AN ABSTRACT OF THE DISSERTATION OF

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Early intervention services promote children's optimal health. The benefit of early intervention is invaluable to society for years to come. One important step in providing early intervention is the identification of children who need early intervention services. In Taiwan, the lack of a culturally appropriate, reliable, and valid child developmental screening instrument for Taiwanese children has significantly hindered the effectiveness and accuracy of identifying children who might benefit from early intervention services. One method has been to translate child development instruments from other countries. However, direct use of translated foreign child development assessment instruments is questionable, unless the tool has been adequately validated in Taiwan.

The present study examined the culturally appropriateness and effectiveness of the Ages and Stages Questionnaire (ASQ) for three-year-old children in Taiwan. The ASQ is a low-cost and widely used child development screening instrument in the United States.

The 36-month ASQ was translated into Manderin Chinese and back translated into English. The translated 36-month ASQ was then reviewed by five Taiwanese child development experts before distribution. The sample included 101 children with no

known developmental delays from 34 preschools in Taiwan and 11 children with diagnosed developmental delays who were registered with the Child Welfare service agency in Pingtung area in southern Taiwan. The 36-month ASQ were completed by the parents and the teachers of these 112 Taiwanese children.

Results indicated that the translated Chinese 36-month ASQ was a culturally appropriate child developmental screening instrument for three-year-old Taiwanese children. The Chinese 36-month ASQ demonstrated satisfactory internal consistency, inter-rater reliability, and criterion validity. However, some issues were identified concerning the content and construct validity of the problem solving and personal social subscales for the translated Chinese 36-month ASQ. In addition, comparison of the 36-month ASQ subscale means found significant differences between the Taiwanese and the U. S. samples on the fine motor and problem solving subscales. Before the translated Chinese 36-month ASQ can be used as a developmental screening instrument in Taiwan, further investigations are needed to establish it's content and construct validity as well as the Taiwanese 36-month ASQ subscale cutoff points using a larger and more representative sample.

The current study contributes to the literature of cross-cultural assessment and had significant practical implications for early identification of children with developmental delays in Taiwan. The study concluded that the translated Chinese 36-month ASQ is a culturally appropriate and reliable tool for Taiwanese children; however, further investigations of the content and construct validity are needed before the ASQ can be recommended for use in Taiwan.

Early Identification of Preschool Children with Developmental Delays in Taiwan

by
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I understand that my dissertation will become part of the permanent collection of Oregon State University libraries. My signature below authorized release of my dissertation to any reader upon request.

Huei-Ling Agnes Tsai, Author

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This dissertation is dedicated to my beloved children Inis, Benny, and Lucy, my husband, and my mother for their endless love, support, and patience.

EARLY IDENTIFICATION OF PRESCHOOL CHILDREN WITH DEVELOPMENTAL DELAYS IN TAIWAN

CHAPTER 1: INTRODUCTION

Effectiveness of Early Intervention

Over the last three decades, vigorous efforts in the United States have demonstrated that early intervention services for children with developmental delays and for children who are developmentally at risk will promote children's optimal health and development (Florian, 1995; Guralnick, 1997; Ramey & Ramey, 1998). Examples of effective early intervention programs include the Abecedarian Project (Campbell & Ramey, 1995), the Perry Preschool Project (Schweinhart, Barnes, Weikart, Barnett, & Epstein, 1993; Schweinhart & Weikart, 1993; Schweinhart, & Weikart, 2002), the Infant Health and Development Program (Brooks-Gunn, Gross, Kraemer, Spiker, & Shapiro, 1992; Gross, 1993; Hill, Brooks-Gunn, & Waldfogel, 2003), and the Head Start Program (Zigler & Berman 1983; Zigler, & Styfco, 1994). However, the success of these programs has not been duplicated in other countries especially Asian countries such as Taiwan.

Early Intervention in Taiwan

In Taiwan, there have been recent efforts to provide early intervention services. Inspired by the U.S. examples and pressured by many child welfare organizations, the Revised Child Welfare Law of 1993 in Taiwan requires every local government to provide early intervention services for children with developmental delays (廖華芳, 李宜靜, 吳文豪, 林麗英, 高麗芷, 1999).

Revised in 1997, the Disability Welfare Law requires the health service system to provide individuals with disabilities early identification, early medical intervention, and health insurance services (廖華芳 et al., 1999). In the same year, a new special education law was put in place to ensure that all three-year-old children with disabilities will attend preschool by 2003 (Kang, Lovett, & Haring, 2002). However, these laws have not been consistently or practically applied to children and families in Taiwan. According to a recent estimate by the Children's Bureau in Taiwan (2003), there are about 133,960 children under age six with developmental delays, and only 16,286 (14%) of them are currently registered for services. This means that the majority (86%) of Taiwanese children with developmental delays under age six still have not been effectively identified to receive early intervention services as the law prescribes. Reasons for low identification rates of children with developmental delays include a lack of systematic developmental screening processes, a traditional prejudice towards individuals with disabilities, and a lack of a cost-effective and culturally valid screening instrument.

Lack of A Systematic Screening Process

One of the barriers to identify children at risk in Taiwan is the lack of a systematic screening process to evaluate children for developmental delays. Although there is an universal health care system that requires pediatricians to screen children for developmental delays during well-child visits, in reality, this is often not done. The parents of every newborn baby since 1995 have been given the Child Health Handbook which contains primal health screening items that are to be checked by the

pediatrician during the well-child visits. However, instead of being checked by the pediatricians, parents are often asked to check off the boxes on those items and then find a stamp on the handbook saying that the physician will not be responsible for the screening results after their well-child visits.

Traditional Prejudice Toward People with Disabilities

The traditional prejudice against individuals with disabilities is another obstacle in identifying children with developmental delays. With the prevailing belief in reincarnation in Taiwan, people think that individuals with disabilities are cursed because of their family's wrong doing in their past lives (Kang, Lovett, & Haring, 2002; Tsai & Rosenkoetter, 2003). Because of this belief, many Chinese people think that providing services for people with disabilities is a waste of time and money (Guthrie, 1994). This explains why the majority of preschools still do not accept children with special needs (Ministry of Education, 2000) and the majority of individuals with disabilities are still kept in their homes and not registered for services (Asian Affairs, 2000).

Lack of Culturally Valid Developmental Screening Instrument

Finally, low identification rates are also due to the absence of a developmental screening 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), the Chinese Children Development Inventory (CCDI), and professional knowledge (萬育維, 1993).

The validity and reliability of Denver II and CCDI for Taiwanese children has not been established, and professional knowledge alone accounts for little developmental screening validity (Glascoe, Martin, & Humphrey, 1990; Glascoe, 1997; Glascoe, 2000a; Glascoe, 2000b).

Development Within a Theoretical Context

Developmental theories suggest that children's environments have a significant influence on their development. Bronfenbrenner's ecological systems theory (1986) provides a macro-level framework to understand how children growing up in different nations may have very different living contexts that affect the individual's growth and development. In addition, Thelen's dynamic systems theory (2000) gives a micro-level perspective on how many different factors may influence an individual's development at any given level. The dynamic systems theory emphasis the interaction of task, function, and environment suggests that children's development may differ according to the specific behavior and culture norms. Research (Super, 1976; Solomons & Solomons, 1975) has also found that different cultures influence parenting beliefs and practices in ways that cause children to differ from culture to culture. Thus, it is very questionable to use another country's standards to evaluate children in Taiwan without checking for cultural validity and reliability first.

The traditional prejudice against individuals with disabilities and a lack of a systematic standardized developmental screening instrument result in a very low identification rate of children with developmental delays in Taiwan. In order to effectively identify children at risk for developmental delays, it is important to rely on

a systematic and cost-effective developmental screening system using culturally valid and reliable instruments. Ideally, the developing child should be screened periodically throughout the developing process. Without standardized procedures, professionals might overlook subtle differences in certain domains of development and delay the timing for referral.

Research Goals

The present study sought to identify an effective and culturally appropriate developmental screening instrument for three-year-old children in Taiwan. Three-year-old children were chosen for this study because: (1) the majority of children under six years of age currently with developmental delays are not identified for early intervention services, (2) age three is the beginning of most Taiwanese children's educational experiences, and (3) early identification of developmental delays allows for early intervention to promote a child's optimal development.

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 developmental delays than screening instruments that are administered by the professionals (American Academy of Pediatrics, 2002). The Ages and Stages Questionnaires (ASQ) are examples of a parent-report, low-cost, and easy to use child developmental screening instrument that can be adapted to use in Taiwan. The reliability and validity of ASQ has been well established over 20 years for the U. S. population (Bricker & Squires, 1989a; Bricker & Squires, 1989b; Bricker, Squires, Kaminski, & Mounts, 1988; Dale, Bates, Reznick, & Morisset, 1989; Diamond &

Squires, 1993; Squires, 2000; Squires & Bricker, 1991). In addition, the ASQ has been translated into Norwegian, Spanish, French, and Korean. Research by Janson (2002) and Janson and Squires (2004) support the cultural validity of the ASQ in Norway. Presently, the validity and reliability of the ASQ are being established in Korea and Canada.

The present study had three goals: (1) to examine the cultural appropriateness of ASQ as a developmental screening instrument for three-year-old children in Taiwan, (2) to investigate the reliability and validity of ASQ for three-year-old children in Taiwan, and (3) to compare the ASQ subset mean scores of U.S. and Taiwanese three-year-old children.

The next chapter will discuss the following topics in depth: (1) how different culture may influence child development from the theoretical perspective and empirical views; (2) different types and purposes of child developmental assessment in early intervention; (3) current practices of child developmental screening in Taiwan; and (4) criteria for selecting effective screening tools, and (5) rational for using the Ages and Stages Questionnaires in the present study.

CHAPTER 2: LITERATURE REVIEW

Cultural Influences on Child Development

Theoretical Perspective

Recent human development theories have emphasized the importance of the interaction between culture and human development. These theories support the notion that using a foreign assessment instrument to evaluate children in Taiwan without checking for cultural validity and reliability is strongly questionable. The ecological system theory and the dynamic systems theory both emphasize the importance of the environmental influence on human development and provide the theoretical perspective for the present study.

Ecological System Theory

Bronfenbrenner's (1979, 1986) ecological system theory suggests that it is vital to study human development in its broader context. In the ecological framework of human development, there are four different levels of environmental systems that all influence the developing child and family: the microsystem, the mesosystem, the exosystem, and the macrosystem (Bretherton, 1993; Bronfenbrenner, 1979, 1986). Bronfenbrenner's definitions of each system are provided below with corresponding examples to illustrate the environment in which a Taiwanese child lives and to demonstrate that the processes operating in different system settings are interdependent.

Macrosystem. The macrosystem comprises the belief systems, resources, hazards, life-styles, opportunity structures, life course options, and patterns of social

interchange that may be considered as a specific society's blueprint for living (Bretherton, 1993; Bronfenbrenner, 1979, 1986). Taiwan is one of the highest populated nations in the world, ranking third, with 610 persons per squared kilometer compared to the U.S. with 30 persons per squared kilometer (Bureau of Statistics, 2000). The majority of people in Taiwan originally came from mainland China. Many have lived in Taiwan for several centuries, with others arriving more recently when the Communist Party took control of mainland China. Thus, most people in Taiwan are Chinese, with only about two percent of the population being of indigenous descent (Bureau of Census, 2003). With more than 50 years of segregation between mainland China and Taiwan, a unique Taiwanese culture has emerged. Nevertheless, people in Taiwan are still very proud of their Chinese ancestry and honor the Chinese tradition. Traditional beliefs of Confucianism, Taoism, and Buddhism still dominate in Taiwanese society. The rationale for the present study is based on the belief that different macrosystem contexts in the U.S. and Taiwan may have an effect on children's development. Thus, it is inappropriate to use an American child development instrument to evaluate Taiwanese children without a validation process.

Exosystem. The exosystem is the context which does not directly involve the child but which exerts an effect on the developing child indirectly, such as through the parent's workplace, the parent's social networks, and community influences on family functioning (Bretherton, 1993; Bronfenbrenner, 1979, 1986). In an effort to move Taiwan into one of the developing countries, Taiwanese working conditions and worker's benefits are undergoing dramatic changes. Examples include female workers

having six to eight weeks of paid maternal leave, two years of unpaid leave, two-day paternal leave for childbirth, and weekly working hours being reduced from 44 to 40 hours. In addition to the change in working conditions, the present experience of a global economic recession, the increase in unemployment and crime rates, and the recent educational revolution are all influencing Taiwanese parents and their developing children. Thus, it is important to examine factors such as the parents' employment and social economic status when studying children's development. The present study collected information regarding parents' employment status and occupation.

Mesosystem. The mesosystem is the settings the child directly participates in such as the school, child care center, peer, relatives, and his or her neighborhood (Bretherton, 1993; Bronfenbrenner, 1979, 1986). In Taiwan, children usually start preschool at age three. Some child care centers will take children at age two or younger, but the majority admit children at age two and a half and older. As seen in the U.S., the quality of child care centers and preschools in Taiwan varies greatly. Compared with American children, Taiwanese children have more opportunities to interact with cousins, relatives, and neighborhood children because families live closer to each other and thus have more contact opportunities. Although not a focus of this study, the present study collected information on how the child care arrangement and the preschool setting is related to a child's development.

Microsystem. The microsystem is the principle context, such as family, where development takes place (Bretherton, 1993; Bronfenbrenner, 1979, 1986). For

Taiwanese children, the microsystem of a child's first three years of life could be very different from an American child. Generally, there are four common family structures (Bureau of Statistics, 2000; 林惠生 ,1994).

The most common type of family structure is the nuclear family in which a child lives with his or her parents. This structure exemplifies the majority of today's Taiwanese society (Bureau of Statistics, 2000). However, with the increase of women in the work force, children under age three are often cared for by a 24-hour nanny (paid child care provider), a day-time nanny, or a nearby relative, usually a grandparent.

The second type of family structure is the three-generation-family in which a child lives with his or her parents and grandparents. Usually this structure consists of the paternal grandparents, but maternal grandparents co-locating are not uncommon either. In this situation, the grandparent is often the primary care giver for the young child although disagreement on parenting beliefs and practices between parents and grandparents are common problems (林惠生 ,1994).

The third type of family structure is the traditional big family in which the paternal grandfather is usually the head of the household and his sons and their families all live together. Because of the industrialization of the Taiwanese society, this arrangement is not as common as it once was. Siblings now often hold jobs in different cities that have resulted in diminishing of the traditional big family in Taiwan. In this arrangement, young children are often cared for by females of the household who are not employed. The family dynamic is more complex in this type of living arrangement.

Usually the male grandparents are the head of the household; however, female grandparents acting as the decision maker is not uncommon.

Finally, there is the single-parent family in which a child lives with one of the parents due to divorce, death of one parent, or an out-of-marriage birth. With the divorce rate increasing in Taiwan, single parent families are also increasing, and this type of family structure is becoming more common (Bureau of Statistics, 2000). Thus, it is important to understand the Taiwanese children's microsystem when assessing child development. The present study gathered information on the child's living arrangement and environment in relation to child development. Taken together, the ecological system theory provides a macro-level view to understand how children growing up in different nations may have very different living contexts that affect an individual's growth and development.

