typically developing children aged 16-30 months with a mean interval of 27.8 days (range = 21-36 days). The consistency between the first and second M-CHAT scores was examined by Pearson's correlation coefficients (r), which showed significantly positively correlated scores between test and retest (range = 0.72 - 0.97, mean = 0.86, $p < .001$). Consistently, a recent study of the Japanese version of the M-CHAT (Inada et al., 2011) also found high test-retest reliability of the M-CHAT by calculating Kappa coefficients (k range = 0.65-1.00, mean = 0.91). In other words, the present results suggest that 30 randomly selected parents of typically developing children can provide reliable answers to most of the items on the translated Chinese M-CHAT.

Regarding the test-retest interval, although the translated Chinese M-CHAT has shown consistent results over a 21 to 36 days interval, it was reported that for enduring status of a trait, the stability of the scores should be assessed for longer periods of time

over months (Carole, Kimberlin, & Almut,; 2008). In contrast, it was indicated that although there is no absolute time interval for test-retest reliability, if the test-retest interval is too long, the research subject's beliefs and behaviors may have changed (Teti, 2006). The researcher considered that children between the ages of 16 to 30 months develop very rapidly, which might have created defects in memory and false consistency. A shorter time interval could reduce the challenges and increase test-retest reliability. Consequently, this study suggests that the ideal time interval to estimate the test-retest reliability in the translated Chinese M-CHAT is a shorter time period of 2-4 weeks between time one and time two.

Another impact factor that may affect the stability of the instrument is the internal consistency among items. Based on the result of the present study, the translated Chinese M-CHAT demonstrated an acceptable internal consistency score ($\alpha = 0.78$) compared to the internal consistency of the initial M-CHAT measure ($\alpha = 0.85$, Robins et al., 2001). However, Cronbach's alpha coefficients if items are deleted suggest that deletion of items 11 ("Does your child ever seem oversensitive to noise? e.g., plugging ears"), item 18 ("Does your child make unusual finger movements near his/her face?"), and item 22 ("Does your child sometimes stare at nothing or wander with no purpose?") will slightly improve the internal consistency to a value exceeding 0.8. In addition, based on the quantitative analysis of cultural appropriateness, the lowest percent of agreement across all 23 items along the three dimensions was item 18. Questions on item 18 also were raised by 15 Taiwanese expert parents and 5 expert professionals, who believed that the meaning of "unusual finger movements" was not clear. This verifies that variation within the testing situation, such as a participant's misunderstanding or confusion on the test

items can cause test reliability to vary (Pedhazur & Schmelkin, 1991). In fact, to improve the reliability of the M-CHAT, item 18 in the revised M-CHAT-R has been changed to, “Does your child make unusual finger movements near his or her eyes? (FOR EXAMPLE, does your child wiggle his or her fingers close to his or her eyes?)”. Thus, it was suggested by expert parents and professionals that some specific terms should be defined more clearly in the test, and supplemental examples may give a better understanding to make an accurate judgment when using the test as a screening tool.

Validity of the Translated Chinese M-CHAT

In general, this study supports the initial criterion and content validity of the translated Chinese M-CHAT in a small sample of Taiwanese children. The Chinese version of the M-CHAT showed criterion validity with the DSM-IV, which is currently the most common diagnostic tool for evaluating autistic symptoms in Taiwan. Based on the two cutoff criteria in the original M-CHAT, the M-CHAT scores were high in criterion I (three or more of any 23 items failed) for all 20 children with a diagnosis of autistic spectrum disorder recruited from the Development Center for Children with Autism in New Taipei City. The results reflected the high criterion validity of the translated Chinese M-CHAT and supported its use as an ASD screening tool for young children in Taiwan.

As mentioned in Chapter II, there are tremendous challenges and barriers to screening and diagnostic procedures due to the lack of valid assessment tools for infants and toddlers with ASD in Taiwan. Although the analysis of criterion validity showed high correspondence between DSM-IV and the Chinese M-CHAT, the results may have been biased, because DSM-IV is not a formal screening or diagnostic tool. It was

reported that DSM-IV has well-established diagnostic criteria for ASD, and all children should be screened specifically for ASD at the 18- and 24-month well-child visits based on DSM-IV criteria, using formal screening and tests (American Psychiatric Association, 2000). Further, to accurately identify autism, Johnson and his colleague (2007) also indicated that an autistic-specific diagnostic tool must meet the criteria defined by the DSM-IV description to qualify for a positive rating of early identification. In addition, DSM-IV criteria may not be sensitive and specific enough for infants and toddlers with ASD when compared to the M-CHAT, which is validated for screening children between 16 and 30 months of age. As indicated by several researchers (Eaves, Wingert, Ho, & Helena, 2006), a low sensitive tool may cause many false-negative reactions (children who have autism symptoms may pass the screening test) and a low specific instrument may give false-positive results (not all children who score at risk will be diagnosed with ASD). In order to effectively identify children with autism in Taiwan, it is urgent to develop valid and reliable instruments.

Although DSM-IV is currently used as a tool for diagnosing autism in Taiwan, the new edition, the DSM-V (American Psychiatric Association, 2013), was released in May, 2013. One of the major changes is that the separate diagnostic labels of Autistic Disorder, Asperger's Disorder, and PDD-NOS were replaced by one term "Autism Spectrum Disorder." In the new edition, more symptoms are needed to meet criteria and one significant concern is that children with higher functioning may no longer meet the diagnostic criteria and may not be able to gain access to relevant services. Certainly, these changes will have an impact on families and people currently diagnosed with an autism spectrum disorder. It should be further examined that how clinicians will use the

new criteria in evaluating children and what potential impact these new criteria will have on the availability of services.

Findings regarding criterion validity of the translated Chinese M-CHAT must be interpreted with caution. This small sample might not be representative of the larger population of Taiwanese children with ASD. In addition, although criterion validity can be achieved by comparing children's results on the translated Chinese M-CHAT with a diagnosis of ASD, parents' views about autism might be influenced by their child's diagnosed ASD. In other words, parents of children who already have a diagnosis of ASD might be responding to the M-CHAT using this identification as a reference point. It is also important to note that because of the low identification rate of children with developmental delays in Taiwan, children who are registered with the social welfare services are usually more severely delayed (Lin et al., 2011). Thus it is unclear if the translated Chinese M-CHAT was able to pick up more subtle autistic variations.

After evaluating the criterion validity, the content validity was examined by both quantitative analysis of the close ended question and qualitative evaluation of expert professionals' comments for the open ended questions. The result showed that the mean CVR (content validity ratio) value of the 23 translated Chinese M-CHAT items across all the three dimensions was 0.94, which indicated a high content validity. Regarding the comments from expert professionals for the translated Chinese M-CHAT items, the results were merged into two themes: (a) additional examples required for some test items, and (b) modifications of items for cultural appropriateness.

It should be noted that the expert professionals' comments and suggestions were consistent with the new M-CHAT-R. Professionals' suggestions of adding examples to

items 2, 3, 6, and 18 for a better understanding corresponded to the new, revised version M-CHAT-R. Item 6 (“Does your child ever use his/her index finger to point, to ask for something?”) and item 18 (“Does your child make unusual finger movements near his/her face?”) have been changed with supplementary examples in the revised M-CHAT-R and discussed previously. Item 2, “Does your child take an interest in other children?” was replaced by “Is your child interested in other children? (FOR EXAMPLE, does your child watch other children, smile at them, or go to them?)” Item 3, “Does your child like climbing on things, such as upstairs?” was revised to “Does your child like climbing on things? (FOR EXAMPLE, furniture, playground equipment, or stairs)”. Despite these issues, there was overall agreement that the translated Chinese M-CHAT was valid to assess Taiwanese children. A description of the suggested modifications of items from experts and the revised items of the new version M-CHAT-R are listed in the Table 12.

Table 12

Suggestions for Item Modification from Experts

Item #	Original Description of M-CHAT Items	Modifications of Items from Experts	Revised Items of the M-CHAT-R
1	Does your child enjoy being swung, bounced on your knee, etc.?	“Knee” should be replaced by “leg”	Does your child like movement activities? (FOR EXAMPLE, being swung or bounced on your knee)
2	Does your child take an interest in other children?	Does your child take an interest in other children, such as watching other children play?	Is your child interested in other children? (FOR EXAMPLE, does your child watch other children, smile at them, or go to them?)
3	Does your child like climbing on things, such as upstairs?	Does your child like climbing on things, such as sofas or chairs?	Does your child like climbing on things? (FOR EXAMPLE, furniture, playground equipment, or stairs)
6	Does your child ever use his/her index finger to point, to ask for something?	“Index finger” should be replaced by “finger”	Does your child point with one finger to ask for something or to get help? (FOR EXAMPLE, pointing to a snack or toy that is out of reach)
7	Does your child ever use his/her index finger to point, to indicate interest in something?	“Index finger” should be replaced by “finger”	Does your child point with one finger to show you something interesting? (FOR EXAMPLE, pointing to an airplane in the sky or a big truck in the road)
16	Does your child walk?	Does your child walk on his/her own or by holding something?	Does your child walk?
18	Does your child make unusual finger movements near his/her face?	Does your child make unusual finger movements near his/her face, such as flipping the fingers repetitively in front of the eyes?	Does your child make unusual finger movements near his or her eyes? (FOR EXAMPLE, does your child wiggle his or her fingers close to his or her eyes?)

Limitations and Recommendations for Future Research

A variety of limitations may have influenced the results of this study.

Recommendations are offered on how such limitations might be overcome in future research studies and follow-up research projects.

First, the sampling method was not a completely randomized design. The three main types of participants in this study -- parents of typically developing children, parents of children with ASD, and teams of professionals who are experts in child development -- were recruited from two municipalities in northern Taiwan, Taipei City and New Taipei City. Although parents of typically developing children were randomly selected from 20 nursery settings in Taipei City and New Taipei City, results might not represent the perspectives of parents throughout Taiwan.

In addition, parents in northern Taiwan might have different perceptions from parents in other parts of the country; however, Taiwan is considered as a fairly homogeneous society (Tung, Chen, & Liu, 2006). Nevertheless, future research should address these concerns by including a broader range of educational and socioeconomic status and a larger sample size from diverse areas of Taiwan.

Second, although a team of professionals who are experts in child development viewed the translated Chinese M-CHAT as culturally appropriate, it is possible that the professionals' training and background reflect western values and norms. In the present study, teams of professionals consisted of physicians, psychologists, occupational therapists, physical therapists, and language pathologists. Although the professionals were all trained in Taiwan and had extensive experience working with children and

families in Taiwan, the medical training system in Taiwan is strongly impacted by western beliefs (Wong, 2006). In addition, all expert professionals worked in northern Taiwan, and their perspectives might not represent the norms and values in other sections of Taiwan. Future research should include professionals from more diverse fields of Taiwan, such as social workers, child-care workers, and/or other early education and care personnel.

Third, the criterion validity in this study did not compare to a validated diagnosis instrument for ASD, but to the criteria of DSM-IV, a commonly used method for diagnosing children with autism in Taiwan. Although a multidisciplinary team of professionals were assigned to evaluate a child suspected of having autism based on DSM-IV criteria in Taiwan, it should be noted that DSM-IV is a significant diagnostic reference used by mental health experts and insurance providers (American Psychiatric Association, 2000). As mentioned previously, DSM-IV may not be sensitive enough to be a diagnostic instrument because the key defining symptom of autism that differentiates it from other syndromes and conditions is substantial impairment in social interaction (Zwaigenbaum et al., 2009). Besides, when comparing children's results on the translated Chinese M-CHAT with an existing condition (a DSM-IV diagnosis of autistic spectrum disorder), parents' beliefs about autism might be influenced by their child's diagnosis and affect the accuracy of criterion validity. A more precise diagnosis and careful interpretation of the test result can avoid criterion bias, such as using current validated assessment tools to accurately diagnose ASD and evaluating children who are at a high risk of ASD by well-trained professional team.

In order to effectively identify children with autism in Taiwan, it is critical to develop valid and reliable instruments for ASD. Further replication studies are necessary using other standardized measurements such as the Childhood Autism Rating Scale (CARS; Schopler, Reichler, & Rothen Renner, 1999), the Autism Diagnostic Interview-Revised (ADI-R; Rutter, Le Couteur, & Lord, 2003), or the Autism Diagnostic Observation Schedule (ADOS; Lord et al., 2012).

Fourth, although qualitative evaluation of the rationales and comment from expert parents and professionals was a strength in the present study, a more in-depth, qualitative approach in gathering demographic information regarding cultural appropriateness should be employed in further research to provide more sound and impartial information about Taiwanese perceptions of the translated M-CHAT, such as family structure, child care arrangement, and parents' socioeconomic status, education, or ethnicity. It is important to examine these factors that may influence children's development and parents' beliefs of identifying the early signs of ASD.

Fifth, it is unclear if the Chinese M-CHAT is capable of identifying less severe autistic variations among Taiwanese children. Due to the lack of culturally validated autism screening instruments for young children with ASD and the low identification rate of children with ASD in Taiwan, children who are registered with the social welfare services usually demonstrate severe delays (Chou, 2010; Lin, Shieh, & Wang, 2008). Future research should include discriminate function analyses to examine the ability of the Chinese M-CHAT to distinguish Taiwanese children with and without ASD. For example, research subjects from inclusive settings should be selected to further examine criterion validity of the translated M-CHAT, because children participating in inclusive

settings might demonstrate less severe autistic syndrome. In addition, children at high-risk for ASD; such as those with low birth weight or of low socioeconomic status, might be another population to include in further examination of this issue.

Finally, the M-CHAT has been updated to the new version of M-CHAT-R recently. Based on the study among a large sample of toddlers (Robins et al., 2014), the revised M-CHAT-R is able to detect ASD at a higher rate when compared to the M-CHAT. Emphasizing the need to reduce a high false positive rate, Robins and her colleagues suggested that the combined use of the M-CHAT-R screen and the telephone interview by using the Follow-Up questions (M-CHAT-R/F) increases its positive predictive value. Further research should focus on translating the M-CHAT-R into traditional Chinese characters and verifying the reliability and validity of the translated Chinese M-CHAT-R screening instrument as well as the follow-up interview M-CHAT-R/F to maximize clinical utility and enhance the accuracy of the autism screening instrument using in the community. The information regarding the M-CHAT-R/F is presented in Appendix F.

Implications for Prevention and Intervention

An effective screening tool for ASD, such as M-CHAT, may greatly improve the ability of parents and practitioners to detect autistic features in very young children. This study has contributed to the growing literature on the cross cultural assessment of the M-CHAT by investigating the cultural appropriateness, reliability, and validity of the translated Chinese M-CHAT with a sample of Taiwanese children. Based on research findings (Albores-Gallo et al., 2012; Canal-Bedia et al., 2011; Inada et al., 2011; Miller, 2006), simply translating a test measure into another language cannot represent thoroughly a translation of the original psychometrics of a test. Careful validation is

essential before an assessment instrument is considered to be accurate for children from different cultural backgrounds. In general, the present study supported the reliability and validity information regarding the translated Chinese M-CHAT. In particular, cultural appropriateness and content validity issues raised by the Taiwanese expert parents and professionals need further investigation, as do issues related to the ability of the translated Chinese M-CHAT to identify children with mild level of autistic impairment.

The present study has important implication for prevention and early intervention practice in Taiwan. Based on estimates by the World Health Organization (WHO, 2010), six to eight percent of children under age six are diagnosed with developmental delay, and yet only less than one percent of children aged 0-6 years old with developmental delay was reported in Taiwan (Wong, 2006). This means that the majority of young children with developmental delay, including the rapidly increasing population of children with ASD (Landa, & Kalb, 2012), have not been properly identified and registered for early intervention services as the requirement of the present Taiwanese law.

Clearly, the child-find system in Taiwan does not adequately identify children with ASD currently (Zwaigenbaum et al., 2009). To eliminate the barriers to autism identification in Taiwan, parental awareness regarding early signs and qualified professionals' training in the diagnostic assessment process of autism need to be improved. Autism signs are unusual, intangible, and some of them are transient, and even well-educated parents can overlook these symptoms (Landa, 2008). Parents may interpret a lack of interest in other children as shyness rather than a symptom, or believe it to be irrelevant if their children do not point to share pleasure. A self-administered autism questionnaire for parents, such as M-CHAT, should be easily received at any child-care

center and healthcare setting. In clinical settings, professionals might overlook subtle differences in some aspects of development and delay the timing for early identification or referral, especially for children with autism. In Taiwan, a formal multidisciplinary evaluation by a team of professionals may be requested to ensure an accurate diagnosis. This means that the professional will consult with specialists from diverse fields and develop the best and effective treatment plan. Professionals' knowledge, strategies, and intervention skills need to be enhanced by efficient training in order to improve accuracy in assessing and diagnosing autism among young children.