Thelen's Dynamic Systems Theory

Thelen's dynamic system theory illustrates that behavior development is not innate but the result of the interaction among the organism, environment, and the task at hand. Her theory helps explain why it is essential to consider different cultural contexts when evaluating children's development.

Coming from an organismic perspective, Thelen builds on Gesell, McGraw, Bayley, and other developmental psychologists' work and proposes the dynamic systems model for human development. The organismic theorists believe the developmental process is universal and that patterns of behavior in all species tend to follow an orderly genetic sequence (Goldhaber, 2000). Although Thelen's work is

mostly in motor development, she believes that other aspects of development can be understood through observable behavior as well (Thelen, 2000).

Thelen's dynamic systems theory focuses on the link between structure and function in infants' motor development. She contends that every movement is a system-wide ensemble of all participating components, assembled in the context of a particular task at hand. Thelen (2000) noted that "behavior was not 'hard-wired' into the brain, but emerges 'online' in the light of the person's available structure, energetic resources, and the nature of the task to be done" (p.390). For example, Taiwanese children learn to use chopsticks at a very young age because the use of chopsticks is demanded in the Taiwanese culture. In contrast, children raised in western cultures learn to use a fork and knife. Thus, in western countries, using a knife to cut food is a very common skill assessed in child development. Thelen's dynamic theory illustrates the interaction of ecological environment and motor development suggesting that motor development may vary according to different contexts. The dynamic theory emphasis on the plasticity of human behavior development provides a micro-level view of how different cultures may have an influence on child development.

Evidences of cultural influences on child development

Studies of individual and cultural differences in motor development also inform us about the plasticity and complexity of developmental pathways, and the influences and limits of daily experience in shaping them (Solomons & Solomons, 1975; Super, 1976). Different cultural contexts have different expectations of a developing child and result in different child rearing practices and developmental

outcomes. Thus, the direct use of translated developmental assessment instruments for Taiwanese children without considering the cultural validity and reliability is problematic. For example, Super (1976), compared 12 ethnic groups in East Africa, and found that sitting and walking were advanced among the children studied because mothers considered these basic skills essential and trained their children early. Another study (Solomons & Solomons, 1975) noted a delay in walking among the Yucatecan (Mexico) infants because caregivers held the babies constantly and did not allow them to crawl on the floor. Work by Bril and Sabatier suggest that child care practices and beliefs in Mali, which differ markedly from Western cultures may contribute to differences in motor development (Bril & Sabatier, 1986).

Another obvious example of cultural influences on children's development is the high value placed on education in many Asian countries, such as China, Japan, Korea, and Taiwan. Because of the high value of education, child rearing practices in these countries tend to be geared towards high academic performance. Such phenomena have already been witnessed in many cross cultural educational studies (Barclay & Wu, 1977; Chen & Liu, 2000; Chiang, 2000; Holden, 2000; Rosenzweig, 2001). Thus, parenting practices of these Asian countries may lead to an increased emphasis on cognitive achievement because of the high academic focus.

Recently, more attention has been directed towards cross-cultural assessment research. A comparison study of Indian and American scales of child development by Vazir, Lansdown, Naidu, Vidyasagar, and Reddy (1994) found differences on motor, language, personal and social skills. The variation between the Indian scales and those

derived from American children confirm the need for a culturally relevant standardization sample when assessing children's development. The authors concluded that the practice of using tests that have not been standardized in India should be discouraged and efforts should be made to develop more culturally appropriate scales for Indian children (Vazir et al., 1994).

The ecological system theory provides a general framework in understanding the living contexts of children from different nations. The dynamic systems theory gives a close-up perspective on how different cultural factors may influence an individual's development. Research also confirms that cultural influences on parental beliefs and practices affect child development leading to children differing on various aspects of development. Together both theory and empirical findings emphasize the links between context and human development and remind us to take cultural differences into account when studying child development and developing adequate developmental assessment instruments.

Assessment in Early Intervention

Vigorous efforts over the last three decades have demonstrated that well-designed, early, intensive, family-centered, and culturally appropriate intervention services will promote children's optimal health and development (Guralnick, 1997; Ramey & Ramey, 1998). Examples of successful intervention projects include the Abecedarian Project (Campbell & Ramey, 1995), the Perry Preschool Project (Schweinhart, Barnes, Weikart, Barnett, & Epstein, 1993; Schweinhart & Weikart, 1993; Schweinhart, & Weikart, 2002), the Infant Health and

Development Program (Brooks-Gunn, Gross, Kraemer, Spiker, & Shapiro, 1992; Gross, 1993; Hill, Brooks-Gunn, & Waldfogel, 2003), and the Head Start Program (Zigler & Berman 1983; Zigler, & Styfco, 1994).

Accurate assessment directly affects the ability to measure the effectiveness of an early intervention program (Guralnick, 1997; McLean, Bailey, & Wolery, 1996; Witt, Elliot, Daly III, Gresham, & Kramer, 1998). Compared with the fundamental transformation early intervention practices over the last 30 years, assessment for early intervention has not caught up with the advancement in the field (Neisworth and Bagnato, 2000). The National Research Council & Institute of Medicine (2000) also reported in *Early Childhood Interventions: View From The Field* that "the key challenge for the field is less a matter of how to define competence and more a question of how to assess it clinically and measure it empirically" (p. 7). The field of early intervention in Taiwan is confronted with the same challenge. To insure the accuracy, validity, and reliability of assessment in the early intervention field, it is essential for the professionals to be knowledgeable in types and purposes of assessment (Neisworth & Bagnato, 2000; Witt et al., 1998). The following provides a brief description of four different types and purposes of assessment in the early intervention field.

Types and Purposes of Assessment

Assessment should be an ongoing process of gathering information for decision-making in the continuous early intervention process. The person who administers the assessment has the responsibility to make sure that the test being used

is valid for the purpose of the assessment because the assessment result is used to determine if a child will receive specialized interventions that can change the family and child's developmental destiny (McLean, Bailey, & Wolery, 1996; Neisworth & Bagnato, 2000; Witt et al., 1998).

There are four different types of assessment in early intervention: screening, norm-referenced diagnostic assessment, curriculum-based assessment, and authentic assessment (McLean, Bailey, & Wolery, 1996; Witt et al., 1998). In addition, there are four distinct purposes of assessment in early intervention: identification and diagnosis, determination of eligibility, assessment for program planning and service delivery, and monitoring of child progress during intervention (McLean et al., 1996; Witt et al., 1998). The following section briefly describes the purposes of each type of assessment. Examples, advantages, and limitations of each type of assessment are also given. The present study focused on the developmental screening type of assessment and is discussed last.

Norm-referenced Diagnostic Assessment

Norm-referenced diagnostic assessment compares a child's performance with that of other children using developmental age scores, developmental quotients, standard scores, or percentile ranks (McLean et al., 1996; Witt et al., 1998). The result is often used to determine if the child is eligible for early intervention services. Clinicians should be aware of the norm group from which these scores were derived, be able to interpret each, and recognize the limitation of each (McLean et al., 1996). Examples of norm-referenced diagnostic assessment instruments include the Bayley

Scales of Infant Development, the Battelle Developmental Inventory (BDI), the Standford-Binet Intelligence Test, the Learning Accomplishment Profile-Diagnostic Standardized Assessment, the Gesell Developmental schedules, and the Brigance Diagnostic Inventory of Early Development-Revised.

The advantages of norm-referenced assessment are that (1) it assists in making eligibility determinations, (2) the procedures are standardized, (3) children are compared to others of their own age, and (4) the language of standardized, norm referenced assessment is universal. The limitations are that (1) the test items selected are not functional for children's everyday life, and therefore children may not be interested in the test items, (2) items selected cannot help in program development or IEP/IFSP goal development, (3) children with disabilities are often not included in norm sample, (4) minority children are often not adequately represented in the norm sample, and (5) the test usually requires specifically trained professionals to administer and thus is often high cost (McLean et al., 1996; Witt et al., 1998).

Curriculum-based Assessment

Another type of assessment is curriculum-based assessment. Curriculum-based assessment provides a useful link among assessment, intervention, and evaluation. Curriculum-based tests assess the child's abilities in the context of previously set objectives (McLean et al., 1996). Early childhood educators and early interventionists can utilize the result of a curriculum-based test to decide what to target when teaching a particular child. However, this assessment does not provide information about where a child's performance stands relative to his or her peers. Examples of

curriculum-based assessment include The Assessment, Evaluation, and Programming System for Infants and Children, The Carolina Curriculum for Infants and Toddlers with Special Needs, The Carolina Curriculum for Preschoolers with Special Needs, and The HELP Strands (McLean et al., 1996; Witt et al., 1998).

The advantages of curriculum-based assessment are that (1) they provide helpful information for the child profile which helps with program planning and curriculum development, (2) they are useful in identifying target goals and objectives and are thus helpful in IFSP/IEP development, (3) they are useful in evaluation of the child's progress over time, and that (4) the test items are likely to be functional and more interesting to children, thereby encouraging best practices (McLean et al., 1996). The disadvantages are that the assessments are time consuming, need training to administer, and are not appropriate for all children, especially ones with severe disabilities.

Authentic Assessment

Authentic assessment refers to an approach that reflects the ongoing experiences children encounter in their homes, schools, communities, and places where they spend their time (McLean et al., 1996). Authentic assessments observe children in their usual environments with materials that are familiar to the child and with people who are familiar to the child. The activities in the assessment are meaningful to the child. Examples include play-based assessment and activity-based assessment.

The advantages are that (1) the test environments, items, and people are

familiar to the child, (2) this type of assessment is aligned with developmentally appropriate practice, (3) the assessment provides meaningful parental involvement in the assessment process, (4) the assessment is useful to incorporate eligibility decision and ongoing assessment, and (5) it is likely to be fun for the child (McLean et al., 1996). The limitations include that the administration is time consuming, has no standardized procedures, and is difficult to compare the child with his peers.

Developmental Screening

Developmental screening is another type of assessment to identify children who are at risk for developmental delays. Developmental screening is a brief assessment used to determine whether or not the child needs more intensive evaluation (McLean et al., 1996; Sonnander, 2000). Screening is the very first step of assessment that is often used on children who are at risk for health and developmental problems (Glascoe, 2000 b; Squires, Katzev, & Jenkins, 2002). A quick, economical, and effective screening assessment can be used on a large number of children for possible biological or developmental problems (Glascoe, 2000 b; Miller, Lemerand, & Schouten, 1990). In other words, a cost-effective screening instrument prevents unnecessarily intensive and potentially expensive diagnostic assessment (Glascoe, 2000 a; Glascoe, 2000 b). Examples of screening tools include the Ages and Stages Questionnaires (ASQ), the Denver Developmental Screening Test- Revised, (Denver II), the Battelle Developmental Screening Test (BDST), the Developmental Activities Screening Inventory II, the Developmental Indicators for the Assessment of Learning-Revised, and the First STEP.

The advantages of developmental screening type instruments include their ease and quick administration with a relatively low cost. However, costs vary greatly among different screening instruments (Glascoe, Martin, & Humphrey, 1990; Squires, Potter, & Bricker, 1999). The limitations of screening type instruments include over identification or under identification and that these instruments are often not very useful for program planning or evaluation (McLean et al., 1996; Sonnander, 2000; Witt et al., 1998).

It is clear that an effective developmental screening instrument not only prevents unnecessary and expensive diagnostic assessments but also helps with early identification of children with developmental delays. The present study sought to identify an effective developmental screening instrument for children in Taiwan.

Early Intervention in Taiwan

Policies

Early intervention efforts in Taiwan have increased in recent years. The Revised Child Welfare Law of 1993 in Taiwan requires every local government to provide early intervention services for children with developmental delays (廖華芳, 李宜靜, 吳文豪, 林麗英, 高麗芷, 1999). In 1997, the revised Disability Welfare Law requires the health service system to provide individuals with disabilities with early identification, early medical intervention, and health insurance services (廖華芳 et al., 1999). In the same year, a new special education law ensured that all three-year-old children with disabilities will attend preschool by 2003 (Kang, Lovett, & Haring, 2002).

According to a recent estimation by the Children's Bureau in Taiwan (2003), there are about 133,960 children under age six with developmental delays using 6-9% estimate suggested by the World Health Organization. However, only 16,286 (14%) of them are currently registered for services. This means that in Taiwan, the majority (86%) of children with developmental delays under age six still have not been effectively identified to receive early intervention services as the law prescribes.

Developmental Screening by the Health Services System

As indicated by the Disability Welfare Law of 1997, the health system should provide early identification and early medical intervention services for individuals with disabilities. There has been a universal health care system since 1995 that recommended that pediatricians screen children for developmental delays during well-child visits. The screening processes vary from serious screening by the pediatricians, to checking off boxes on the well-baby handbook by the parents, to no screening at all.

The child health handbook, which was designed by the Department of Health, has been given to the parents of every newborn baby since 1995. It contains primal health screening items that are to be checked by the pediatricians during the well-child visits. Yet in reality, parents often find a stamp on the child health handbook after their well-child check ups saying that the physician will not be responsible for the screening results.

Current Developmental Screening Instruments in Taiwan

Similar to that in the United States, the field of early childhood intervention in Taiwan also is confronted with the challenge of lacking culturally appropriate, valid, and reliable assessment instruments. The practice of using translated assessment instruments is common because it takes a tremendous investment in time, effort, and money to develop valid, reliable, culturally appropriate assessment instruments. However, proper procedures need to be carried out to ensure the validity and reliability of a translated instrument.

For those pediatricians who actually carry out well-child health evaluation and developmental screening, currently the most often used methods are professional knowledge, the Denver Developmental Screening Test Revised (Denver II), and the Chinese Children Development Inventory (CCDI) (萬育維, 1993). The validity and reliability of CCDI are currently unavailable. The following discussion focuses on the validity and reliability of professional knowledge and the Denver II.

Professional Knowledge

Without standardized procedures or instruments, professional knowledge accounts for little developmental screening validity (Glascoe & Dworkin, 1995; Glascoe; 2000). Glascoe (1999) reported that the majority of children with serious emotional problems, developmental disabilities, and sensory impairments are not identified before school entry. Palfrey and colleague (1994) also found that fewer than 30% of children with developmental or behavioral disabilities are detected by their primary health provider. This may be caused by the fact that most physicians rely on

short clinical observation, review of milestones, and informal checklists for developmental screening during the well child check up visits instead of using standardized developmental screening tests.

Developmental and behavioral problems emerge slowly and subtly. Few children with academic difficulties or diagnosed disabilities have obvious clinical and neurological dysfunction (Glascoe, 2000b). Without standardized procedures, professionals in different fields might overlook subtle differences in certain domains of development. As Glascoe (2000)b indicated that "under-detection limits children's access to critical early intervention services that can ameliorate and, in some cases, alleviate disabilities" (p. 252). There is no question that professionals in child health and early intervention bear a great responsibility to identify children who are developmentally at risk. A standardized developmental screening tool will significantly enhance the effectiveness of early identification of children for early intervention services.

Denver II

The Denver Developmental Screening Test (DDST) was first developed in 1967 and was revised in 1992. It is now called the Denver II. It tests the following developmental domains: language, social adaptive, gross motor, and fine motor. The average administration of the Denver II takes about 15 minutes. In addition, professionals need to have 15 hours of training by a certified instructor in order to administer the standardized procedure correctly. Hence, in many situations, it can be an expensive and impractical choice for developmental screening purposes.

The Denver II has recently been translated into Chinese and used in Taiwan. As noted earlier, culture influences parenting practices and beliefs can have a significant impact on child development. Although the Denver II has been introduced to more than 50 countries, only 15 of them have had it standardized for their population (Frankenburg et al., 1992). In addition, the accuracy of the Denver II has been criticized in the literature. Studies have found that the Denver II has high over-referral rate (76%) and low specificity (43%) meaning that children who are typically developing tend to be identified by the Denver II as developmentally delayed (Glascoe, Byrne, Ashford, Johnson, Chang, & Strickland, 1992). Moreover, it is very costly and has not been tested for validity and reliability in Taiwan.

A recent effort was undertaken in Taiwan to examine the differences in young children's Denver II gross and fine motor development scores between the United States and Taiwan (Cheng & Tsai, 2002). The study found that 11 out of 17 motor development items had significant differences in Z scores between the American and Taiwanese samples. Although Cheng and Tsai's study is limited because of the sampling method and small sample size ($N = 176$), it draws attention to the appropriateness of adopting a developmental measurement from another country without checking for culture appropriateness or establishing the reliability and validity of the instrument in the country where it is used.

Selecting Accurate Screening Tools

Because of the slow emergence and early subtlety of developmental problems, the American Academy of Pediatrics (2002) recommended that clinicians repeatedly

assess children's development. For screening purposes, a low-cost, easy to use, reliable, valid, and culturally appropriate measurement is necessary. Miller and colleague (1990) noted that an adequate screening instrument will decrease the misuse of assessment resources especially in a large scale screening process.

Types of Developmental Screening Instruments

There are two types of developmental screening instruments, parent-completed and professional-administered. Examples of parent-completed instruments include the Parents' Evaluation of Development Status (PEDS), the Ages and Stages Questionnaires, and the Child Development Inventories. Examples of professional-administered instruments include the Denver II, the Bayley Infant Neuro-develomental Screener, the Battelle Developmental Inventory Screening Test, and the Brigance Screeners. The validity and reliability of parent report instruments have been well established in the U. S. (Bricker et al., 1987; Dale et al., 1989; Diamond & Squires, 1993; Squires, 1996; Kenny et al., 1987; Squires et al. 2002; Glascoe, 2000). The present study utilized a parent-report screening instrument to assess children's development in Taiwan.

Criteria for Effective Screening Instrument

Because the test publication industry is not regulated professionally or federally, Glascoe (2000) suggested the following criteria in selecting an effective screening instrument: (1) using a standardized procedure, (2) having established norms in the country, (3) having the instrument be highly correlated with diagnostic measures, (4) testing for test-retest and inter-observer reliability, (5) having adequate sensitivity

(meaning that at least 70 to 80 percent of children with disabilities are detected), (6) having adequate specificity (meaning that at least 70 to 80 percent of children without disabilities are correctly identified by passing scores), and (7) having an acceptable low over-referral rate (20% to 30%).

Using specificity and sensitivity of 70 to 80 percent as criteria, the Committee on Children With Disabilities of the American Academy of Pediatrics (2001) reported that parent-report instruments such as the Parents' Evaluation of Development Status (PEDS), the Ages and Stages Questionnaires (ASQ), and the Child Development Inventories have excellent psychometric properties, are inexpensive, require less time to administer, and are equally predictive of developmental delays as professional-administered assessments. The present study used the 36-month ASQ on a sample of three-year-old Taiwanese children.

Testing an Effective Screening Instrument

Reliability and validity are central issues in all measurement (Neuman, 1997; Pedhazure & Schmelkin, 1991). An effective developmental screening instrument should have adequate measurement reliability and validity as indicated by Glascoe (2000) and the American Academy of Pediatrics (2001). In addition, an effective developmental screening instrument should consider cultural appropriateness or ecological validity according to human developmental theories (Bronfenbrenner, 1979; Thelen, 2000). Ecological validity and types of measurement reliability and validity are briefly discussed below.

Ecological Validity

As mentioned earlier, developmental theories support that the ecological factors affect children's development. Thus, it is important to address ecological validity when assessing child development. Ecological validity was brought to attention by Bronfenbrenner (1979). He defined ecological validity as follows: "the environment experienced by the subjects in a scientific investigation has the properties it is supposed or assumed to have by the investigator" (1979, p. 29). He further advocated the necessity for appropriate interpretation of data by qualified investigators. The present study addressed ecological validity for Taiwanese children by using Taiwanese child development experts, parents, and preschool teachers to examine the cultural appropriateness of the translated Chinese 36-month ASQ.

Reliability

Reliability refers to the dependability and consistency of an instrument. There are four ways to examine an instrument for reliability: test-retest reliability, inter-rater reliability, split-half reliability, and internal consistency (Neuman, 1997; Pedhazure & Schmelkin, 1991). The test-retest reliability examines the stability of an instrument by giving the same test to the same person repeatedly (Neuman, 1997). A reliable instrument should yield the same results each time. The inter-rater reliability examines the equivalence of an instrument by having different raters use the same instrument on the same person (Neuman, 1997). An instrument is reliable if the raters agree with each other. The split-half reliability involves dividing the indicators of the same construct into two groups and determining whether both halves give the same results

(Neuman, 1997; Pedhazure & Schmelkin, 1991). The internal consistency examines whether the indicators in a scale measures the same phenomenon (Pedhazure & Schmelkin, 1991). The Cronbach's alpha coefficient is the most widely use measure for internal consistency of a scale. An alpha coefficient of .80 or higher indicates a reliable scale (Pedhazure & Schmelkin, 1991).

Validity

Validity refers to the accuracy of an instrument. There are four types of validity: face validity, content validity, criterion validity, and construct validity. Face validity is a consensus method of measurement validity. It is achieved by asking other members of the scientific community to review if the indicators in a scale measuring the construct. Content validity is a special type of face validity. It examines whether the full content of a construct is represented in an instrument (Neuman, 1997). A content-valid instrument includes all areas of the measuring construct. Criterion validity examines if an instrument agree with an external standard (Neuman). Criterion validity can be achieved by comparing the test results with an established instrument of the same construct or an existed condition. Construct validity examines whether multiple indicators operate in a consistent manner (Neuman). Recently, confirmatory factor analysis (CFA) using structural equation modeling (SEM) has become the method of choice to examine the construct validity of an instrument (Bryant, 2000). The present study investigated the reliability and validity of the translated Chinese 36-month ASQ by examining the inter-rater reliability, internal consistency, content validity, criterion validity, and construct validity of the scale.

Ages and Stages Questionnaires

The Ages and Stages Questionnaires (ASQ) are parent-report, low-cost, and easy to use. The ASQ can be mailed to the parents or completed by the parents during the waiting time of well-child visits to screen for developmental delays. A secondary advantage of using the ASQ is to empower parents and enhance parents' knowledge about child development (Squires & Bricker, 1991; Squires, 1996). Hence, it is ideal to be used in a continuous, systematic developmental monitoring process.

The ASQ screening system is composed of 19 questionnaires designed to be completed by parents or primary caregivers (Squires et al., 1999). The questionnaire intervals are given at 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 27, 30, 33, 36, 42, 48, 54, and 60 months of age (Squires et al.). Each questionnaire contains 30 developmental items that are written in simple, straightforward language (Squires et al.). The items are divided into five areas: communication, gross motor, fine motor, problem solving, and personal-social (Squires et al.). Illustrations are provided when possible to assist parents and caregivers in understanding the test items (Squires et al.).

For the 30 developmental items, parents check *yes* to indicate that their child performs the behavior specified in the item, *sometimes* to indicate an occasional or emerging response, or *not yet* to indicate that their child does not yet perform the behavior (Squires et al. 1999). Unlike the Denver II, the ASQ does not require training to administer except that the parent or whoever is answering the questionnaires must be able to read at the fourth to sixth grade reading level.

Validity and Reliability of the ASQ

The reliability and validity have been well established in the U. S. (Bricker & Squires, 1989a; Bricker & Squires, 1989b; Squires & Bricker, 1991; Bricker et al., 1988; Dale et al., 1989; Diamond & Squires, 1993; Squires, 2000; Squires & Bricker, 1991). According to the technical report (Squires et al., 1999), the inter-observer reliability of ASQ between parents and professional examiners is 94 percent ($N = 112$); and the test-retest reliability of ASQ completed by parents at two to three weeks intervals is also 94 percent ($N = 175$).

To examine the content validity of the ASQ in the U. S., the measure was compared to the Revised Gesell and Armatruda Developmental and Neurological Examination, the Bayley Scales of Infant Development, the McCarthy Scales of Children's Abilities, the Stanford Binet, and the Battelle Developmental Inventory. The concurrent validity coefficients ranges from 76 to 97 percent depending on the different questionnaire; and the overall validity was 85.4 percent ($N = 1613$). One area not assessed was the construct validity of the ASQ. Because the underlying theoretical structure of the ASQ has not been examined, the present study assessed the structure of the scale by using a confirmatory factor analysis on the Taiwanese 36-month ASQ data.

Cultural Adaptability

Cross culture adaptations of the ASQ have been recently underway. The ASQ is also available in Spanish, Norwegian, French, and Korean (Squires et al., 1999; Janson, 2002; Janson & Squires, 2004; Dionne & Squires, in preparation). The ASQ

scoring method allows for omission of culturally inappropriate items so that a child will not be penalized because of an inappropriate test item (Squires et al.). Moreover, ASQ has recently been successfully adapted to Norway (Janson, 2002; Janson & Squires, 2004).

Although the U. S. ASQ stresses its culture adaptability, there are only five Asian subjects in the normative sample representing 0.4 percent of the total sample. The U. S. ASQ normative samples (N = 1287) include 64.9 percent Caucasian (n = 835), 13.5 percent African American (n = 174), 0.4 percent Asian/Pacific Islander (n = 5), 14.6 percent Native American (n = 188), 4 percent Latino/ Hispanic (n = 52), and 2.6 percent Biracial (n = 33). However, there are more than a dozen countries in the categories of Asian / Pacific Islander, such as Japan, Korea, India, Philippine, China, and Taiwan, and enormous differences exist among these Asian cultures. Because of the differences in cultures, it is not appropriate to use the ASQ in any country until it has been tested for validity and reliability and standardized in that country (Vazir, Lansdown, Naidu, Vidyasagar, & Reddy, 1994; McLean, Bailey, & Wolery, 1996). Furthermore, although Janson's (2000) study supported cross-cultural validity in Norway, the researcher also noted that small, insignificant, but systematic differences in motor development were found between Norway and American samples. Thus, the present study examined if cultural factors affected scores of the ASQ in Taiwan.

Purpose of Study

The need for a culturally valid and reliable screening instrument is evident from the low identification rate of children with developmental delays in Taiwan.

Although the ASQ seems to be an ideal instrument for developmental screening purposes, a number of questions need to be addressed before ASQ can be adapted to use in Taiwan. Based on human development theories and research on the influence of culture on development, the purpose of this study was to examine the ecological validity of the ASQ in Taiwan.

Rationale for Using the 36-month-old ASQ

The present study used a cross-sectional design to examine data from the 36-month ASQ. Three-year-old children were chosen for this study for the following reasons: the majority of children under six years of age with developmental delays are not identified for early intervention services; age three is the beginning of most Taiwanese children's educational experiences; early identification of developmental delays allows early intervention to occur when problems can be more easily treated to promote optimal health and development; and the 36-month ASQ has the highest true positive rate of all ASQs (sensitivity 90% which means that 90% of children identified by the 36-month ASQ are further diagnosed with developmental problems).

Research Goals and Hypothesis

The present study had three goals. First, the study examined the cultural appropriateness of the 36-month ASQ as a developmental screening instrument for three-year-old children in Taiwan by asking experts' opinions of the scale. Parents and preschool teachers who participated in the study were also asked to examine the cultural appropriateness of the scale. It was expected that the 36-month ASQ would be culturally appropriate for Taiwanese children.

Second, the current study investigated the reliability and validity of the 36-month ASQ for three-year-old children in Taiwan. The reliability was addressed by examining internal consistency of the scale and comparing teachers' and parents' ASQ scores. It was predicted that the 36-month ASQ would be reliable in a sample of Taiwanese children. The present study also examined the validity of the measure by using a confirmatory factor analysis. It was expected that the 36-month ASQ will load on five developmental domains. If the Taiwanese 36-month ASQ data did not confirm a five-factor structure, an exploratory factor analysis would be performed to further investigate the underlying structure of the scale.

Finally, the present study compared the ASQ mean scores of U.S. and Taiwanese three-year-old children to examine significant differences in items for American and Taiwanese children. It was unclear if the scores of the American and Taiwanese children would be the same. The scores could be the same because development tends to follow certain universal patterns and that the study from Norway found no significant differences between American and Norwegian data. On the other hand, research also suggests that culture can have a profound influence on child development. It is possible that the degree of cultural differences between the U.S. and Norway would not be as great as the differences between the U.S. and Taiwan. Therefore it is possible that the present study will find significant differences on the ASQ scores between the American and Taiwanese samples.

CHAPTER 3: METHOD

The present study used a cross-sectional research design to investigate three goals: (1) to examine the cultural appropriateness of the 36-month ASQ as a developmental screening instrument for three-year-old children in Taiwan, (2) to investigate the reliability and validity of the 36-month ASQ for three-year-old children in Taiwan, and (3) to compare the 36-month ASQ subset mean scores of U.S. and Taiwanese three-year-old children.

Measures

Demographic Questionnaires

Background information questionnaires for parents and teachers (see Appendix A and B) were completed by the preschool teachers and parents. Background information included age, gender, education, occupation and employment status, living arrangement and environment, preschool settings such as teacher-child ratio, and types of preschool program were obtained from the questionnaires.

Satisfaction Survey

A satisfaction survey (see Appendix C) about the 36-month ASQ was attached with the ASQ. The survey queried respondents regarding the appropriateness of the test items on the 36-month ASQ, the length of time spent in completing the questionnaire, perceptions about the scale, and willingness to complete ASQ measures.

Child Assessment Measure

The Ages and Stages Questionnaires (ASQ) are a time-specific series of parent completed developmental assessments targeting development at 4, 8, 10, 12, 14, 16, 18,

20, 22, 24, 27, 30, 33, 36, 42, 48, 54, and 60 months. The ASQs are developmental screening instruments that are intended to identify children who may have developmental delay and who would benefit from further diagnostic assessment. Five developmental areas are assessed including communication, gross motor, fine motor, problem solving, and personal social domains. Each questionnaire consists of 30 items with six items in each domain. The test items were written in a simple and straightforward language. Examples of the test items such as "Does your child jump with both feet leaving the floor at the same time?" and "Does your child take turns by waiting while another child or adult takes a turn?" Parents were asked to check *yes*, *sometimes,* or *not yet* on the item according to their observation of the child's performance.

The 36-month ASQ (see Appendix D) was chosen for the present study because it has the highest sensitivity rate compared to ASQ questionnaires that target other ages. Specifically, the 36-month ASQ has demonstrated a sensitivity rate of 90 percent in U.S. studies (Squires et al., 1999). This means that 90 percent of children identified by the 36-month ASQ screening instrument as needing further evaluation are further diagnosed with developmental delays in later developmental assessments. In addition, the 36-month ASQ was chosen because most Taiwanese children enter preschool at age three. Entrance to preschool is an ideal time to screen children for developmental problems in order to provide early intervention services, as Taiwanese law presently requires.