The current study has shown that there is an urgent need to establish a systematic screening and diagnosis process for young children with ASD. Employing a valid and culturally appropriate screening instrument for autism should be the primary step to achieve the goal. The results of the translated Chinese M-CHAT demonstrated the psychometric properties of this scale for Taiwanese children with autistic spectrum disorders. Further investigation is necessary to validate the scale and establish national norms data in Taiwan in order to determine the clinical utility of the translated Chinese M-CHAT. Practically, this study provided parents and practitioners with a cost-effective and culturally appropriate screening instrument for early identification of children with ASD in order to receive early intervention services in a timely manner.

Conclusion

To date, autistic spectrum disorders affect an estimated 1% - 2% of children in the United States (CDC, 2010; Landa, & Kalb, 2012). An increasing number of children with ASD and lifelong developmental disabilities have impacted families in many ways. Fortunately, the burden and cost to families can be reduced by raising the awareness of

early identification and early intervention. To effectively identify children, a culturally appropriate, reliable, and valid child development screening instrument is necessary.

The understanding of ASD and its services and intervention for children with autism has improved in Taiwan over the years. These efforts included the passage of laws that require early intervention services for children with ASD and attempts to coordinate existing social welfare, health, and education systems to provide services for children with ASD in Taiwan. However, there are some barriers to identifying children with ASD in Taiwan, including parental ignorance regarding early identification, lack of a systematic screening process, and lack of culturally validated screening instruments for autism. Furthermore, the low autism prevalence rate under age six in Taiwan reflects that the screening and diagnosis system are not yet developed comprehensively (Lin et al., 2011). In contrast, several validated screening and diagnostic measures for ASD have been developed in the United States, and the M-CHAT screening tool is a validated, systematic and cost-effective autism screening tool designed for young children 16-30 months of age.

The current study aimed to verify the psychometric properties of the translated Chinese M-CHAT for young children in Taiwan. The purposes of this study were: (a) to examine the cultural appropriateness of the Chinese M-CHAT version as an autism screening instrument for toddlers in Taiwan, and (b) to investigate the reliability and validity of the Chinese M-CHAT version for toddlers in Taiwan. Results indicated that the translated Chinese M-CHAT was a culturally appropriate autistic screening instrument for children aged 16-30 months in Taiwan, and it demonstrated satisfactory test-retest reliability and internal consistency in the present study. The translated Chinese M-CHAT

also confirmed criterion validity by correctly identifying the 20 Taiwanese children with diagnosed ASD. However, questions were raised by expert parents and professionals regarding additional examples required for some test items and modifications of items for cultural appropriateness.

Some limitations were highlighted in this study. Although the hypothesis of the study was that the professional team would view the translated Chinese M-CHAT as culturally appropriate, bias caused by professionals' training and background based on western values and norms may have impacted their responses. Professionals from more diverse fields should be included in future studies. Further, the multidisciplinary team of professionals should identify children with ASD based on validated diagnosis instruments instead of the criteria of DSM-IV. Moreover, it is not clear whether the Chinese M-CHAT can identify children with mild autism due to the low identification rate of children with autistic spectrum disorders in Taiwan. The researcher suggests that further investigations should employ an in-depth qualitative approach and use a large and random sample before the translated Chinese M-CHAT can be adapted and used as an autism screening instrument in Taiwan. To maximize sensitivity and detect as many cases of ASD as possible, a new revision of M-CHAT-R was published recently. Undoubtedly, further research should focus on investigating the psychometrics properties of the Chinese M-CHAT-R to more effectively serve in early identification and early intervention for children with ASD in Taiwan.

The study has significant practical implications for prevention and early intervention of children with ASD in Taiwan. Results support the literature of cross cultural assessment of the M-CHAT and emphasized the need for thorough investigation

of psychometrics properties of translated instruments by careful validation and considering the cultural variation that may affect assessment processes. Moreover, proper transcultural examination of the psychometrics of the child development instrument is required before an instrument is used in a population other than the original normative population. This study indicated that the child-find system in Taiwan does not adequately identify children with ASD who can then be registered for early intervention services as required by the present Taiwanese law, due to the low prevalence of children aged 0-6 years old with developmental delay. There is a crucial need to establish a systematic screening and diagnosis process for young children with ASD. The results of the translated Chinese M-CHAT demonstrate the cultural appropriateness, reliability, and validity of this scale for Taiwanese children with ASD. Future research can build on these results for further quantitative and qualitative research in order to establish the norms of the M-CHAT in Taiwan. Practically, for accurate and effective use of the translated Chinese M-CHAT in the general population of Taiwanese society, one should be aware that children who fail the translated Chinese M-CHAT may not have a diagnosis of ASD; however, these children are at risk for ASD or other developmental delays, and therefore, it is strongly recommended that these children should be referred for further assessment, diagnostic testing, and early intervention as soon as possible.

Early identification for children with ASD is extremely important because it allows high-quality early intervention to improve the psychosocial adjustment of these children and empower families to live healthy and productive lives (Matson, 2007). This study is the first critical step in establishing the translated Chinese M-CHAT as a potential cost-effective way of identifying young children with ASD in Taiwan to ensure

that children with ASD can be identified in order to receive early intervention services and to best promote children's healthy social and emotional development.

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APPENDIX A
DEMOGRAPHIC QUESTIONNAIRE
(ENGLISH AND CHINESE VERSION)

Demographic Questionnaire

Part I: Background Information

1. Your age____ Gender: Male____ Female____
 Religion: Christian____ Catholic____ Buddhist ____ Daoism____
 Other, please specify_____
2. Your highest level of education: Elementary____ Middle School____ High School____ College/University____ Master____ PhD____
3. Occupation: _____ Title: _____
4. Family yearly salary (NTD): 3010,000~5000,000____1510,000~3000,000____
 1010,000~1500,000____ 500,000~1000,000____ below 500,000____
5. If you work in the child development field, how many years of experience do you have in early childhood education? _____

Part II: Information about Your Child (for parents only)

1. You are the child's: Mother____ Father____ Other, please specify_____
2. Your child's gender: Male____ Female____,
3. Child's Birthdate (mm/dd/year): _____
4. Child's Ethnicity: Minan____, Hugka____, Mainland____, Aborigines____, Other, please specify_____
5. Your child's preschool/nursery center _____
6. The primary care provider:
 Mother____ Father____ Grandmother____ Grandfather ____ Nanny____
 Other, please specify_____
7. Who does the child live with now?
 Both birth parents____ Mother and stepfather____ Father and stepmother____
 Mother only ____ Father only ____ Grandparents ____
 Other, please specify_____
8. Was there anything unusual about the child's birth? Yes ____ No____
 If yes, please specify_____
9. Does your child have any emotional or behavioral problem? Yes ____ No____
 If yes, please specify_____
10. In general, how do you rate your child's health?
 Poor ____ Not so good____ Average____ Very good____ Excellent____
11. In general how do you rate the child's development?
 Poor ____ Not so good____ Average____ Very good____ Excellent____

Thank you for providing this important information!

個人背景資料問卷調查表

I. 個人基本資料

1. 您的年齡：_____歲 性別：☐男 ☐女
宗教：基督教☐ 天主教☐ 佛教☐ 道教☐ 其他：_____
2. 最高學歷：小學☐ 國中☐ 高中☐ 大學☐ 碩士☐ 博士☐
3. 職業：農林漁牧☐ 工☐ 商☐ 醫☐ 軍☐ 公☐ 教☐ 家管☐ 無☐
其他：_____
- 服務單位：_____ 職稱：_____
4. 你的家庭年收入在：
☐501萬元以上 ☐301-500萬元
☐151-300萬元 ☐101-150 萬元
☐50-100 萬元 ☐少於50 萬元
5. 若您在兒童發展相關領域工作，您服務的年資為：
☐1 年 ☐2-3 年 ☐4-5 年 ☐5~9 年 ☐10 年以上

II. 您孩子的基本資料（限父母填寫）

1. 您是孩子的：父☐ 母☐ 其他：_____
2. 孩子的性別：☐男☐女
3. 孩子的出生年/月/日：_____
4. 孩子的種族：閩南☐客家☐外省☐原住民☐其他：_____
5. 幼兒園或托兒所名稱：_____
6. 主要照顧者：母親☐ 父親☐ 祖父母☐ 保母☐ 其他：_____
7. 孩子現在與誰同住：父母☐ 養父母☐ 祖父母☐ 其他：_____
8. 孩子出生過程是否順利？是☐否☐ 若填否，請描述：_____
9. 您認為孩子是否有情緒或行為方面的問題？
是☐否☐ 若填否，請描述：_____
10. 整體而言，您認為孩子的健康狀況如何？
很差☐不太好☐還好☐很好☐極佳
11. 整體而言，您認為孩子的發展狀況如何？
很差☐不太好☐還好☐很好☐極佳

感謝您的填答及撥冗回覆本問卷！

APPENDIX B

EXPERT SURVEY: CULTURAL AND DEVELOPMENTAL APPROPRIATENESS

CHECKLIST FOR THE M-CHAT ITEMS

(ENGLISH AND CHINESE VERSION)

Expert Survey: Cultural and Developmental Appropriateness Checklist for the M-CHAT Items

(Note: This Expert Survey will be translated into Chinese for research participants in Taiwan)

Please review if the following items are culturally and developmentally appropriate for a typical developing 16-30 months old child. If you disagree, please provide a rationale for your answer. *Please* note that you can make any *comments* that might improve future versions. Thank you for providing this important information!