As noted earlier, the reliability and validity of the Ages and Stages Questionnaires had been established in several studies (Bricker et al., 1988; Bricker & Squires, 1989a; Bricker & Squires, 1989b; Squires & Bricker, 1991; Dale et al., 1989; Diamond & Squires, 1993; Squires, 2000; Squires & Bricker, 1991; Squires et al., 1999). In a recent report (Squires et al., 1999), the inter-observer reliability of the ASQ between parents and professional examiners was 94 percent (n = 112); and the test-retest reliability of the ASQ completed by parents at two to three weeks intervals was also 94 percent (n = 175). The concurrent validity of the ASQs as reported in percent agreement between the ASQs and standardized assessments for the various ASQs (various ages) ranged from 76 to 97 percent; with 84 percent overall agreement (n = 1613) (Squires et al., 1999).

Procedure

Translation and Back Translation

The ASQ was written in English and has been translated into other languages. In order to collect data from Taiwanese families, the 36-month ASQ was translated into Mandarin Chinese by the researcher, a native Mandarin Chinese speaker. The translated Chinese 36-month ASQ was then back translated into English by a U.S. court-registered English- Mandarin interpreter. Back-translation of the ASQ was compared with the original ASQ and no obvious discrepancies were found.

Review by An Expert Panel

Five Taiwanese child development experts were recruited and asked to verify cultural appropriateness and content validity of the translated 36-month ASQ using a

checklist (see Appendix E). The five member expert panel in this study included leading Taiwanese researchers and health professionals who have specializations in child development and are engaged in active professional practices with children. The five-member expert panel included the following:

- Dr. Finlan Cheng is a child psychologist and professor in the child care department at the National Pingtung University of Science and Technology, Pingtung, Taiwan; she holds a PhD degree in psychology and counseling.
- Dr. Su-Lan Young is a child psychologist and language pathologist. An associate professor in the special education department at the National Pingtung Normal College, Pingtung, Taiwan. Dr. Young holds PhD degrees in both psychology and counseling and language pathology.
- Dr. Ming-Chou Wu is a general pediatrician working in a primary care clinic in Pingtung, Taiwan.
- Ms. Pai-Hua Lee is an occupational therapist who works primarily with infants and young children at a regional medical center in Pingtung, Taiwan.
- Ms. E-Jane Hwang is a physical therapist working at the early intervention center of the Victory Home in Pingtung, Taiwan.

Sampling Process

Children With No Known Developmental Delays

The current study employed a convenience sampling process to identify children with no known developmental delays. The researcher contacted the directors of 35 preschools in Taiwan by phone to invite participation in the study. The directors

of the preschools were provided information about the purpose and procedures of the study. All 35 preschools agreed to participate in the study. Each preschool was provided with letters (Appendix F) to give to parents of all enrolled children whose age in month fell between 34 to 38 months. The letter explained the purpose of the study and stated that participation was voluntary. With the letter, parents were also given a questionnaire packet consisting of the 36-month ASQ, a parent background questionnaire (Appendix A), and the ASQ satisfaction survey (Appendix C). Parents who agreed to participate returned their completed questionnaire packet to the preschools. One preschool did not follow through on distributing the questionnaires making the total number of participating preschools 34. When parents returned completed packets to the preschool, the administrator collected these and held them for researcher to pick up. Thus, a total of 155 questionnaire packets were distributed to parents whose children were enrolled in one of 34 preschools; and 133 packets were returned. The return rate was approximately 86%.

Teachers of the same children were provided a similar letter, a teacher background questionnaire (Appendix B), the 36-month ASQ, and the ASQ satisfaction survey (Appendix C). A total of 55 preschool teachers were contacted and all completed the study materials. The return rate for teachers was 100%. One week after the researcher distributed the questionnaire packets to the preschools, the preschool directors were contacted by phone to remind them to collect the questionnaire packets and to arrange time for the researcher to pick up the completed parent and teacher packets.

Children With Known Developmental Delays

To recruit children with known developmental delays, a list was obtained of children with disabilities who were registered with the Early Intervention Center of the Pingtung Social Welfare Department, Pingtung, Taiwan. From this list, 23 children were identified whose ages in month fell between 34 and 38 months on the list. Parents of these children were sent a letter and questionnaire packet and were asked to complete these and return them by mail to the researcher. Of the 23 parents contacted, 11 parents returned the completed packet. The resulting response rate was approximately 50 percent.

Protection of Human Subjects

Human subjects' safety and rights were ensured through the following procedures. Prior to the research, the student researcher and faculty supervisors completed required federally approved training in the ethical use of human participants in research projects. Prior to data collection, specific procedures for the protection of human subjects in proposed study were submitted to the Oregon State University Institutional Review Board for the Protection of Human Subjects.

These following procedures were approved and followed in all subsequent work. On all completed documents, names and other identifying information were replaced with identification numbers. All data were secured in a locked file cabinet in the student researcher's office, which was locked when vacant. Following completion of the research, findings will be distributed to participants in summary form and results will be reported as overall patterns and group means. No individual will be

identified by name in any public report. If the results of both the parent and teacher completed 36-month ASQ indicate that the child with no previously known developmental delays may need further evaluation, the child's parents will be informed by letter from the researcher that their child's ASQ score indicates that the child may benefit from further developmental assessment. Parents will be provided information on local diagnostic centers for such assessments will be identified. Specific ASQ scores and sub-scores will not be provided. The intent of these follow-up procedures is to assure that families whose children have a potential disability are informed while at the same time not alarming families or labeling children unnecessarily.

Sample

The sample for the present study consisted of 144 three-year-old Taiwanese children, 71 (49.3%) boys and 73 (50.7%) girls, whose parents and preschool teachers completed the questionnaire packets. Of these 144 children, 133 children had no known developmental delays and 11 children had diagnosed developmental delays. Of the 133 children with no known developmental delays, 32 were dropped from the sample, because their ages did not fall between 34 and 38 months. Thus the analyses and subsequent results were based on a data set consisting of the 101 children with no known developmental delays and the 11 children with known developmental delays (N = 112). Because the purpose of this study was to determine if the 36-month ASQ could effectively identify children with developmental delays, the 11 children with known delays were included in all analyses except those used to determine the 36-month ASQ

subscale mean scores that were used as cutoff points for Taiwanese children. These 11 children were also not included in the analyses used to compare subscale mean scores between the Taiwanese data and the American normative data.

Sample Demographic Characteristics

Child Characteristics

The final sample consists of 112 Taiwanese children who were between 34 to 38 months of age at the time of measurement. There were 51 (45.5%) female and 61 (54.5%) male. The majority of the children (n = 85) were from Pingtung area (the southern part of Taiwan), a few were from Taipei (n = 13) and Taichung (n = 8) areas. Most children (n = 80, 71%) in the sample were born of Chinese decent, two children's (1.8%) fathers were French and one child's (0.9%) mother was Indonesian. Data on the ethnicity item were missing for 30 (27%) children[1].

More than half (n = 60, 54%) of children in the sample lived with both their parents, about 24 percent (n = 26) of them lived with parents and grandparents (three-generation family), less than two percent (n = 2) of the children lived in the traditional extended family, and only 0.9 percent (n = 1) of the children lived with a nanny (paid caregiver). Parents reported on the child's primary caregiver before age three. Mothers were identified as the primary caregivers for most (n = 28, 25%) of the 112 children, 20 (17.9%) were cared for by nannies, grandparents provided the primary early care for 18 (16.1%) children, and 16 (14.3%) children received early primary care from their parents and grandparents, jointly.

Parents Characteristics

Mothers' age ranged from 23 to 43 with an average of 32 years old. The fathers' age ranged from 25 to 47 with an average of 36 years old. The parents' average education levels were approximately 14 years for both fathers and mothers. The majority of mothers and fathers were college graduates (see Table 1).

Over 63 percent (n = 71) of mothers held full-time jobs, and less than three percent (n = 3) of mothers worked part-time (Table 2). Approximately 13 percent (n = 14) of mothers were unemployed. The fathers' employment status, on the other hand, showed about 80 percent (n = 89) were employed full-time; only one father indicated being unemployment and no one reported holding a part-time job (see Table 2).

Preschool Teachers Sample Characteristics

All 55 preschool teachers participated in the study were female. The preschool teachers' age ranged from 22 to 51 years with an average of 32 years. Years of experience in child care or preschool settings ranged from one year to 27 years. More than half (n = 31, 56%) of the preschool teachers had at least 14 years of education. Thirteen (24%) preschool teachers were high school graduates. Only 28 (51%) teachers responded to the question regarding their education major. Of those 28 respondents, 18 teachers were reported child care and early childhood education, and the other 10 teachers were reported more diverse educational backgrounds such as industrial management and applied life science. The teacher-child ratio ranged from 1:5 to 1:26 with a mean of 11 children (SD = 5.5) per teacher.

Table 1

Number and Percentage of Parents in Each Education Level, by Gender

	Mother		Father	
Education Level	*n*	Percent	*n*	Percent
Less than 9 years	5	4.5	5	4.5
High school graduate (12 yrs)	32	28.6	33	29.5
Junior college graduate (14 yrs)	10	8.9	5	4.5
College graduate (16 yrs)	40	35.7	40	35.7
Graduate school (18 yrs)	3	2.7	6	5.4
Missing	21	18.8	23	20.5
Total	112	100	112	100

Table 2

Number and Percentage of Parents in 8 Occupational Categories, by Gender

	Mother		Father	
Occupation	*n*	Percent	*n*	Percent
Skilled laborer	20	17.9	14	12.5
Unskilled laborer	23	20.5	14	12.5
Government employee	7	6.3	23	20.5
Teacher	9	8.0	5	4.5
Manager	6	5.4	18	16.1
Professional	4	3.6	6	5.4
Executive	1	0.9	2	1.8
Missing + Unemployed	42	37.5	29	25.9
Total	112	100	112	100

Table 3

Characteristics of Preschool Teachers

	Range	*Mean*	*Std. Deviation*
Age	22-51	32	7.6
Years of child care experiences	1-27	8	5.5
Teacher child ratio	1:5 to 1:26	1:11	5.5
Education level in years	12-16	14	1.5

Note. Valid *N* was 55.

CHAPTER 4: RESULTS

The main goals of this study were to examine (1) the cultural appropriateness of the 36-month ASQ as a developmental screening instrument for three-year-old children in Taiwan, (2) to investigate the reliability and validity of the 36-month ASQ for three-year-old children in Taiwan, and (3) to compare the 36-month ASQ mean scores for U.S. and Taiwanese children.

Cultural Appropriateness of the Translated Chinese 36-Month ASQ

The cultural appropriateness or ecological validity of the 36-month ASQ, as translated into Chinese, was assessed by five experts, participating parents and preschool teachers, the court-registered interpreter, and the investigator who all are of Taiwanese backgrounds. First, the translated 36-month ASQ was reviewed for cultural appropriateness by a five-person expert panel. Second, on the satisfaction survey, parents were asked to identify any inappropriate item on the 36-month ASQ. Finally, participating teachers were also asked to indicate any inappropriate item on the 36-month ASQ on the satisfaction survey.

Ecological Validity: The Expert Panel

Five Taiwanese child development experts were asked to provide input regarding the appropriateness of the translated Chinese 36-month Ages and Stages Questionnaire for Taiwanese children. Dr. Wu, the pediatrician, pointed out that the picture on the fine motor subscale item 5 showed a left hand image holding a pair of scissors. He suggested that a right hand image would be more appropriate. Other than that, all five experts agreed that the Chinese 36-month ASQ was culturally appropriate

for Taiwanese children. However, various comments were given regarding the developmental content appropriateness of the Chinese 36-month ASQ subscale items. The experts' comments regarding content validity will be presented in the validity section.

Ecological Validity: Teachers' and Parents' Perception of Cultural Appropriateness

After they had completed the ASQ, participating Taiwanese parents and teachers were asked to identify any item from the translated Chinese 36-month ASQ that they considered to be inappropriate for their child. Specifically, a survey question asked "Do you think the test items on the ASQ were appropriate for your child's age?" The word *culturally* was not on the question. However, it was reasonable to expect the Taiwanese parents and preschool teachers were evaluating the ASQ from their Taiwanese perspectives. Response choices were *yes*, *sometimes*, and *no*. A space for written comments was also provided on the survey questionnaire. Out of a total sample of 112, 87 (78%) parents responded on this question; 25 (22%) parents declined to answer this question. Among the 87 parents who responded, 73 (84%) parents responded "yes" indicating agreement that the test items were appropriate for their children, and 13 (15%) parents answered *sometimes*. One (1%) parent answered *no* indicating that one or more items on the ASQ were not appropriate. However, no parent who indicated a 'sometimes" or "no" subsequently identified any specific items in the written comments section of the satisfaction survey. Several parents did make written comments but most often these comments were provided by those who answered *yes* and were not related to the cultural aspect of the questionnaire. Rather,

parents made suggestions on how to improve the questionnaire. Examples of these comments were "too many questions on one page", "should use numbers such as 4, 3, 2, 1 to rate the child instead of just *yes* or *no*", and "should include what normal development skills are for reference."

Of the 55 participating teachers, 49 responded to the survey question regarding the appropriateness of the translated Chinese 36-month ASQ items. Most (82 %, n = 40) of the teachers checked *yes* indicating that the ASQ test items were appropriate, however, eight (16%) of the teachers answered *sometimes*, and one (2%) teacher answered *no*. Similar to the findings from the parents' written comments, there was no comment related to cultural appropriateness ASQ. Rather, suggestions were made regarding wording of particular questions or requesting ideas and solutions for children who seemed to be delayed in development.

In sum, the cultural appropriateness of the translated 36-month ASQ was validated by the panel of Taiwanese child development experts and by the participating teachers and parents of three-year-old children in Taiwan. These results suggest that the translated Chinese 36-month ASQ was culturally appropriate for three-year-old Taiwanese children.

Reliability of the Translated 36-month ASQ

The second goal of this study was to investigate the reliability and validity of the 36-month ASQ for three-year-old children in Taiwan. Inter-rater reliability, internal consistency, content validity, criterion validity, and construct validity were evaluated using data obtained from a Taiwanese sample which included 101 children with no

known developmental delays and 11 children with diagnosed developmental delays for a total sample size of 112.

Inter-Rater Reliability

The first type of the reliability examined was inter-rater reliability. A measure's inter-rater reliability is established when raters agree with each other (Neuman, 1997). The inter-rater reliability assesses the agreement of different raters' rating and categorization (Pedhazur & Schmelkin, 1991; Neuman, 1997). Inter-rater reliability of the translated 36-month ASQ was evaluated by comparing the teacher's and the parents' subscale scores for the same child. The subscale scores were calculated using the procedures described in the *ASQ User's Guide* (Squires et al., 1999). Specifically, subscale scores are calculated by adding subscale item points, giving each *yes* 10 points, each *sometimes* 5 points, and each *not yet* 0 point. There were six items in each subscale making the highest possible subscale score a 60. A ratio score was computed for omitted items on a subscale as instructed in the *ASQ User's Guide* (Squires et al., 1999). Ratio scores were computed by dividing the subscale's total points by the number of items answered. The ratio score was then added with the original subscale total points for a final subscale score. However, if all six items were unanswered for a subscale, the entire subscale was treated as a missing value.

Using subscale scores, paired samples correlations were calculated. The paired samples correlations of the 36-month ASQ subscale scores from the teachers and the parents ranged from .45 to .78 (see Table 4). All five subscales paired samples correlations were significant at the .001 level. This finding indicated that the parents'

and the teachers' ratings of a child were moderately to strongly positively correlated.

Paired sample *t* tests were used to compare the teachers' and parents' ASQ subscales mean scores on the same child. The paired sample *t* tests revealed that there were no statistically significant differences between the parents' and the teachers' mean scores on four of the five 36-month ASQ subscales (see Table 4). However, there was a significant difference in parents and teachers' mean scores on the personal social subscale. The parent's and teachers' personal social subscale means were 52.6 (SD = 9.7) and 48.5 (SD = 12.0) respectively, t (95) = 4.279, $p < .001$ (see Table 4). In general, using the Chinese 36-month ASQ, Taiwanese parents and preschool teachers rated the same child similarly. Only the personal social subscale has statistically significant difference on mean scores.

Table 4

Paired Sample Correlations, Mean Scores, Standard Deviations and t statistics of Parents' and Teachers' 36-Month ASQ Subscale Scores

Paired samples	*Correlation*	*Mean*	*N*	*SD*	*t*	*df*
Communication	.784***		96		-.405	95
Parent		53.6		11.6		
Teacher		54.0		12.1		
Gross motor	.500***		96		.911	95
Parent		52.8		11.4		
Teacher		51.7		12.7		
Fine motor	.628***		93		1.075	92
Parent		46.7		15.8		
Teacher		45.2		15.5		
Problem solving	.453***		94		-.022	93
Parent		49.8		13.1		
Teacher		49.8		13.9		
Personal social	.645***		96		4.279***	95
Parent		52.6		9.7		
Teacher		48.5		12.0		

Note. *** $p < .001$

Internal Consistency

In addition to the inter-rater 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 of the translated Chinese 36-month ASQ was examined using Cronbach's alpha coefficient on the whole scale and also on the five subscales for both parents' and teachers' data.

Internal consistency of the Chinese 36-Month ASQ by Parents

Results suggested that the parent version of the 36-month ASQ was internally consistent for Taiwanese parents. Correlations of all items are presented in Table 5. Specifically, for the whole scale, the standardized Cronbach's alpha coefficient was .96. Inter-item correlations ranged from .18 (personal social subscale item 1 "copy line up four blocks" and gross motor subscale item 4 "stand on one foot for one second")[2] to .93 (problem solving subscale item 4 "repeat two single digit numbers" and item 6 "repeat three single digit numbers")[2]. Examination of the alpha coefficients with each item be deleted indicated no improvement in the reliability after deleting any item on the 36-month ASQ. This suggests that the total 36-month ASQ scale as completed by parents is internally consistent.

Table 5

Inter-item Correlation Matrix of the Chinese 36-Month ASQ Completed by The Parents

Item	C1	C2	C3	C4	C5	C6	G1	G2
C1. Point to 7 body parts	---							
C2. Three-word sentence	.574	---						
C3. Shoes on table, book under chair	.691	.488	---					
C4. Tell action in a picture or book	.805	.698	.683	---				
C5. Pull zip up and down as directed	.617	.255	.611	.513	---			
C6. Tell whole name	.782	.702	.664	.856	.471	---		
G1. Kick ball forward	.580	.267	.396	.430	.437	.379	---	
G2. Jump with both feet up	.681	.537	.417	.669	.414	.738	.701	---
G3. One foot one step up stairs	.486	.360	.509	.509	.423	.448	.784	.556
G4. Stand on one foot one second	.547	.290	.360	.426	.484	.482	.509	.624
G5. Throw ball over shoulder	.735	.405	.520	.632	.606	.550	.604	.595
G6. Jump forward 6 inches	.561	.587	.471	.584	.337	.592	.447	.695

Table 5 *Continued*

Item	C1	C2	C3	C4	C5	C6	G1	G2
F1. Copy vertical line	.632	.370	.518	.627	.538	.537	.442	.585
F2. Put string through one bead	.370	.283	.552	.430	.469	.463	.248	.260
F3. Copy circle	.681	.555	.573	.730	.506	.612	.399	.540
F4. Copy horizontal line	.699	.516	.613	.775	.533	.625	.508	.628
F5. Hold scissors correctly	.506	.290	.495	.569	.402	.553	.378	.478
F6. Hold pencil correctly	.439	.376	.580	.509	.390	.465	.419	.521
P1. Copy line up 4 blocks	.533	.487	.592	.632	.360	.614	.474	.494
P2. Use chair reach for things	.285	.320	.293	.398	.290	.387	.513	.462
P3. Answer incomplete picture	.557	.401	.480	.550	.480	.535	.397	.511
P4. Repeat 2 single digit numbers	.612	.407	.663	.539	.573	.498	.427	.446
P5. copy 3-block bridge	.572	.316	.476	.521	.478	.559	.398	.395
P6. Repeat 3 single digit numbers	.680	.417	.679	.577	.587	.510	.436	.457

Table 5 *Continued*

Item	C1	C2	C3	C4	C5	C6	G1	G2
S1. Feed self with spoon	.774	.534	.671	.739	.502	.718	.693	.695
S2. Push cart around object	.628	.562	.578	.632	.450	.723	.512	.706
S3. Know self in a mirror	.619	.321	.493	.443	.552	.431	.458	.512
S4. Put on jacket or shirt	.398	.319	.459	.441	.472	.428	.255	.387
S5. Know gender of self	.809	.485	.588	.736	.533	.741	.445	.648
S6. Waits for a turn	.622	.427	.646	.546	.470	.641	.389	.416

Table 5 *Continued*

Item	G3	G4	G5	G6	F1	F2	F3	F4
C1. Point to 7 body parts								
C2. Three-word sentence								
C3. Shoes on table, book under chair								
C4. Tell action in a picture or book								
C5. Pull zip up and down as directed								
C6. Tell whole name								
G1. Kick ball forward								
G2. Jump with both feet up								
G3. One foot one step up stairs	---							
G4. Stand on one foot one second	.402	---						
G5. Throw ball over shoulder	.540	.414	---					
G6. Jump forward 6 inches	.351	.492	.529	---				

Table 5 *Continued*

Item	G3	G4	G5	G6	F1	F2	F3	F4
F1. Copy vertical line	.387	.442	.635	.608	---			
F2. Put string through one bead	.312	.431	.284	.412	.418	---		
F3. Copy circle	.323	.405	.630	.609	.684	.394	---	
F4. Copy horizontal line	.455	.463	.646	.658	.802	.403	.825	---
F5. Hold scissors correctly	.413	.445	.297	.464	.512	.440	.501	.581
F6. Hold pencil correctly	.544	.260	.309	.490	.479	.380	.373	.471
P1. Copy line up 4 blocks	.540	.177	.523	.529	.411	.362	.491	.529
P2. Use chair reach for things	.585	.192	.328	.240	.324	.222	.260	.258
P3. Answer incomplete picture	.327	.316	.538	.421	.579	.371	.604	.608
P4. Repeat 2 single digit numbers	.384	.325	.464	.528	.497	.366	.471	.562
P5. copy 3-block bridge	.350	.274	.532	.347	.404	.267	.447	.516
P6. Repeat 3 single digit numbers	.393	.374	.533	.540	.531	.353	.526	.621

Table 5 *Continued*

Item	G3	G4	G5	G6	F1	F2	F3	F4
S1. Feed self with spoon	.762	.489	.711	.561	.557	.387	.577	.592
S2. Push cart around object	.687	.544	.617	.552	.452	.442	.411	.484
S3. Know self in a mirror	.384	.371	.527	.399	.455	.306	.414	.422
S4. Put on jacket or shirt	.395	.361	.444	.354	.362	.343	.398	.408
S5. Know gender of self	.382	.490	.579	.574	.656	.385	.576	.655
S6. Waits for a turn	.400	.479	.385	.470	.412	.561	.450	.451

Table 5 *Continued*

Item	F5	F6	P1	P2	P3	P4	P5	P6
F1. Copy vertical line								
F2. Put string through one bead								
F3. Copy circle								
F4. Copy horizontal line								
F5. Hold scissors correctly	---							
F6. Hold pencil correctly	.501	---						
P1. Copy line up 4 blocks	.453	.442	---					
P2. Use chair reach for things	.293	.334	.487	---				
P3. Answer incomplete picture	.425	.337	.439	.369	---			
P4. Repeat 2 single digit numbers	.389	.468	.578	.194	.500	---		
P5. copy 3-block bridge	.465	.222	.622	.318	.358	.631	---	
P6. Repeat 3 single digit numbers	.418	.479	.504	.135	.472	.932	.621	---

Table 5 *Continued*

Item	F5	F6	P1	P2	P3	P4	P5	P6
S1. Feed self with spoon	.524	.575	.662	.505	.472	.493	.465	.543
S2. Push cart around object	.419	.587	.534	.444	.378	.406	.345	.449
S3. Know self in a mirror	.282	.440	.366	.310	.437	.439	.318	.450
S4. Put on jacket or shirt	.398	.425	.329	.202	.287	.297	.349	.372
S5. Know gender of self	.460	.450	.549	.467	.667	.547	.530	.559
S6. Waits for a turn	.488	.429	.449	.246	.351	.515	.441	.502

Table 5 *Continued*

Item	S1	S2	S3	S4	S5	S6
S1. Feed self with spoon	---					
S2. Push cart around object	.770	---				
S3. Know self in a mirror	.541	.617	---			
S4. Put on jacket or shirt	.478	.437	.226	---		
S5. Know gender of self	.622	.523	.552	.332	---	
S6. Waits for a turn	.656	.513	.373	.422	.468	---

Note: C = Communication. G = Gross Motor. F = Fine Motor. P = Problem Solving. S = Personal Social.

The alpha coefficients for each subscale were examined next. The communication subscale had the highest internal consistency ($\alpha = .91$) and the personal social subscale had the lowest internal consistency ($\alpha = .83$). Examination of the subscale alpha levels with an item deleted found that only the gross motor subscale was not improved by item deletion. The gross motor subscale standardized Cronbach's alpha was .86. In contrast, examination of the effect of item deletion on the alpha levels showed that the other four subscales' alpha coefficients would improve with the deletion of items.

The communication subscale standardized Cronbach's alpha was .91. The inter-item correlations ranged from .37 (between subscale item 2 "use three or more words to form a sentence" and item 5 "pull zip up and down as directed")[2] to .86 (between subscale item 4 "tell actions on a picture" and item 6 "tell whole name")[2]. If subscale item 2 (use three or more words to form a sentence)[2] was deleted, the alpha level for the communication subscale would improve slightly from .8976 to .9056. If subscale item 5 (pull zip up and down as directed)[2] was deleted, the alpha would improve from .8976 to .8998.

The fine motor subscale standardized Cronbach's alpha was .87. Inter-item correlations ranged from .35 (between subscale item 2 "pull string through one bead" and item 6 "hold pencil between thumb and other fingers")[2] to .82 (between subscale item 3 "copy circle" and item 4 "copy horizontal line")[2]. If subscale item 2 (pull string through one bead)[2] was deleted, the alpha coefficient for the fine motor subscale would improve from .8711 to .8731. If subscale item 6 (hold pencil between thumb

and other fingers)[2] was deleted, the alpha coefficient would improve from .8711 to .8736.

The problem solving subscale standardized Cronbach's alpha was .85. The inter-item correlations ranged from .19 (between subscale item 2 "use a chair or box to reach for things" and item 6 "repeat three single digit numbers")[2] to .94 (between subscale item 4 "repeat two single digit numbers" and item 6 "repeat three single digit numbers")[2]. If subscale item 2 (use a chair or box to reach for things)[2] was deleted, the alpha coefficient for the problem solving subscale would improve from .8471 to .8584.

Finally, the standardized Cronbach's alpha for the personal social subscale was .83. The inter-item correlations ranged from .27 (between subscale item 3 "know self in the mirror" and item 4 "put on jacket or shirt")[2] to .70 (between subscale item 1 "feed self with spoon" and item 2 "push cart around objects")[2]. If subscale item 4 (put on a jacket or shirt)[2] was deleted, the alpha coefficient for the personal social subscale would improve from .8103 to .8235.

Overall, the Cronbach's alpha statistic calculated for the 36-month ASQ as completed by Taiwanese parents exceeded .80 for the whole scale and for each subscale indicating satisfactory internal reliability. However, inter-item correlations and alpha coefficients if item deleted on some subscales indicated that deletion of some items may slightly improve the internal consistency at the subscale levels.

Internal Consistency of the Chinese 36-Month ASQ by Preschool Teachers

The internal consistency of the preschool teachers' 36-month ASQ was examined next. For the whole scale, the standardized Cronbach's alpha coefficient

was .96. The inter-item correlations ranged from .15 (between personal social subscale item 4 "put on jacket or shirt" and communication subscale item 4 "put shoes on table, books under chair")[2] to .84 (between problem solving subscale item 4 "repeat two single digit numbers" and item 6 "repeat three single digit numbers")[2]. Similar to the findings reported above for parents' ASQ data, examination of the alpha coefficients with items deleted indicated no improvement in the reliability after deleting any item on the total 36-month ASQ. This suggests that the total 36-month ASQ scale is internally consistent whether the scale is completed by parents or teachers.

The alpha coefficient for each subscale of the teachers 36-month ASQ was examined next. Similar to the results of the parent's ASQ findings, the highest reliability alpha was the communication subscale ($\alpha = .88$) and the lowest reliability alpha was the personal social subscale ($\alpha = .77$). Examination of the alpha if an item was deleted found that only the problem solving subscale would have an improved alpha coefficient if subscale item 3 (answer "what is this?" of an incomplete picture of a person)[2] was deleted.

The standardized Cronbach's alpha for the problem solving subscale was .80. The inter-item correlations ranged from .23 (between subscale item 2 "use a chair or box to reach for things" and item 3 "answer what is this of an incomplete picture of a person")[2] to .83 (between subscale item 4 "repeat two single digit numbers" and item 6 "repeat three single digit numbers")[2]. If subscale item 3 (answer "what is this?" of an incomplete picture of a person)[2] was deleted, the alpha coefficient would improve from .7874 to .8082.

The standardized Cronbach's alpha for the communication subscale was .88. The inter-item correlations ranged from .36 (between subscale item 2 "use three or more words to form a sentence" and item 5 "pull zip up and down as directed")[2] to .77 (between subscale item 1 "point to seven correct body parts" and item 4 "tell actions on a picture")[2]. Item deletion did not improve the communication subscale alpha coefficient.

The standardized Cronbach's alpha for the gross motor subscale was .84. The inter-item correlations ranged from .28 (between subscale item 3 "one foot one step up stairs" and item 5 "throw ball over shoulder"[2]) to .63 (between subscale item 1 "kick ball forward" and item 4 "stand on one foot for one second"[2]). Item deletion did not improve the alpha coefficient for the gross motor subscale.