Item from the M-CHAT	The test item is easily understood		The test item is culturally appropriate		The test item is developmentally appropriate for children between 16 to 30 months of age		Rationale for a “no” response	Additional comments, if any
1. Does your child enjoy being swung, bounced on your knee, etc.?	Yes	No	Yes	No	Yes	No		
2. Does your child take an interest in other children?	Yes	No	Yes	No	Yes	No		
3. Does your child like climbing on things, such as upstairs?	Yes	No	Yes	No	Yes	No		
4. Does your child enjoy playing peek-a-boo/hide-and-seek?	Yes	No	Yes	No	Yes	No		
5. Does your child ever pretend, for example, to talk on the phone or take care of a doll or pretend other things?	Yes	No	Yes	No	Yes	No		
6. Does your child ever use his/her index finger to point, to ask for	Yes	No	Yes	No	Yes	No		

something?								
7. Does your child ever use his/her index finger to point, to indicate interest in something?	Yes	No	Yes	No	Yes	No		
8. Can your child play properly with small toys (e.g. cars or bricks) without just mouthing, fiddling, or dropping them?	Yes	No	Yes	No	Yes	No		
9. Does your child ever bring objects over to you (parent) to show you something?	Yes	No	Yes	No	Yes	No		
10. Does your child look you in the eye for more than a second or two?	Yes	No	Yes	No	Yes	No		
11. Does your child ever seem oversensitive to noise? (e.g., plugging ears)	Yes	No	Yes	No	Yes	No		
12. Does your child smile in response to your face or your smile?	Yes	No	Yes	No	Yes	No		
13. Does your child imitate you? (e.g., you make a face-will your child imitate it?)	Yes	No	Yes	No	Yes	No		
14. Does your child respond to his/her name when you call?	Yes	No	Yes	No	Yes	No		
15. If you point at a toy across the room, does your child look at it?	Yes	No	Yes	No	Yes	No		
16. Does your child walk?	Yes	No	Yes	No	Yes	No		
17. Does your child look at things you are looking at?	Yes	No	Yes	No	Yes	No		

18. Does your child make unusual finger movements near his/her face?	Yes	No	Yes	No	Yes	No		
19. Does your child try to attract your attention to his/her own activity?	Yes	No	Yes	No	Yes	No		
20. Have you ever wondered if your child is deaf?	Yes	No	Yes	No	Yes	No		
21. Does your child understand what people say?	Yes	No	Yes	No	Yes	No		
22. Does your child sometimes stare at nothing or wander with no purpose?	Yes	No	Yes	No	Yes	No		
23. Does your child look at your face to check your reaction when faced with something unfamiliar?	Yes	No	Yes	No	Yes	No		

專家問卷:學步期自閉症檢核表修訂版(M-CHAT)之文化及發展適應性調查表

請依據您的觀點，檢視下列各發展項目是否在文化及發展適應性上能符合16至30個月大的兒童，並勾選您的答案。在您勾選不同意的項目上，請提供可能的原因。歡迎您在任何一項目上給予意見及評論，作為日後檢核表改善之用。感謝您提供寶貴的意見！

附註：此檢核表乃依據美國學步期自閉症檢核表修訂版 The Modified Checklist for Autism in Toddlers, M-CHAT (Robin, Fein, Barton, & Green, 2001)而編製

項目	此項目容易了解		此項目符合本土文化		此項目符合16至30個月大兒童之發展		若您勾選不同意，請提供可能的原因	意見及評論
1. 你的孩子喜歡你搖他或是把他放在你的膝蓋上等等之類的事嗎？	是 <input type="checkbox"/>	否 <input type="checkbox"/>	是 <input type="checkbox"/>	否 <input type="checkbox"/>	是 <input type="checkbox"/>	否 <input type="checkbox"/>		
2. 你的孩子對其他孩子有興趣嗎？	是 <input type="checkbox"/>	否 <input type="checkbox"/>	是 <input type="checkbox"/>	否 <input type="checkbox"/>	是 <input type="checkbox"/>	否 <input type="checkbox"/>		
3. 你的孩子喜歡爬東西，像上樓梯嗎？	是 <input type="checkbox"/>	否 <input type="checkbox"/>	是 <input type="checkbox"/>	否 <input type="checkbox"/>	是 <input type="checkbox"/>	否 <input type="checkbox"/>		
4. 你的孩子喜歡玩捉迷藏嗎？	是 <input type="checkbox"/>	否 <input type="checkbox"/>	是 <input type="checkbox"/>	否 <input type="checkbox"/>	是 <input type="checkbox"/>	否 <input type="checkbox"/>		
5. 你的孩子會假裝，例如，講電話或照顧洋娃娃，或假裝其他事情嗎？	是 <input type="checkbox"/>	否 <input type="checkbox"/>	是 <input type="checkbox"/>	否 <input type="checkbox"/>	是 <input type="checkbox"/>	否 <input type="checkbox"/>		
6. 你的孩子曾用食指指著東西，要求要某樣東西嗎？	是 <input type="checkbox"/>	否 <input type="checkbox"/>	是 <input type="checkbox"/>	否 <input type="checkbox"/>	是 <input type="checkbox"/>	否 <input type="checkbox"/>		
7. 你的孩子曾用食指指著東	是 <input type="checkbox"/>	否 <input type="checkbox"/>	是 <input type="checkbox"/>	否 <input type="checkbox"/>	是 <input type="checkbox"/>	否 <input type="checkbox"/>		

西，表示對某樣東西有興趣嗎？								
8. 你的孩子會正確玩小玩具（例如車子或積木），而不是只把它們放在嘴裡、隨便亂動或是把它們丟掉？	是 <input type="checkbox"/>	否 <input type="checkbox"/>	是 <input type="checkbox"/>	否 <input type="checkbox"/>	是 <input type="checkbox"/>	否 <input type="checkbox"/>		
9. 你的孩子曾經拿東西給你（家長）看嗎？	是 <input type="checkbox"/>	否 <input type="checkbox"/>	是 <input type="checkbox"/>	否 <input type="checkbox"/>	是 <input type="checkbox"/>	否 <input type="checkbox"/>		
10. 你的孩子會注意看著你的眼睛超過一、兩秒鐘嗎？	是 <input type="checkbox"/>	否 <input type="checkbox"/>	是 <input type="checkbox"/>	否 <input type="checkbox"/>	是 <input type="checkbox"/>	否 <input type="checkbox"/>		
11. 你的孩子曾對聲音過分敏感嗎？（例如摀住耳朵）	是 <input type="checkbox"/>	否 <input type="checkbox"/>	是 <input type="checkbox"/>	否 <input type="checkbox"/>	是 <input type="checkbox"/>	否 <input type="checkbox"/>		
12. 你的孩子看著你的臉或是你的微笑時會以微笑回應嗎？	是 <input type="checkbox"/>	否 <input type="checkbox"/>	是 <input type="checkbox"/>	否 <input type="checkbox"/>	是 <input type="checkbox"/>	否 <input type="checkbox"/>		
13. 你的孩子會模仿你嗎？（例如：你扮個鬼臉，你的孩子會模仿嗎？）	是 <input type="checkbox"/>	否 <input type="checkbox"/>	是 <input type="checkbox"/>	否 <input type="checkbox"/>	是 <input type="checkbox"/>	否 <input type="checkbox"/>		
14. 你的孩子聽到別人叫他／她的名字時，他／她會回應嗎？	是 <input type="checkbox"/>	否 <input type="checkbox"/>	是 <input type="checkbox"/>	否 <input type="checkbox"/>	是 <input type="checkbox"/>	否 <input type="checkbox"/>		
15. 如果你指著房間另一頭的玩具，你的孩子會看那個玩具嗎？	是 <input type="checkbox"/>	否 <input type="checkbox"/>	是 <input type="checkbox"/>	否 <input type="checkbox"/>	是 <input type="checkbox"/>	否 <input type="checkbox"/>		
16. 你的孩子走路嗎？	是 <input type="checkbox"/>	否 <input type="checkbox"/>	是 <input type="checkbox"/>	否 <input type="checkbox"/>	是 <input type="checkbox"/>	否 <input type="checkbox"/>		
17. 你的孩子會看你正在看的東西嗎？	是 <input type="checkbox"/>	否 <input type="checkbox"/>	是 <input type="checkbox"/>	否 <input type="checkbox"/>	是 <input type="checkbox"/>	否 <input type="checkbox"/>		
18. 你的孩子會在他／她的臉	是 <input type="checkbox"/>	否 <input type="checkbox"/>	是 <input type="checkbox"/>	否 <input type="checkbox"/>	是 <input type="checkbox"/>	否 <input type="checkbox"/>		