The standardized Cronbach's alpha for the fine motor subscale was .86. The inter-item correlations ranged from .20 (between subscale item 2 "pull string through one bead" and item 6 "hold pencil between thumb and other fingers")[2] to .72 (between subscale item 3 "copy circle" and item 4 "copy horizontal line")[2]. Item deletion did not improve the alpha coefficient for the fine motor subscale.

Finally, the standardized Cronbach's alpha for the personal social subscale was .77. Inter-item correlations ranged from .13 (between subscale item 2 "push cart backwards or make a turn" and item 6 "wait for a turn")[2] to .62 (between subscale item 1 "feed self with spoon" and item 2 "push cart around objects")[2]. Again, item deletion would not improve the alpha coefficient for the personal social subscale.

In sum, the Cronbach's alpha statistic for the 36-month ASQ as completed by

both parents and preschool teachers exceeded .80 for the whole scale and all subscale levels with the exception of the personal social subscale of the teachers' 36-month ASQ; for this subscale, the alpha level (.77) was only slightly below the acceptable level of .80. These results indicate satisfactory internal reliability for both parents' and teachers' 36-month ASQ.

Validity of the Translated Chinese 36-Month ASQ

Criterion Validity

After the reliability of the 36-month ASQ was examined, the criterion validity of the scale was tested next. Criterion validity addresses the issue of whether an instrument can be used to predict a relevant external outcome (Bryant, 2000). To investigate the ability of the translated 36-month ASQ to correctly identify children with developmental delays, parents of 11 Taiwanese three-year-old children with diagnosed developmental delays in Pingtung area were invited to complete the Chinese 36-month ASQ.

To determine the cutoff points for Taiwanese sample, the subscale mean scores for ASQ were obtained from 101 Taiwanese children age ranged from 34 to 38 months old with no known developmental delays. The mean scores of the Chinese 36-month ASQ ($N = 101$) subscales were as follows: communication 55.2 ($SD = 7.6$), gross motor 53.9 ($SD = 9.5$), fine motor 48.1 ($SD = 14.0$), problem solving 51.0 ($SD = 11.3$), and personal social 53.8 ($SD = 6.8$).

The *ASQ User's Guide* (Squires et al., 1999) indicated the cutoff point in the U. S. sample were two standard deviations below the means of each subscale score.

Using two standard deviations below the mean as a principal cutoff point for identification of possible developmental delays, all 11 Taiwanese children with known developmental delays were correctly identified with at least three subscale mean scores below the cutoff points (see Table 6). The *ASQ User's Guide* (Squires et al., 1999) recommended referring a child for further evaluation if his/her score in one or more areas is below the established cutoff point, and following up a child whose score in a particular area is close to the cutoff point or whose parent has indicated a concern in the overall section of the questionnaire. The Taiwanese 36-month ASQ subscale cutoff points and the subscale scores of the 11 Taiwanese children with diagnosed developmental delays are summarized in Table 6.

Table 6

The 36-month ASQ Subscale Cutoff Scores and Scores of 11 Taiwanese Children with ***Diagnosed Developmental Delays***

Subscale		Communi - cation	Gross Motor	Fine Motor	Problem Solving	Personal Social
TW *M/SD*		55 / 8	54 / 10	48 / 14	51 / 11	54 / 7
Cutoff		**39**	**34**	**20**	**29**	**40**
Child ID	134	0	0	0	0	0
	135	10	35	5	10	25
	136	5	25	10	30	20
	137	20	20	20	40	30
	138	40	50	20	50	50
	139	30	40	15	15	50
	140	0	0	0	0	0
	141	0	0	0	0	10
	142	0	25	0	20	5
	143	0	50	15	20	40
	144	0	30	0	30	10

Note. TW = Taiwan. One or more scores below the subscale cutoff score indicate the need for further developmental evaluation (Squires et al., 1999).

The parent data for the 36-month ASQ indicated that 14 (13.8%) children of the 101 children with no known delays fell into the referral category due to scores below the cut-off point in one or more subscale areas. Eleven of these 14 children were not placed in the referral category using teacher's data. Three children (3%) out of a total 112 children were placed in the referral category by both the teacher and the parent.

In contrast, the teachers' 36-month ASQ ratings identified 11 children for referral using the same cutoff points. Nine of the 11 children identified by the teachers were not placed in the referral category using the parent's ratings. Together, the percent of agreement on placing a child into the referral category between the parents' and teachers' 36-month ASQ subscale scores was only 13 percent (three out of 23). The 36-month ASQ subscale scores of the 23 Taiwanese children with no known developmental delays who were placed in the referral category by their parents' ratings and /or their preschool teachers' ratings are presented in Table 7.

Table 7

The 36-Month ASQ Cutoff Points and Subscale Scores of the 23 Taiwanese Children Identified As Need Further Evaluation by ***Parents and/or Preschool Teachers***

Subscale		Communication	Gross Motor	Fine Motor	Problem Solving	Personal Social
ID	TW/Cutoff	**39**	**34**	**20**	**29**	**40**
7	Parent	**35**	35	-9	48	60
	Teacher	60	60	54	60	55
8	Parent	54	60	50	60	55
	Teacher	40	**20**	30	**15**	45
17	Parent	55	60	35	60	55
	Teacher	40	35	**5**	**25**	**40**
21	Parent	40	**30**	45	60	50
	Teacher	45	**25**	-9	**25**	45
24	Parent	50	**20**	40	30	60
	Teacher	45	50	35	45	45
32	Parent	60	60	60	60	55
	Teacher	55	**22**	54	-9	50
34	Parent	55	40	25	50	50
	Teacher	50	35	**10**	50	45
35	Parent	50	**30**	25	50	50
	Teacher	55	35	22	50	45

Table 7 (Continued)

Subscale		Communication	Gross Motor	Fine Motor	Problem Solving	Personal Social
ID	TW/Cutoff	**39**	**34**	**20**	**29**	**40**
41	Parent	40	**30**	30	37	60
	Teacher	60	60	45	60	55
42	Parent	50	**30**	36	**20**	54
	Teacher	60	40	40	50	45
47	Parent	60	60	**20**	50	50
	Teacher	55	50	**20**	40	**40**
50	Parent	55	50	40	**25**	55
	Teacher	60	50	50	50	45
51	Parent	45	55	**7**	37	**40**
	Teacher	55	55	55	40	45
54	Parent	40	50	**7**	37	**40**
	Teacher	60	55	50	40	45
60	Parent	60	55	40	60	55
	Teacher	50	50	30	-9	**36**
69	Parent	50	50	50	30	55
	Teacher	40	40	35	48	**25**

Table 7 (Continued)

Subscale		Communication	Gross Motor	Fine Motor	Problem Solving	Personal Social
ID	TW/Cutoff	**39**	**34**	**20**	**29**	**40**
75	Parent	60	60	60	60	60
	Teacher	60	60	40	48	**35**
98	Parent	45	50	**10**	40	50
	Teacher	50	50	25	50	55
99	Parent	55	60	50	**20**	55
	Teacher	55	60	50	60	55
100	Parent	**12**	40	**5**	**5**	**20**
	Teacher	**5**	45	**0**	**0**	**15**
103	Parent	60	60	60	60	60
	Teacher	50	55	**10**	48	45
124	Parent	60	50	**20**	50	55
	Teacher	60	50	25	50	55

Note. TW = Taiwan. -9 = Missing data. Subscale scores lower than the cutoff points were highlighted. Those children with referral status identified by both parents' and teachers' ASQ ratings are underlined in Bold.

Content Validity

After results suggested that the Chinese 36-month ASQ demonstrated adequate criterion validity, content validity was examined. Content validity is a special type of face validity. It addresses the question of whether the full content of a definition is represented in a measure (Neuman, 1997). The content validity was assessed using data from the five Taiwanese child development experts. As mentioned previously, the Taiwanese child development expert panel made several comments regarding the appropriateness of the content of items included in the 36-month ASQ. Three themes emerged from the experts' comment: (1) the subscale domain names did not match some of the test items, (2) there were some repetitive items within a single subscale domain, and (3) not all items were appropriate for the developmental level of a 36-month-old child.

Subscale Titles Do Not Match With Some of the Test Items

Two of the expert panelists indicated problems with the test items and the subscale titles in the problem solving, personal social subscales, and communication subscales. One of the expert panelists, Dr. Cheng, commented that the subscale names did not match with the content of the subscale test items, particularly in the problem solving and personal social subscales. She also noted that problem solving items did not represent typical problem solving testing items and that personal social subscale could be further divided into two subscales, daily personal skills and social interaction. She suggested either changing the subscale names or replacing the items.

Similarly, another expert panelist, Dr. Young also viewed test items on the

problem solving and personal social subscales to be problematic. For example, the problem solving subscale item 1 (line up four blocks following demonstration) [2] seemed to assess imitation behavior instead of a problem solving skill. She further commended that problem solving subscale item 4 and 6 (repeat two single digit numbers and repeat three single digit numbers) [2] tapped auditory memory testing items and not problem solving skills.

Dr. Young also indicated that personal social subscale item 1 (feed self with spoon) [2] and item 4 (put on jacket or coat) [2] were assessing adaptive motor skills because there were no social interactions involved in the processes. She commented that personal social subscale item 4 (knows gender of self) [2] was more of a cognitive item and that item 2 (pushing cart around an object) [2] assessed a motor, not a personal social skill.

In addition, Dr. Young indicated that communication subscale item 1 (point seven correct body parts) [2] should be a cognitive item. She suggested using "name everyday items such as cups, shoes, and milk" instead. She further indicated that communication subscale item 4 (tell the actions in a book or a picture) [2] is more of a cognitive item than a communicative item.

Repetitive items within a single subscale domain

The experts also commented on repetitive items in a single subscale. Dr. Young stated that, in her opinion, communication subscale items 3 and 5 both test for receptive language, and problem solving items 4 and 6 (repeat 2 single digit numbers and repeat 3 single digit numbers) [2] were both auditory memory testing items. She

questioned the value of repeating such similar items in a screening instrument. She further suggested replacing one of the two receptive language items with "understand child's speech most of the time" (stated as the child's skill, this new item would be "speaks understandably most of the time"). However, it is noted that this item is actually part of the parent's concern section at the end of the 36-month ASQ.

Appropriateness of Developmental Content Level

In terms of the appropriateness of the items for children aged 36 months. Ms. Hwang commented that fine motor subscale item 5 "using one hand holding scissors" was too difficult for a 3-year-old child. She thought that it was more appropriate for a 5-year-old child. However, no reference was given that substantiated this claim.

Ms. Lee on the other hand, indicated a number of items were too easy for a 3-year-old child. She pointed out that a 16-19 month-old Taiwanese child can kick ball forward and a two-year-old can jump with both feet up. She further indicated that the abilities to imitate or copy a vertical line and to line up four blocks were too easy for a 36-month-old child. She cited references from the child development standards developed in Hong Kong and Singapore.

In general, results from the five Taiwanese child development experts suggested that there were some problems regarding the content appropriateness of the communication, problem solving, and personal social subscales. The divergent concerns about the appropriateness of developmental level of the 36-month ASQ by the Taiwanese physical therapist and occupational therapist indicated that clinically, different child developmental standards may be used to assess Taiwanese children.

Construct Validity

After the investigation of content validity of the 36-month ASQ, the construct validity was examined next. Because the absence of the earlier studies assessing the construct validity of the ASQ, a preliminary confirmatory factor analysis using the Taiwanese data was conducted in the present study to further analyze the structure of the scale. Construct validity addresses the question of whether the various indicators operate in a consistent manner (Neuman, 1997).

According to the authors of the ASQ, the ASQ questionnaires evaluate five domains of child development: communication, gross motor, fine motor, problem solving, and personal social (Squires et al., 1999). One way to examine the construct validity of the Chinese 36-month ASQ was to confirm the five-factor structure of the scale using a confirmatory factor analysis. Confirmatory factor analysis is used to confirm the link between underlying factors and their measured variables (Byrne, 2001). Thus, the CFA model has been termed a measurement model within the framework of structural equation modeling (SEM).

In confirmatory factor analysis, maximum likelihood factor analysis is a more complicated statistical method which not only explains the error variances but also explains as much variance as possible in the population correlation matrix, as estimated from the sample correlation matrix (Kline, 1997). Thus, it is particularly suited for confirmatory factor analysis (Kline, 1997; Tabachnick & Fidell, 2001). It was thought that the five developmental domains, communication, gross motor, fine motor, problem solving, and personal social would be correlated with each other. Thus,

a maximum likelihood confirmatory factor analysis (CFA) was employed using the 112 Taiwanese children's 36-month ASQ scores completed by the parents to evaluate the construct validity of the scale.

Results of confirmatory factor analysis using structural equation modeling (SEM) with AMOS indicated the proposed 5-factor model had a poor fit, $X^2 = 944.3$, $df = 395$, $p < .001$, $N = 112$, $NFI = .67$, $CFI = .77$, $RMSEA = .11$. The subscale correlations ranged from .63 between fine motor and problem solving subscales to .99 between the personal social and communication subscales.

In SEM, a X^2 value of 944.3 with 395 degrees of freedom and a probability of less than .001 ($p < .001$) suggests that the fit of the data to the hypothesized model is not adequate (Byrne, 2001). Normed fit index (NFI) and comparative fit index (CFI) are commonly cited fit indices. A value of .90 to .95 or greater for NFI and CFI represent adequate fit to the hypothesized model (Byrne, 2001). Root mean square error of approximation (RMSEA) is another commonly used fit index and a value of less than .05 indicates a good fit (Byrne, 2001).

Because of the poor fit of the CFA, results were not interpreted. To further investigate the underlying structure of the Chinese 36-month ASQ, an exploratory factor analysis was performed with SPSS using maximum likelihood with Promax rotation. Maximum likelihood with oblique rotation was chosen because the five ASQ subscales were highly correlated, correlations ranged from .63 between fine motor and problem solving subscales to .99 between the personal social and communication subscales.

Results of the translated Chinese 36-month ASQ exploratory factor analysis with oblique rotation identified six factors with Eigen values greater than 1. To interpret factor loadings with oblique rotation, Tabachnick and Fidell (2001) suggested loadings excess .71 as excellent, .63 as very good, .55 as good, .45 as fair, and .32 as poor. Only factor loadings greater than .60 were discussed in this factor analytic solution (see Table 8).

The first factor consisted of three items from the fine motor subscale. The items were "copy vertical line[2]", "copy circle[2]," and "copy horizontal line[2]." These three items accounted for 51 percent of the total variance. The second factor contained items from the communication subscale. The items were "use three or more words to form a sentence[2]," "tell actions in the book[2]," and "tell whole name[2]." The second factor accounted for an additional six percent of the total variance. The third factor seemed to represent two items from the gross motor subscale (kick ball forward and one foot one step up stairs)[2] and one item from the problem solving subscale (use a chair or a box to reach for unreachable items[2]). This third factor accounted for an additional 4.6 percent of the variance. The fourth factor contained items from the problem solving subscale. These items were "repeat two single digit numbers[2]" and "repeat three single digit numbers,[2]" which accounted for an additional 4.4 percent of the total variance. The fifth factor had only one item loaded which was "point to seven body parts[2]" from the communication subscale, and it accounted for an additional 4.1 percent of the total variance. The last factor also had only one item loaded which was "jump with both feet up[2]" from the gross motor subscale, and it accounted for an

additional 3.3 percent of the total variance. Overall, the results of the EFA found that the majority of the variance (51%) was accounted for by three items from the fine motor subscale with the other subscales accounting for smaller amounts of the overall variance.