附近做出一些不尋常的手指頭動作嗎？								
19. 你的孩子會設法吸引你看他／她自己的活動嗎？	是 <input type="checkbox"/>	否 <input type="checkbox"/>	是 <input type="checkbox"/>	否 <input type="checkbox"/>	是 <input type="checkbox"/>	否 <input type="checkbox"/>		
20. 你是否曾經懷疑你的孩子聽力有問題？	是 <input type="checkbox"/>	否 <input type="checkbox"/>	是 <input type="checkbox"/>	否 <input type="checkbox"/>	是 <input type="checkbox"/>	否 <input type="checkbox"/>		
21. 你的孩子能理解別人說的話嗎？	是 <input type="checkbox"/>	否 <input type="checkbox"/>	是 <input type="checkbox"/>	否 <input type="checkbox"/>	是 <input type="checkbox"/>	否 <input type="checkbox"/>		
22. 你的孩子有時候會兩眼失焦或是沒有目的地逛來逛去嗎？	是 <input type="checkbox"/>	否 <input type="checkbox"/>	是 <input type="checkbox"/>	否 <input type="checkbox"/>	是 <input type="checkbox"/>	否 <input type="checkbox"/>		
23. 你的孩子碰到不熟悉的事物時會看著你的臉，看看你的反應嗎？	是 <input type="checkbox"/>	否 <input type="checkbox"/>	是 <input type="checkbox"/>	否 <input type="checkbox"/>	是 <input type="checkbox"/>	否 <input type="checkbox"/>		

APPENDIX C

**INSTRUCTIONS AND PERMISSIONS FOR
USE OF THE M-CHAT**

Instructions and Permissions for Use of the M-CHAT™

The Modified Checklist for Autism in Toddlers (M-CHAT; Robins, Fein, & Barton, 1999) is available for free download for clinical, research, and educational purposes. There are two authorized websites: the M-CHAT and supplemental materials can be downloaded from www.firstsigns.org or from Dr. Robins' website, at <http://www.mchatscreen.com>

Users should be aware that the M-CHAT continues to be studied, and may be revised in the future. Any revisions will be posted to the two websites noted above.

Furthermore, the M-CHAT is a copyrighted instrument, and use of the M-CHAT must follow these guidelines:

- (1) Reprints/reproductions of the M-CHAT must include the copyright at the bottom (© 1999 Robins, Fein, & Barton). No modifications can be made to items or instructions without permission from the authors.
- (2) The M-CHAT must be used in its entirety. There is no evidence that using a subset of items will be valid.
- (3) Parties interested in reproducing the M-CHAT in print (e.g., a book or journal article) or electronically (e.g., as part of digital medical records or software packages) must contact Diana Robins to request permission (drobins@gsu.edu).

Instructions for Use

The M-CHAT is validated for screening toddlers between 16 and 30 months of age, to assess risk for autism spectrum disorders (ASD). The M-CHAT can be administered and scored as part of a well-child check-up, and also can be used by specialists or other professionals to assess risk for ASD. The primary goal of the M-CHAT was to maximize sensitivity, meaning to detect as many cases of ASD as possible. Therefore, there is a high false positive rate, meaning that not all children who score at risk for ASD will be diagnosed with ASD. To address this, we have developed a structured follow-up interview for use in conjunction with the M-CHAT; it is available at the two websites listed above. Users should be aware that even with the follow-up questions, a significant number of the children who fail the M-CHAT will not be diagnosed with an ASD; however, these children are at risk for other developmental disorders or delays, and therefore, evaluation is warranted for any child who fails the screening.

The M-CHAT can be scored in less than two minutes. Scoring instructions can be downloaded from <http://www.mchatscreen.com> or www.firstsigns.org. We also have developed a scoring template, which is available on these websites; when printed on an overhead transparency and laid over the completed M-CHAT, it facilitates scoring. Please note that minor differences in printers may cause your scoring template not to line up exactly with the printed M-CHAT.

Children who fail 3 or more items total or 2 or more critical items (particularly if these scores remain elevated after the follow-up interview) should be referred for diagnostic evaluation by a specialist trained to evaluate ASD in very young children. In addition, children for whom there are physician, parent, or other professional's concerns about ASD should be referred for evaluation, given that it is unlikely for any screening instrument to have 100% sensitivity.

APPENDIX D
M-CHAT MEASURE
(ENGLISH AND CHINESE VERSION)

Child's Name _____ Filled out by: _____
 Date of Birth _____ Relationship to child _____
 Today's date _____

Modified Checklist for Autism in Toddlers (M-CHAT)

Please fill out the following about how your child **usually** is. Please try to answer every question. If the behavior is rare (e.g., you've seen it once or twice), please answer as if the child does not do it.

1.	Does your child enjoy being swung, bounced on your knee, etc.?	Yes	No
2.	Does your child take an interest in other children?	Yes	No
3.	Does your child like climbing on things, such as up stairs?	Yes	No
4.	Does your child enjoy playing peek-a-boo/hide-and-seek?	Yes	No
5.	Does your child ever pretend, for example, to talk on the phone or take care of dolls, or pretend other things?	Yes	No
6.	Does your child ever use his/her index finger to point, to ask for something?	Yes	No
7.	Does your child ever use his/her index finger to point, to indicate interest in something?	Yes	No
8.	Can your child play properly with small toys (e.g. cars or bricks) without just mouthing, fiddling, or dropping them?	Yes	No
9.	Does your child ever bring objects over to you (parent) to show you something?	Yes	No
10.	Does your child look you in the eye for more than a second or two?	Yes	No
11.	Does your child ever seem oversensitive to noise? (e.g., plugging ears)	Yes	No
12.	Does your child smile in response to your face or your smile?	Yes	No
13.	Does your child imitate you? (e.g., you make a face-will your child imitate it?)	Yes	No
14.	Does your child respond to his/her name when you call?	Yes	No
15.	If you point at a toy across the room, does your child look at it?	Yes	No
16.	Does your child walk?	Yes	No
17.	Does your child look at things you are looking at?	Yes	No
18.	Does your child make unusual finger movements near his/her face?	Yes	No
19.	Does your child try to attract your attention to his/her own activity?	Yes	No
20.	Have you ever wondered if your child is deaf?	Yes	No
21.	Does your child understand what people say?	Yes	No
21.	Does your child sometimes stare at nothing or wander with no purpose?	Yes	No
23.	Does your child look at your face to check your reaction when faced with something unfamiliar?	Yes	No

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<http://www.dbpeds.org/media/mchat>

修正的幼兒自閉症檢查表 (M-CHAT)

請按照你孩子平常的狀況回答下列問題。儘量每個問題都回答。如果那種行為很少出現（例如：你看過一、兩次），請以孩子沒有做過來作答。

- | | | |
|--------------------------------------------------|---|---|
| 1. 你的孩子喜歡你搖他或是把他放在你的膝蓋上等等之類的事嗎？ | 是 | 否 |
| 2. 你的孩子對其他孩子有興趣嗎？ | 是 | 否 |
| 3. 你的孩子喜歡爬東西，像上樓梯嗎？ | 是 | 否 |
| 4. 你的孩子喜歡玩捉迷藏嗎？ | 是 | 否 |
| 5. 你的孩子會假裝，例如，講電話或照顧洋娃娃，或假裝其他事情嗎？ | 是 | 否 |
| 6. 你的孩子曾用食指指著東西，要求要某樣東西嗎？ | 是 | 否 |
| 7. 你的孩子曾用食指指著東西，表示對某樣東西有興趣嗎？ | 是 | 否 |
| 8. 你的孩子會正確玩小玩具（例如車子或積木），而不是只把它們放在嘴裡、隨便亂動或是把它們丟掉？ | 是 | 否 |
| 9. 你的孩子曾經拿東西給你（家長）看嗎？ | 是 | 否 |
| 10. 你的孩子會注意看著你的眼睛超過一、兩秒鐘嗎？ | 是 | 否 |
| 11. 你的孩子曾對聲音過敏感嗎？（例如摀住耳朵） | 是 | 否 |
| 12. 你的孩子看著你的臉或是你的微笑時會以微笑回應嗎？ | 是 | 否 |
| 13. 你的孩子會模仿你嗎？（例如：你扮個鬼臉，你的孩子會模仿嗎？） | 是 | 否 |
| 14. 你的孩子聽到別人叫他／她的名字時，他／她會回應嗎？ | 是 | 否 |
| 15. 如果你指著房間另一頭的玩具，你的孩子會看那個玩具嗎？ | 是 | 否 |
| 16. 你的孩子走路嗎？ | 是 | 否 |
| 17. 你的孩子會看你正在看的東西嗎？ | 是 | 否 |
| 18. 你的孩子會在他／她的臉附近做出一些不尋常的手指頭動作嗎？ | 是 | 否 |
| 19. 你的孩子會設法吸引你看他／她自己的活動嗎？ | 是 | 否 |
| 20. 你是否曾經懷疑你的孩子聽力有問題？ | 是 | 否 |
| 21. 你的孩子能理解別人說的話嗎？ | 是 | 否 |
| 22. 你的孩子有時候會兩眼失焦或是沒有目的地逛來逛去嗎？ | 是 | 否 |
| 23. 你的孩子碰到不熟悉的事物時會看著你的臉，看看你的反應嗎？ | 是 | 否 |