Based on the above results of the preliminary confirmatory factor analysis in this study, the five-factor structure of the Taiwanese 36-month ASQ was not confirmed. This suggested that the indicators of different subscales of the 36-month ASQ may not be testing the areas as described on the subscale titles. In addition, the findings from the exploratory factor analysis on the item factor loadings paralleled the experts' critique in the content validity of the Chinese 36-month ASQ that the problem solving subscale did not represent typical problem solving testing items and that personal social subscale may not be measuring only one phenomenon.

Table 8

Exploratory Factor Analysis: Factor loadings and Variance Explained of The Chinese 36-Month ASQ Completed by Parents

Factor	1	2	3	4	5	6
Factor Name	FM	COM	GM	AM	COG	GM
Variance Explained	51.3%	6.0%	4.6%	4.4%	4.2%	3.3%
Items by subscales						
Communication						
Tell whole name	-.072	**.885**	-.116	-.059	.141	.262
3-word sentence	.060	**.642**	-.074	-.008	.012	.005
Tell action in book	.322	**.601**	-.031	-.077	.167	.040
Receptive lang (shoes)	.096	.493	.128	.285	.121	-.251
Point to 7 body parts	.029	.230	-.147	.053	**.866**	.005
Receptive lang (zip)	.188	.032	.100	.281	.282	-.114
Gross Motor						
1 foot 1 step upstairs	-.039	.040	**.985**	-.033	.018	-.089
Kick ball forward	.057	-.444	**.725**	.073	.337	.210
Throw ball over shoulder	.334	-.049	.216	-.050	.466	-.026
Jump w/both feet up	.058	.078	.195	.002	.102	**.755**
Balance on 1 foot 1 sec.	.093	-.021	.123	-.030	.292	.328
Jump forward 6 inches	.385	.124	-.001	.192	-.143	.407

Table 8 (Continued)

Factor	1	2	3	4	5	6
Factor Name	FM	COM	GM	AM	COG	GM
Variance Explained	51.3%	6.0%	4.6%	4.4%	4.2%	3.3%
Items by subscales						
Fine Motor						
Copy horizontal line	**.952**	.010	.007	-.005	-.021	.029
Copy circle	**.830**	.148	-.125	-.099	.111	-.031
Copy vertical line	**.788**	-.059	.006	.012	.050	.081
Hold scissors correctly	.369	.308	.143	-.036	-.062	.021
String through one bead	.213	.467	.145	.064	-.177	-.173
Hold pencil correctly	.097	.211	.390	.192	-.194	.128
Problem Solving						
Repeat 2 single numbers	-.087	.006	-.067	**1.077**	-.037	.090
Repeat 3 single numbers	.040	-.030	-.088	**.888**	.139	.016
Copy 3-block bridge	.029	.247	-.021	.435	.111	-.033
Copy line up 4 blocks	.038	.441	.316	.270	-.173	-.009
Answer incomplete picture of a person	.419	.110	-.034	.157	.028	.116
Use chair to reach things	-.040	.225	**.636**	-.126	-.181	.120

Table 8 (Continued)

Factor	1	2	3	4	5	6
Factor Name	FM	COM	GM	AM	COG	GM
Variance Explained	51.3%	6.0%	4.6%	4.4%	4.2%	3.3%
Items by subscales						
Personal Social						
Feed self with spoon	-.033	.334	.496	-.079	.342	-.010
Push cart around object	-.190	.505	.434	-.071	.095	.212
Know self in mirror	-.044	-.031	.102	.139	.489	.102
Put on jacket or coat	.205	.288	.222	-.051	-.055	-.005
Know gender of self	.150	.317	.-.172	.068	.448	.143
Wait for a turn	-.134	.535	.080	.173	.220	-.110

Note. Extraction Method: Maximun Likelihood. Rotation Method: Promax. FM = Fine Motor. COM = Communication. GM = Gross Motor. AM = Auditory Memory. COG = Cognition.

Taiwan and U.S. ASQ Mean Score Comparison

The final goal of this study was to compare the 36-month ASQ data collected from Taiwan with the data from the U.S. The specific question was whether the mean scores of five subscales differed statistically by culture. As mentioned earlier, only data from the 101 Taiwanese children with no known developmental delays were used to determine the subscale means and standard deviations. Two sample *t*-tests were used to compare the subscale mean scores of the 36-month ASQ for the Taiwan and the U. S. samples.

Results indicated that significant differences exist between the Taiwan and the U. S. samples on two subscales: fine motor and problem solving subscales (see Table 8). Specifically, the fine motor subscale means for Taiwan children ($N = 90$) and U.S. children ($N = 512$) were, respectively, 48.1 ($SD = 14.0$) and 52.1 ($SD = 11.1$), $t\ (600) = -2.74$, $p < .01$. The problem solving subscale means for Taiwan children ($N = 91$) and U.S. children ($N = 512$) were, respectively, 51.1 ($SD = 11.3$) and 54.9 ($SD = 8.2$), $t\ (601) = -3.32$, $p < .01$. However, further examination of the true score differences between the Taiwan and the U. S. 36-month ASQ fine motor and problem solving subscale means found that although statistically significant, the actual subscale score differences were less than five points (the minimum increment of a subscale score). No statistically significant differences were identified for the communication, gross motor, and personal social subscales between the Taiwan and U. S. samples. Table 9 presents the means, standard deviations, and *t* statistics for the five ASQ subscales from the Taiwan and U. S. samples.

Overall, the results suggest that the translated Chinese 36-month ASQ is a culturally appropriate child development screening instrument for Taiwanese children. The Chinese 36-month ASQ demonstrated adequate internal consistency on the whole scale and the subscale levels except for the personal social subscale from the preschool teachers. The Chinese 36-month ASQ demonstrated criterion validity by correctly identifying the 11 Taiwanese children with diagnosed developmental delays. However, results of content validity using experts' examination and construct validity of the Chinese 36-month ASQ using confirmatory and exploratory factor analysis found that the content of the test items may not be testing the construct as the subscale titles represent. Furthermore, the comparison of the 36-month ASQ subscale mean scores between the Taiwanese and the U. S. samples revealed that although the difference were small, statistically significant differences existed on the fine motor and problem solving subscales.

Table 9

Means, Standard Deviations, and t Statistics of The 36-Month ASQ Subscale Scores for Taiwan Sample and U.S. Normative Sample

Domain / sample	*Mean*	*SD*	*N*	*t* statistic
Communication /Taiwan	55.2	7.6	93	1.14
Communication /U. S.	54.3	7.8	512	
Gross Motor /Taiwan	53.9	9.5	93	-1.35
Gross Motor /U. S.	54.7	9.5	512	
Fine Motor /Taiwan	48.1	14.0	90	-2.74**
Fine Motor /U. S.	52.1	11.1	512	
Problem Solving /Taiwan	51.0	11.3	91	-3.32**
Problem Solving /U. S.	54.9	8.2	512	
Personal Social /Taiwan	53.8	6.8	93	.56
Personal Social /U. S.	53.4	7.4	512	

Note. * * $p < .01$

Endnote

[1]At the time of data collection, significant ethnicity issues were being raised by the Taiwanese presidential election campaign. It may be that this led some parents to refuse to provide this information. Some respondents commented on the questionnaire that "we are all Taiwanese!"

[2] For the sake of brevity, only the main concept of a test item was described in the text. Please refer to appendix A for complete test item questions.

CHAPTER 5 DISCUSSION

The present study sought to validate the cultural appropriateness, reliability and validity of a Chinese language version the 36-month ASQ using a Taiwanese sample of child development experts, parents and preschool teachers. In general, results found that the translated Chinese 36-month ASQ was a culturally appropriate and reliable scale in Taiwan. However, some aspects of validity of the 36-month scale were questionable using the Taiwanese data. Furthermore, the comparison of subscale mean scores of the 36-month ASQ revealed that statistically significant differences existed on the fine motor and problem solving subscales between the Taiwan and the U.S. samples. The following discussion is organized in the following order: the cultural appropriateness, reliability, validity, limitations and suggestions for future research, and finally implications for practice.

Cultural Appropriateness of the Translated Chinese 36-Month ASQ

Ecological Validity:

Expert Panel and Satisfaction Survey from Parents and Teachers

The cultural appropriateness of the Chinese 36-month ASQ was examined by five Taiwanese child development experts and parents and teachers of three-year-old children in Taiwan. Parents, preschool teachers and the five-person panel of Taiwanese child development experts agreed that the items on the Chinese 36-month ASQ were appropriate for Taiwanese children. Only one comment questioned the cultural appropriateness of the measure. Specifically, one of the panel members (Dr. Wu, the Taiwanese pediatrician) noted that the picture on the fine motor subscale item 5

showing a left hand image holding a pair of scissors should be changed to show a right hand image. This comment was considered to be culturally related because traditionally, left handed people were considered rude and not well mannered in Chinese society. One of the reasons for this tradition was that Chinese used chopsticks and sat at a round table during meals. Most people were right-handed, so a person using chopsticks in their left handed would hit the person to his/her left side when eating and cause inconvenience to others. Such differences were discouraged in traditional Chinese social culture. In the past, a left handed child was hit on his/her left hand whenever he/she used the left hand in eating, writing, or other task such as using scissors. However, more recently this traditional preference for right handedness has decreased and few parents now openly object to left-handedness. Moreover, the purpose of the picture was to show the coordination of the thumb and fingers using a pair of scissors. Therefore, it was concluded that changing the left hand image to a right hand image may be considered, although it was not necessary from a cultural or developmental point of view.

Ecological Validity:

The Expert Panel, Parents', and Teachers' Perception of Cultural Appropriateness

All participants in the study were Taiwanese including the expert panel and the investigator. The court-registered interpreter, although an American, was raised and educated and had worked in Taiwan before she became an American. This indicated a strong ecological validity in assessing the cultural appropriateness of the translated Chinese 36-month ASQ from the Taiwanese point of view. Although the word

culturally appropriate did not appear on the satisfaction survey question for parents and teachers, it was reasonable to expect that the parents and teachers evaluated the appropriateness of the test items from a Taiwanese perspective.

The results of this study indicate that the test items on the Chinese 36-month ASQ were not culturally biased. Moreover, a recent study conducted in Norway also confirmed that the behaviors targeted by the ASQ were not culturally dependent (Jansan & Squires, 2004). Therefore, the claim of cultural adaptability of the ASQ (Squires et al., 1999) was affirmed by the recent Norway study and by the current Taiwan study.

Reliability of the Translated Chinese 36-Month ASQ

Inter-rater Reliability

The reliability of the Chinese 36-month ASQ was studied by examining the inter-rater reliability and internal consistency between parents' and teachers' ASQ rating. Both analyses affirmed that the 36-month ASQ was a reliable measure in this sample. The inter-rater reliability analysis for the Taiwanese parent and preschool teacher data indicated that the Taiwanese parents and the preschool teachers evaluated the same child similarly with one exception. Results indicated a small but statistically significant difference between the parent and teacher personal social subscale means. The personal social subscale mean difference between parents and preschool teachers may be due to contextual differences between home and school. The parents' personal social subscale mean ($M = 52.6$, $SD = 9.7$) was higher than the teachers' rating ($M = 48.5$, $SD = 12$), indicating that parents may have perceived children as having more

personal and social skills compared to teachers. It is reasonable to assume that given the differences between home and school environments, parents and teachers might have different expectations and observations regarding the social behaviors assessed by the items on the personal social subscale. For example, the parents and teachers may have different observations about the question asking about a child waiting for a turn. This behavior may be easier to achieve at home than at school because more than 70 percent of the children in the Taiwanese sample live in a household with only one or two children. In the preschool settings, however, where the average adult to child ratio is 1:11, a child might have to wait longer for his or her turn to get attention from the adults. Thus, teachers may be more likely to see turn-taking behavior as more difficult for a child.

Although the differences in parent and teacher subscale ratings may seem unimportant for specific subscales, one concern was the low rate of agreement on the scores that lead to a child being identified as needing referral for further assessment of developmental disabilities. According to both teachers' and parents' 36-month ASQ ratings, a total of 23 children were identified with scores low enough to lead to placement in the referral category. Fourteen children received such scores from parents and 11 children received such scores from their preschool teachers. However, only three out of the 23 children received scores low enough to place them in the referral category from both their parents and teachers. Thus for only 13% (three, out of 23) of children did both parents and teachers agree on needing referral for further assessment. Contextual factors between home and school may be accounted for the different

observation between parents and preschool teachers. It is also possible that children may behave differently in different settings for different people. Further investigation is needed to determine the influences on and of the accuracy of both parents' and teachers' assessments, particularly among Taiwanese people. Given that the ASQ is intended to be completed by parents, it is recommended that the ASQ continue to be used as a parent-completed scale.

Internal Consistency

The internal consistency of the translated Chinese 36-month ASQ was examined for both the whole scale and the subscales using data from both parents and teachers. Both parents' and teachers' Chinese 36-month ASQ showed excellent internal consistency ($\alpha = .96$). The internal consistency of the subscales was also very good with the standardized alpha ranging from .77 to .91; only one subscale alpha level fell below the desired .80.

The relative low alpha level of .77 was found on the teachers' personal social subscale. This finding was similar to that reported for a U. S. sample (Squires et al., 1999) in which the personal social subscale of the 36-month ASQ as reported by the parents also had the lowest standardized alpha coefficient ($\alpha = .55$) than any other subscale alpha levels (alpha ranged from .55 to .76). In the current study of a Chinese version of the 36-month ASQ, concerns about the personal social subscale were also raised by two of the Taiwanese child development experts, Dr. Cheng and Dr. Young, who noted that the personal social subscale seemed to be testing two different areas of child development, personal adaptive behaviors (such as dressing) and social

interaction (such as turn-taking). If in fact diverse developmental domains are being assessed within a subscale, it is not surprising that alpha coefficients indicate relatively lower levels of the internal consistency.

Similarly, a recent Canadian (Quebec) study of the ASQ (Squires & Dionne, in preparation) also found that for three out of the four Ages and Stages Questionnaires (42, 48, 54, and 60 month) studied, the personal social subscales had the low alpha coefficients compared to the other subscales. However, the 36-month ASQ was not among the ASQ versions examined. The Cronbach's alpha coefficients of the French translation from Canadian sample ranged from .24 to .81 for the 42, 48, 54, and 60-month ASQs. The personal social subscales of the French ASQ had the lowest Cronbach's alpha coefficients except for the 42-month ASQ. In the French 42-month ASQ, the gross motor subscale had the lowest Cronbach's alpha ($\alpha = .40$) and the personal social subscale was the second lowest ($\alpha = .56$).

Taken together, the findings of this current study suggest that in general, the translated Chinese 36-month ASQ was a reliable scale. However, the personal social subscale was found to have relatively low internal consistency which might have been accounted for by divergent developmental items in the subscale. This conclusion is supported by findings of the exploratory factor analysis. These findings will be discussed in the following section on scale validity.