APPENDIX E
M-CHAT SCORING
(English and Chinese version)

Modified Checklist for Autism in Toddlers (M-CHAT)*

Diana L. Robins, M.A., Deborah Fein, Ph.D., Marianne L. Barton, Ph.D., & James A. Green,

Ph.D.

University of Connecticut

*The full text may be obtained through the Journal of Autism and Developmental Disorders,

April 2001

PLEASE NOTE: The M-CHAT was not designed to be scored by the person taking it. In the validation sample, the authors of the M-CHAT scored all checklists. If parents are concerned, they should contact their child's physician.

Abstract

Autism, a severe disorder of development, is difficult to detect in very young children. However, children who receive early intervention have improved long-term prognoses. The Modified – Checklist for Autism in Toddlers (M-CHAT), consisting of 23 yes/no items, was used to screen 1076 children. Thirty of 44 children given a diagnostic/developmental evaluation were diagnosed with a disorder on the autism spectrum. Nine items pertaining to social relatedness and communication were found to have the best discriminability between children diagnosed with and without autism/PDD. Cutoff scores were created for the best items and the total checklist. Results indicate that the M-CHAT is a promising instrument for the early detection of autism.

Background

The M-CHAT is an expanded American version of the original CHAT from the U.K. The M-CHAT has 23 questions using the original nine from the CHAT as its basis. Its goal is to improve the sensitivity of the CHAT and position it better for an American audience.

The M-CHAT has been steadily expanding its radius of usage in the state of Connecticut and surrounding New England states. Its authors are still collecting data on the initial study, awaiting final outcomes for sensitivity and specificity after the subjects return for their 3.5 year well-child visit by 2003. The authors have applied for funding of an expanded study on 33,000 children. The M-CHAT tests for autism spectrum disorders against normally developing children.

M-CHAT Scoring Instructions

A child fails the checklist when **2 or more critical items** are failed **OR** when **any three items** are failed. Yes/No answers convert to pass/fail responses. Below are listed the *pass responses* for each item on the M-CHAT. **Bold capitalized items with an asterisk (*) are CRITICAL items.**

Not all children who fail the checklist will meet criteria for a diagnosis on the autism spectrum. However, children who fail the checklist should be evaluated in more depth by the physician or referred for a developmental evaluation with a specialist.

NOTE: The scoring key that we provide is the mirror opposite of the key you will find if you download the MCHAT from any website but ours. The British key provides you with all the FAILED responses. This key provides you with all of the CORRECT or answers – that is, the answers that you will find for typically developing children

1. Yes
- 2. YES ***
3. Yes
4. Yes
5. Yes
6. Yes
- 7. YES ***
8. Yes
- 9. YES ***
10. Yes
11. No
12. Yes
- 13. YES ***
- 14. YES ***
- 15. YES ***
16. Yes
17. Yes
18. No
19. Yes
20. No
21. Yes
22. No
23. Yes

修正的幼兒自閉症檢查表（M-CHAT）計分說明

關鍵性項目中有兩項或兩項以上的答案為未通過，或是所有項目當中有任何三項的答案為未通過，該名兒童就被評定為未通過。是／否的答案轉換為通過／未通過。

下列為M-CHAT上所有項目未通過的答案。粗體字的項目為關鍵性項目。

檢查表判定為未通過的兒童並非全都達到自閉症範圍診斷的標準。然而，未通過檢查表的兒童應該由醫師做更進一步的評估，或是交由專家做發展評估。

1.否	6.否	11.是	16.否	21.否
2.否	7.否	12.否	17.否	22.是
3.否	8.否	13.否	18.是	23.否
4.否	9.否	14.否	19.否	
5.否	10.否	15.否	20.是	

APPENDIX F

**MODIFIED CHECKLIST FOR AUTISM IN
TODDLER, REVISED, WITH
FOLLOW-UP
(M-CHAT-R/F)**

Modified Checklist for Autism in Toddlers, Revised, with Follow-Up
(M-CHAT-R/F)TM

Diana L. Robins, Ph.D.
Deborah Fein, Ph.D.
Marianne Barton, Ph.D.

Acknowledgement: We thank the M-CHAT Study Group in Spain for developing the flow chart format used in this document.

For more information, please see www.mchatscreen.com
or contact Diana Robins at DianaLRobins@gmail.com

© 2009 Diana Robins, Deborah Fein, & Marianne Barton

Permissions for Use of the M-CHAT-R/F™

The Modified Checklist for Autism in Toddlers, Revised with Follow-Up (M-CHAT-R/F; Robins, Fein, & Barton, 2009) is a 2-stage parent-report screening tool to assess risk for Autism Spectrum Disorder (ASD). The M-CHAT-R/F is available for free download for clinical, research, and educational purposes. Download of the M-CHAT-R/F and related material is authorized from www.mchatscreen.com.

The M-CHAT-R/F is a copyrighted instrument, and use of the M-CHAT-R/F must follow these guidelines:

- (1) Reprints/reproductions of the M-CHAT-R must include the copyright at the bottom (© 2009 Robins, Fein, & Barton). No modifications can be made to items, instructions, or item order without permission from the authors.
- (2) The M-CHAT-R must be used in its entirety. Evidence indicates that any subsets of items do not demonstrate adequate psychometric properties.
- (3) Parties interested in reproducing the M-CHAT-R/F in print (e.g., a book or journal article) or electronically for use by others (e.g., as part of digital medical record or other software packages) must contact Diana Robins to request permission (DianaLRobins@gmail.com).
- (4) If you are part of a medical practice, and you want to incorporate the first stage M-CHAT-R questions into your own practice's electronic medical record (EMR), you are welcome to do so. However, if you ever want to distribute your EMR page outside of your practice, please contact Diana Robins to request a licensing agreement.

Instructions for Use

The M-CHAT-R can be administered and scored as part of a well-child care visit, and also can be used by specialists or other professionals to assess risk for ASD. The primary goal of the M-CHAT-R is to maximize sensitivity, meaning to detect as many cases of ASD as possible. Therefore, there is a high false positive rate, meaning that not all children who score at risk will be diagnosed with ASD. To address this, we have developed the Follow-Up questions (M-CHAT-R/F). Users should be aware that even with the Follow-Up, a significant number of the children who screen positive on the M-CHAT-R will not be diagnosed with ASD; however, these children are at high risk for other developmental disorders or delays, and therefore, evaluation is warranted for any child who screens positive. The M-CHAT-R can be scored in less than two minutes. Scoring instructions can be downloaded from <http://www.mchatscreen.com>. Associated documents will be available for download as well.

Scoring Algorithm

For all items except 2, 5, and 12, the response "NO" indicates ASD risk; for items 2, 5, and 12, "YES" indicates ASD risk. The following algorithm maximizes psychometric properties of the M-CHAT-R:

- LOW-RISK:** **Total Score is 0-2;** if child is younger than 24 months, screen again after second birthday. No further action required unless surveillance indicates risk for ASD.
- MEDIUM-RISK:** **Total Score is 3-7;** Administer the Follow-Up (second stage of M-CHAT-R/F) to get additional information about at-risk responses. If M-CHAT-R/F score remains at 2 or higher, the child has screened positive. Action required: refer child for diagnostic evaluation and eligibility evaluation for early intervention. If score on Follow-Up is 0-1, child has screened negative. No further action required unless surveillance indicates risk for ASD. Child should be rescreened at future well-child visits.
- HIGH-RISK:** **Total Score is 8-20;** It is acceptable to bypass the Follow-Up and refer immediately for diagnostic evaluation and eligibility evaluation for early intervention.

M-CHAT-R™

Please answer these questions about your child. Keep in mind how your child usually behaves. If you have seen your child do the behavior a few times, but he or she does not usually do it, then please answer **no**. Please circle **yes** or **no** for every question. Thank you very much.

1. If you point at something across the room, does your child look at it? (FOR EXAMPLE , if you point at a toy or an animal, does your child look at the toy or animal?)	Yes	No
2. Have you ever wondered if your child might be deaf?	Yes	No
3. Does your child play pretend or make-believe? (FOR EXAMPLE , pretend to drink from an empty cup, pretend to talk on a phone, or pretend to feed a doll or stuffed animal?)	Yes	No
4. Does your child like climbing on things? (FOR EXAMPLE , furniture, playground equipment, or stairs)	Yes	No
5. Does your child make <u>unusual</u> finger movements near his or her eyes? (FOR EXAMPLE , does your child wiggle his or her fingers close to his or her eyes?)	Yes	No
6. Does your child point with one finger to ask for something or to get help? (FOR EXAMPLE , pointing to a snack or toy that is out of reach)	Yes	No
7. Does your child point with one finger to show you something interesting? (FOR EXAMPLE , pointing to an airplane in the sky or a big truck in the road)	Yes	No
8. Is your child interested in other children? (FOR EXAMPLE , does your child watch other children, smile at them, or go to them?)	Yes	No
9. Does your child show you things by bringing them to you or holding them up for you to see – not to get help, but just to share? (FOR EXAMPLE , showing you a flower, a stuffed animal, or a toy truck)	Yes	No
10. Does your child respond when you call his or her name? (FOR EXAMPLE , does he or she look up, talk or babble, or stop what he or she is doing when you call his or her name?)	Yes	No
11. When you smile at your child, does he or she smile back at you?	Yes	No
12. Does your child get upset by everyday noises? (FOR EXAMPLE , does your child scream or cry to noise such as a vacuum cleaner or loud music?)	Yes	No
13. Does your child walk?	Yes	No
14. Does your child look you in the eye when you are talking to him or her, playing with him or her, or dressing him or her?	Yes	No
15. Does your child try to copy what you do? (FOR EXAMPLE , wave bye-bye, clap, or make a funny noise when you do)	Yes	No
16. If you turn your head to look at something, does your child look around to see what you are looking at?	Yes	No
17. Does your child try to get you to watch him or her? (FOR EXAMPLE , does your child look at you for praise, or say “look” or “watch me”?)	Yes	No
18. Does your child understand when you tell him or her to do something? (FOR EXAMPLE , if you don’t point, can your child understand “put the book on the chair” or “bring me the blanket”?)	Yes	No
19. If something new happens, does your child look at your face to see how you feel about it? (FOR EXAMPLE , if he or she hears a strange or funny noise, or sees a new toy, will he or she look at your face?)	Yes	No
20. Does your child like movement activities? (FOR EXAMPLE , being swung or bounced on your knee)	Yes	No

M-CHAT-R Follow-Up (M-CHAT-R/F)TM

Permissions for Use

The Modified Checklist for Autism in Toddlers, Revised, with Follow-Up (M-CHAT-R/F; Robins, Fein, & Barton, 2009) is designed to accompany the M-CHAT-R. The M-CHAT-R/F may be downloaded from www.mchatscreen.com.

The M-CHAT-R/F is a copyrighted instrument, and use of this instrument is limited by the authors and copyright holders. The M-CHAT-R and M-CHAT-R/F may be used for clinical, research, and educational purposes. Although we are making the tool available free of charge for these uses, this is copyrighted material and it is not open source. Anyone interested in using the M-CHAT-R/F in any commercial or electronic products must contact Diana L. Robins at DianaLRobins@gmail.com to request permission.

Instructions for Use

The M-CHAT-R/F is designed to be used with the M-CHAT-R; the M-CHAT-R is valid for screening toddlers between 16 and 30 months of age, to assess risk for autism spectrum disorder (ASD). Users should be aware that even with the Follow-Up, a significant number of the children who fail the M-CHAT-R will not be diagnosed with ASD; however, these children are at risk for other developmental disorders or delays, and therefore, follow-up is warranted for any child who screens positive.

Once a parent has completed the M-CHAT-R, score the instrument according to the instructions. If the child screens positive, select the Follow-Up items based on which items the child failed on the M-CHAT-R; only those items that were originally failed need to be administered for a complete interview.

Each page of the interview corresponds to one item from the M-CHAT-R. Follow the flowchart format, asking questions until a PASS or FAIL is scored. Please note that parents may report “maybe” in response to questions during the interview. When a parent reports “maybe,” ask whether most often the answer is “yes” or “no” and continue the interview according to that response. In places where there is room to report an “other” response, the interviewer must use his/her judgment to determine whether it is a passing response or not.

Score the responses to each item on the M-CHAT-R/F Scoring Sheet (which contains the same items as the M-CHAT-R, but Yes/No has been replaced by Pass/Fail). The interview is considered to be a screen positive if the child fails any two items on the Follow-Up. If a child screens positive on the M-CHAT-R/F, it is strongly recommended that the child is referred for early intervention and diagnostic testing as soon as possible. Please note that if the healthcare provider or parent has concerns about ASDs, children should be referred for evaluation regardless of the score on the M-CHAT-R or M-CHAT-R/F.

M-CHAT-R Follow-Up™ Scoring Sheet

Please note: Yes/No has been replaced with Pass/Fail

1. If you point at something across the room, does your child look at it? (FOR EXAMPLE , if you point at a toy or an animal, does your child look at the toy or animal?)	Pass	Fail
2. Have you ever wondered if your child might be deaf?	Pass	Fail
3. Does your child play pretend or make-believe? (FOR EXAMPLE , pretend to drink from an empty cup, pretend to talk on a phone, or pretend to feed a doll or stuffed animal)	Pass	Fail
4. Does your child like climbing on things? (FOR EXAMPLE , furniture, playground equipment, or stairs)	Pass	Fail
5. Does your child make <u>unusual</u> finger movements near his or her eyes? (FOR EXAMPLE , does your child wiggle his or her fingers close to his or her eyes?)	Pass	Fail
6. Does your child point with one finger to ask for something or to get help? (FOR EXAMPLE , pointing to a snack or toy that is out of reach)	Pass	Fail
7. Does your child point with one finger to show you something interesting? (FOR EXAMPLE , pointing to an airplane in the sky or a big truck in the road)	Pass	Fail
8. Is your child interested in other children? (FOR EXAMPLE , does your child watch other children, smile at them, or go to them?)	Pass	Fail
9. Does your child show you things by bringing them to you or holding them up for you to see – not to get help, but just to share? (FOR EXAMPLE , showing you a flower, a stuffed animal, or a toy truck)	Pass	Fail
10. Does your child respond when you call his or her name? (FOR EXAMPLE , does he or she look up, talk or babble, or stop what he or she is doing when you call his or her name?)	Pass	Fail
11. When you smile at your child, does he or she smile back at you?	Pass	Fail
12. Does your child get upset by everyday noises? (FOR EXAMPLE , a vacuum cleaner or loud music)	Pass	Fail
13. Does your child walk?	Pass	Fail
14. Does your child look you in the eye when you are talking to him or her, playing with him or her, or dressing him or her?	Pass	Fail
15. Does your child try to copy what you do? (FOR EXAMPLE , wave bye-bye, clap, or make a funny noise when you do)	Pass	Fail
16. If you turn your head to look at something, does your child look around to see what you are looking at?	Pass	Fail
17. Does your child try to get you to watch him or her? (FOR EXAMPLE , does your child look at you for praise, or say “look” or “watch me”)	Pass	Fail
18. Does your child understand when you tell him or her to do something? (FOR EXAMPLE , if you don’t point, can your child understand “put the book on the chair” or “bring me the blanket”)	Pass	Fail
19. If something new happens, does your child look at your face to see how you feel about it? (FOR EXAMPLE , if he or she hears a strange or funny noise, or sees a new toy, will he or she look at your face?)	Pass	Fail
20. Does your child like movement activities? (FOR EXAMPLE , being swung or bounced on your knee)	Pass	Fail

Total Score: _____

APPENDIX G
INSTITUTIONAL REVIEW BOARD APPROVAL

UNIVERSITY of
NORTHERN COLORADO



Institutional Review Board

DATE: January 31, 2014

TO: Feng-Chen Lin

FROM: University of Northern Colorado (UNCO) IRB

PROJECT TITLE: [534401-2] THE IDENTIFICATION OF EARLY SIGNS OF AUTISM
SPECTRUM DISORDERS IN YOUNG CHILDREN OF TAIWAN

SUBMISSION TYPE: Revision

ACTION: APPROVAL/VERIFICATION OF EXEMPT STATUS

DECISION DATE: January 31, 2014

Thank you for your submission of Revision materials for this project. The University of Northern Colorado (UNCO) IRB approves this project and verifies its status as EXEMPT according to federal IRB regulations.

We will retain a copy of this correspondence within our records for a duration of 4 years.

If you have any questions, please contact Sherry May at 970-351-1910 or Sherry.May@unco.edu. Please include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within University of Northern Colorado (UNCO) IRB's records.

APPENDIX H
CONSENT FORMS FOR PARENTS
(English and Chinese version)

CONSENT FORM FOR HUMAN PARTICIPANTS IN RESEARCH
UNIVERSITY OF NORTHERN COLORADO

Project Title: The Identification of Early Signs of Autism Spectrum Disorders in Young Children of Taiwan

Researcher: Feng-Chen Lin, M.A., School of Special Education

Phone Number: 970-313-8141

Email: lin1746@bears.unco.edu, jessicafclin@gmail.com

Dear parent,

You are invited to participate in a research study conducted from the School of Special Education, University of Northern Colorado. I hope to learn about the identification of early signs of autism spectrum disorders in young children of Taiwan. Below I provide more information for you to make an informed decision about your participation.

What the study is about: The purposes of this study are: (a) to examine the cultural appropriateness of M-CHAT as an autism screening instrument for toddlers in Taiwan, and (b) to investigate the reliability and validity of M-CHAT for toddlers in Taiwan.

What we will ask you to do: If you agree to be in this study, you will be asked to complete the M-CHAT measure, demographic questionnaire and the expert survey. These surveys will take about 10-15 minutes to complete. A few of you will be randomly selected to complete the M-CHAT a second time, which should only take about 10 minutes to complete.

Risks and benefits: I do not anticipate any risks to your participating in this study. As you are responding to the measures, there is a risk that you may feel challenged and uncomfortable about issues raised by the surveys. I will be willing to answer and clarify any questions regarding the measures. Referral resources will be provided if needed. If at any time you feel uncomfortable, you can choose to stop participating in this study.

You will benefit from this study by gaining more understanding of early signs of autism. When signs and symptoms of autism are identified early, children can receive evidence-based interventions as early as possible. If you decide to participate in this study, you will receive a small handbook related to early identification of developmental delay, early signs of children with autism and the resources of early intervention.

Your answers will be confidential. The records of this study will be kept private. In any sort of report we make public we will not include any information that will make it possible to identify you. Research records will be kept in a locked file; only the researcher will have access to the records. Please feel free to contact me if you have any questions about the study.

Participation is voluntary. You may decide not to participate in this study and if you begin participation you may still decide to stop and withdraw at any time. Your decision will not result in loss of benefits to which you are otherwise entitled. Having read the above and having had an opportunity to ask any questions, please sign below if you would like to participate in this research. A copy of this form will be given to you to retain for future reference. If you have any concerns about your selection or treatment as a research participant, please contact the Office of Sponsored Programs, Kepner Hall, University of Northern Colorado Greeley, CO 80639; 970-351-2161.

Signature of Parent _____ Date _____

Address: _____

Signature of Researcher _____ Date _____



問卷調查同意書

親愛的家長您好：

非常感謝您撥冗填寫此問卷。本人目前正在進行一項『幼兒自閉症早期徵兆之辨識與評估』的研究，目的在於了解美國幼兒自閉症篩檢量表修訂版(The Modified Checklist for Autism in Toddlers, M-CHAT)之中文版檢測項目是否符合台灣 16 至 30 個月大幼兒的發展，及其應用於台灣之適切性調查。本研究結果將做為日後篩檢量表修正與改善之用，以便能有效推廣，因此，您的評論與參與對本研究具有重要意義與價值。

本問卷內容包括(1)背景資料問卷(2)專家參問卷(3)幼兒自閉症檢核表。參與本研究不會帶來任何危險，若您同意參與本研究，請您撥冗 10-15 分鐘完成此份問卷。本研究進行過程中，部分參與者將在 2-3 週內再收到一份相同的幼兒自閉症檢核表，作為本研究再測信度之參考。此研究過程中所收集的資料將會絕對保密，並僅供學術研究之用，絕不對外個別發表。如有需要，本研究結果的摘要將免費提供給您參考。

您的參與純屬自願性質，若您不願意參加、或中途決定退出，可在任何時間告知研究人員，我們將尊重您的決定。若有任何疑問時請盡量提出，研究人員將樂意為您說明並回答相關問題。謝謝您的鼎力支持與協助。

在此致上最誠摯的謝意，敬祝您

身體健康 平安喜樂

美國北科羅拉多大學特殊教育研究所

指導教授：Dr. Kay Ferrell

博士班研究生：林鳳貞

聯絡電話：0953252484

聯絡 Email：jessicafclin@gmail.com

中華民國一〇三年六月

參與者姓名_____日期_____

參與者Email_____

APPENDIX I
CONSENT FORMS FOR PROFESSIONALS
(English and Chinese version)

CONSENT FORM FOR HUMAN PARTICIPANTS IN RESEARCH
UNIVERSITY OF NORTHERN COLORADO

Project Title: The Identification of Early Signs of Autism Spectrum Disorders in Young Children of Taiwan

Researcher: Feng-Chen Lin, M.A., School of Special Education

Phone Number: 970-313-8141

Email: lin1746@bears.unco.edu, jessicafclin@gmail.com

Dear professionals,

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What the study is about: The purposes of this study are: (a) to examine the cultural appropriateness of M-CHAT as an autism screening instrument for toddlers in Taiwan, and (b) to investigate the reliability and validity of M-CHAT for toddlers in Taiwan.

What we will ask you to do: If you agree to be in this study, you will be asked to complete the demographic questionnaire and the expert survey. These surveys will take about 10-15 minutes to complete.

Risks and benefits: I do not anticipate any risks to your participating in this study. I will be willing to answer and clarify any questions regarding the measures. If at any time you feel uncomfortable, you can choose to stop participating in this study.

You will benefit from this study by gaining more understanding of early signs of autism. When signs and symptoms of autism are identified early, children can receive evidence-based interventions as early as possible. If you decide to participate in this study, you will receive a small handbook related to early identification of developmental delay, early signs of children with autism and the resources of early intervention.

Your answers will be confidential. The records of this study will be kept private. In any sort of report we make public we will not include any information that will make it possible to identify you. Research records will be kept in a locked file; only the researcher will have access to the records. Please feel free to contact me if you have any questions about the study.

Participation is voluntary. You may decide not to participate in this study and if you begin participation you may still decide to stop and withdraw at any time. Your decision will not result in loss of benefits to which you are otherwise entitled. Having read the above and having had an opportunity to ask any questions, please sign below if you would like to participate in this research. A copy of this form will be given to you to retain for future reference. If you have any concerns about your selection or treatment as a research participant, please contact the Office of Sponsored Programs, Kepner Hall, University of Northern Colorado Greeley, CO 80639; 970-351-2161.

Signature of Parent _____ Date _____

Address: _____

Signature of Researcher _____ Date _____

問卷調查同意書

親愛的早療專業團隊您好：

非常感謝您撥冗填寫此問卷。本人目前正在進行一項『幼兒自閉症早期徵兆之辨識與評估』的研究，目的在於了解美國幼兒自閉症篩檢量表修訂版(The Modified Checklist for Autism in Toddlers, M-CHAT)之中文版檢測項目是否符合台灣 16 至 30 個月大幼兒的發展，及其應用於台灣之適切性調查。本研究結果將做為日後篩檢量表修正與改善之用，以便能有效推廣，因此，您的評論與參與對本研究具有重要意義與價值。

本問卷內容包括(1)背景資料問卷(2)專家參問卷。參與本研究不會帶來任何危險，若您同意參與本研究，請您撥冗 10-15 分鐘完成此份問卷。此研究過程中所收集的資料將會絕對保密，並僅供學術研究之用，絕不對外個別發表。如有需要，本研究結果的摘要將免費提供給您參考。

您的參與純屬自願性質，若您不願意參加、或中途決定退出，可在任何時間告知研究人員，我們將尊重您的決定。若有任何疑問時請盡量提出，研究人員將樂意為您說明並回答相關問題。謝謝您的鼎力支持與協助。

在此致上最誠摯的謝意，敬祝您

身體健康 平安喜樂

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聯絡 Email: jessicafclin@gmail.com

中華民國一〇三年六月

參與者姓名_____日期_____

參與者Email_____