Validity of the Translated Chinese 36-Month ASQ

Criterion Validity

The criterion validity of the Chinese 36-month ASQ was examined using a Taiwanese sample of three-year-old children who had diagnosed developmental delays. The criterion validity was confirmed when the ASQ scores correctly identified the 11 children with diagnosed developmental delays. These children were identified using cutoff points based on two standard deviations below the subscale means for the 101 Taiwanese children with no known developmental delays. It is 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 (see Appendix G for developmental profile reported by their parents). Thus it is unclear if the 36-month ASQ could pick up more subtle developmental variations.

Construct Validity

The construct validity was assessed using a confirmatory factor analysis. The results of confirmatory factor analysis did not confirm a five-factor solution suggesting that the 30 indicators in the scale may not consistently measure the developmental constructs indicated by the five a priori subscale domains. In addition, the high correlation (.99) between the communication and personal social subscales indicating that the two subscales may be accessing the same domain of child development.

Furthermore, the problem solving subscale had questionable content validity as

indicated by the experts' comments regarding the content validity of items included in the problem solving subscale. The experts noted that several of the items did not represent typical problem solving test items. For example, Dr. Young commended that asking children to repeat two single digit numbers and repeat three single digit numbers both were testing auditory memory not problem solving skill. This finding was further confirmed by the inter-item correlation and the exploratory factor analysis. In particular, these two items had the highest inter item correlation (.93) in the reliability standardized alpha test for the whole scale and also loaded together on the same factor in the exploratory factor analysis. These results suggest that these two items were testing the same phenomenon.

In addition, the four other problem solving subscale items did not load on the same factor with the two items testing auditory memory. Rather, using chair or box to reach for things (problem solving item 2) loaded with the other two gross motor subscale items. It suggested that the problem solving subscale item of using chair or box to reach for things was more consistent with testing of the motor skills than the problem solving skills.

In terms of the personal social subscale, none of the six subscale items loaded on any factor of the exploratory factor analysis. This finding paralleled the Taiwanese child development experts' review and the previous result finding of low internal consistency for the personal social subscale.

In sum, these findings question the construct validity of the personal social and problem solving subscales of the Chinese 36-month ASQ. However, before it can be

concluded that the subscales of the ASQ are not valid to assess the appropriate developmental constructs, methodological factors that limit this study must be detailed.

Limitation and Suggestions for Future Research

There were a number of limitations that could influence the results of the current study. First, the sampling method used a non-randomized procedure. The subjects recruited were mostly from Pingtung area indicating selection bias and thus may not be representative of general Taiwanese three-year-old children. This weakens the generalizability of the study findings.

Second, the small sample size was insufficient for conducting confirmatory factor analysis. In the present study, the confirmatory factor analysis model had 30 predictors; 30 predictors demand a minimum sample size of 450 to run this model adequately. The recommended sample size for factor analysis was roughly 10-15 cases per predictor or five cases per parameter estimated. Comray and Lee (1992) gave as a guide sample size of 50 as very poor, 100 as poor, 200 as fair, 300 as good, 500 as very good, and 1000 as excellent (as cited in Tabachnick & Fidell, 2001, p. 588). Tabachnick and Fidell (2001) suggested that it was important to have at least 300 cases for factor analysis, however, for solutions that have several high loading marker variables (>.80) about 150 cases might be sufficient. Clearly, the sample size of 112 cases in this study was not adequate to run the maximum likelihood confirmatory factor analysis, so results must be interpreted with caution.

Third, the assumption of normality in variable distribution was violated

because the screening instrument was designed to identify outliers. In the case of the Chinese 36-month Ages and Stages Questionnaire, the variables, namely the 30 test items, were all skewed to the right with most of the responses being *yes* on all of the 30 items. Although this is expected because most children are developing normally and therefore would receive a *yes* score, the violation of normality in variable distribution nonetheless may negatively affect the findings of factor analysis. Nevertheless, the attempt to confirm a five-factor structure for the translated Chinese 36-month ASQ was a valuable step, as Tabachnick and Fidell (2001) had noted that "to the extent that normality fails, the solution is degraded but may still be worthwhile." (2001, p. 588).

Furthermore, a recent study of a similar type of instrument, the Infant-Toddler Social and Emotional Assessment (ITSEA), by Bracha , Perez-Diaz, Gerardin, Perriot, Rocque, Flament, Reinert, Mazet, & Carter (2004) successfully confirmed the latent factor structure of the ITSEA using confirmatory factor analysis in a French sample (N = 250). Similar to the ASQ, the ITSEA questionnaire is also a parent-report questionnaire. The ITSEA is comprised of 17 subscales that are grouped into three problem domains, labeled Internalizing, Externalizing, and Dysregulation, and one competence domain. The ITSEA is composed of 166 items that are rated on a three-point scale: 0 (*not true*), 1 (*somewhat true*), and 2 (*very true*). The means of the ITSEA ranged from .07 to .97 for the problem domains and .25 to 1.7 for the competence domain indicating that the data were similarly skewed as the ASQ. The authors noted that "despite the low-risk nature of the sample and relatively small

sample size, fit indices were all relatively strong and all domains and the majority of the scales exhibited adequate intra-scale consistency coefficients." (Bracha et al., 2004, p. 126). In other words, the limitation of small sample size and violation of normality of variable distribution may not necessarily result in a failure of confirmatory factory analysis.

Interestingly, results of the exploratory factor analysis showed that 51 percent of the variance consisted of three items from the fine motor subscale. This raised the question of whether the ASQ was mainly assessing fine motor skills. Future research should more directly examine this issue.

Because of the small sample size and the violation of normality of the variable distribution, the results of confirmatory factory analysis in the present study should be considered preliminary. Recommendations for future research include a larger and representative sample, and utilizing recent statistical methods to perform item and scale analysis of non-normal distributed variables. Specifically, item response theory has been suggested in Janson and Squires' (2004) study to further investigate the structure of the 36-month ASQ.

Fourth, researchers and practitioners would benefit from investigations of the accuracy of, and influences on, parents' and teachers' ASQ rating. These issues were not addressed in this study. Despite the high paired correlations between the parents' and teachers' ASQ ratings, only three out of 23 children were placed in the referral category by both the parent and the teacher. It would be ideal if all 23 children identified by either the parent or the teacher could be referred for further

developmental evaluation by child development professionals to further verify the accuracy of parents' and teachers' observations of the child. However, considering the traditional stigma of individuals with disability, the current availability of the placement for children with developmental delays in Taiwan, it was decided that only those children who were identified by both parents and teachers would be notified to pursue further developmental evaluations. This rather conservative approach was intended to avoid unnecessarily alarming the family and avoid labeling the child. Future research should also include additional child development evaluations to validate the accuracy of the parent ratings.

Fifth, although ecological validity a strength in the present study, a more in-depth, qualitative approach in gathering information regarding cultural appropriateness is recommended in further research to provide more contextual information about Taiwanese perceptions of the 36-month ASQ.

Sixth, although small but significant differences were found in the mean scores on two ASQ subscales comparing the Taiwan and U. S. samples, the actual differences in mean scores were less than five points (the minimum increment of a subscale score). This suggests that the different cultural context might have an effect on child development. However, as pointed out previously, the sampling method and sample size of the present study limited the interpretation and generalization of this result. Because of these limitations, and because statistically significant differences were found between the two samples' subscale mean scores, it may not be appropriate to interpret the 36-month ASQ scores of Taiwanese children using the U.S. 36-month

ASQ cutoff points. Thus, a larger sample size and more representative sample is needed to further determine the Chinese 36-month ASQ's subscale mean scores and cutoff points for Taiwanese three-year-old children.

Finally, the cultural and contextual factors such as social policies, family structures, child care arrangements, and parents' social economical status and ethnicity all influence children's development and are important to examine. Although these factors were not the main focus of the present study, it is important for future research to examine the effect of these contextual factors on Taiwanese children's development.

Implications for Practice

The present study has contributed to the literature of cross-cultural assessment of the ASQ, a widely used child developmental screening instrument. Professionals in the early intervention field have paid increased attention to the cultural validity of child development assessment instruments. There is increased recognition that merely translating a test into another language does not also equal a translation of the original psychometrics of a test (Bracha et al., 2004; Cohen & Spenciner, 2003; Dionne & Squires in preparation; Janson & Squires, 2004). Careful validation steps are necessary for an assessment instrument to be accurate for children from different cultural backgrounds. In general, the present study supported the reliability and validity information regarding the translated Chinese 36-month ASQ.

The present study has important implication for early intervention practice in Taiwan. Using the Would Health Organization's estimate of six to nine percent of the population as developmentally compromised, there are about 133,960 children under

age six with developmental delays in Taiwan, and yet only 16,286 (14%) of them are currently registered for services (Children's Bureau, 2003). This means that the majority (86%) of children under age six who are developmentally compromised have not been properly identified in order to receive early intervention services as the present Taiwanese law requires.

It is apparent that the current child-find system in Taiwan is not effective in identifying children with developmental delays. The need for an effective and culturally appropriate child development screening instrument was evident from the lack of a culturally appropriate child development screening instrument for Taiwanese children and the fact that approximately 86 percent of children under six with developmental delays in Taiwan still had not been identified for early intervention services.

The results of the present study confirmed the cultural appropriateness and the reliability of the Chinese 36-month ASQ but there were some questions about the validity of the problem solving and personal social subscales. Future research can build on these results to further investigate the construct validity of the 36-month ASQ, establish the norms of the 36-month ASQ in Taiwan and then to examine the reliability and validity of the other19 ASQ questionnaires.

This study was the first critical step in establishing ASQ as a potentially cost-effective way of identifying children with developmental delays in Taiwan to ensure that children can receive services as early as possible and promote children's optimal health.

CHAPTER 6 CONCLUSION

A number of studies have documented that early intervention services promote children's optimal health. The benefit of early intervention is invaluable for the society in the years to come. Identifying children who need early intervention is the first step in providing these important services. To effectively identify children who might benefit from early intervention services, a culturally appropriate, reliable, and valid child development screening instrument is necessary. Although it takes tremendous amount of investment to develop a child development assessment instrument, the direct use of a translated foreign child development assessment instrument without validating its cultural validity and reliability is strongly questionable.

The field of early intervention in Taiwan over the last two decades has made giant steps towards promoting early intervention services for children with developmental delays. These efforts included the passage of laws that require early intervention services for children with developmental delays and attempts to coordinate existing social welfare, health, and education systems to provide services for children with developmental delays in Taiwan. However, the lack of a culturally appropriate, reliable, and valid child developmental screening instrument for Taiwanese children has significantly hindered the effectiveness in identifying children who might benefit from early intervention services.

The present study sought to identify an effective and culturally appropriate developmental screening instrument for three-year-old children in Taiwan. The Ages and Stages Questionnaires, a low-cost, parent-report, and widely used age specific

child development screening instrument in the United States seemed to be promising for adaptation as a developmental screening instrument in Taiwan.

The three goals of this study were (1) to examine the cultural appropriateness of the translated Chinese 36-month ASQ as a developmental screening instrument for three-year-old children in Taiwan, (2) to investigate the reliability and validity of the translated Chinese 36-month ASQ for three-year-old children in Taiwan, and (3) to compare the 36-month ASQ subscale mean scores of U.S. and Taiwanese three-year-old children.

Results indicated that the translated Chinese 36-month ASQ was a culturally appropriate child developmental screening instrument for three-year-old children in Taiwan. The translated Chinese 36-month ASQ demonstrated satisfactory internal consistency and inter-rater reliability in the present study. The translated Chinese 36-month ASQ also demonstrated criterion validity by correctly identified the 11 Taiwanese children with diagnosed developmental problems. However, questions were raised about the content validity and construct validity of the translated Chinese 36-month ASQ. Further, the comparison of the 36-month ASQ subscale means found that significant although small differences existed on the fine motor and problem solving subscales between the American and Taiwanese samples. Further investigations of content validity and construct validity, and establishing the Taiwanese 36-month ASQ subscale cutoff points using a larger and more representative sample is needed before the translated Chinese 36-month ASQ can be adapted and used as a child developmental screening instrument in Taiwan.

The present study makes an important contribution to the literature of cross-cultural assessment. Results support and further emphasize the need for thorough investigation of psychometrics properties of translated instruments. Professionals in the early intervention field need to keep in mind that culturally appropriate developmental assessment is not merely translating the instrument but also considering the ecological and contextual factors that affect development in the 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. Although examination of the contextual factors on child development was not the focus of the present study, it is important for future research to investigate how these contextual factors affect child development in different nations.

The study has significant practical implications for early identification of children with developmental delays in Taiwan. The need for an effective child find system and a culturally appropriate, reliable, and valid child developmental screening instrument in Taiwan is evident from the estimated 86 % of children with developmental delays still have not been properly identified to receive early intervention services. Future research can build on these results to further investigate the content and construct validity of the 36-month ASQ, establish the norms of the 36-month ASQ in Taiwan and test the remaining 19 ASQ questionnaires for reliability and validity.

This study was the first critical step in establishing the ASQ as a potential

cost-effective way of identifying children with developmental delays in Taiwan to ensure that children with developmental problems can be identified in order to receive early intervention services and to promote healthy and resilient children.

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Appendix A

Background Questionnaire for Parents

Information about the child

1. Name:_____

2. Gender: _____ male _____ female

3. Ethnicity: Minan, Hugka, Mainland, Aboriginals, Other, please specify_____

4. Birthdate:_____

5. Preschool:_____Tuition and expenses/semester:_____

6. Teacher's name:_____

7. The primary care provider before preschool entry:

   Mother____ Father____ Grandmother _____Grandfather _____Nanny

   Other, please specify_____

8. Who dose the child live with now?

   Both birth parents _____adoptive parents _____mother and stepfather

   father and stepmother _____mother only _____father only

   grandparents _____foster parents____Other, please specify_____

9. Where does your child go for outdoor physical activities?

   ____Park ___Near-by Schools _Other, please describe_____

10. How often does your child go out for physical activities?

    _____daily ___weekly ___monthly ___seldom ___never

11. Please list all your child's brothers and sisters below:

Name	gender	age	live together
_____	_____	____	__ yes ___no
_____	_____	____	__ yes ___no
_____	_____	____	__ yes ___no

12. If the child does not live with both birth parents, how often does the child have contact with the other parent?

    _____daily ____weekly ____monthly ____seldom ____never

13. Was there anything unusual about the child's birth?___ yes ___no

    If yes, please specify_____

14. In general, how do you rate your child's health?

    ___ Poor ___Not so good ___Average ___Very good ___Excellent

    ___ Poor ___Not so good ___Average ___Very good ___Excellent

Information about the parents

1. Mother's name:_____ age:_____
2. Education: ___Elementary ___Middle School ___High School

   ___College ___Graduate School
3. Currently employed?___ yes ___no (if no, jump to #6).
4. Occupation:_____Title:_____
5. ___Part-time ___full-time
6. What was your last job?_____
7. Father's name:_____ age:_____

8. Education: ___Elementary ___Middle School ___High School

   ___College ___Graduate School

9. Currently employed?___ yes ___no(if no, jump to #12).

10. Occupation:_____Title:_____

11. ___Part-time ___full-time

12. What was your last job?_____

Thank you for providing this important information!

父母親或主要照顧者背景資料問卷

有關於這個孩子的資料

1. 姓名:_____

2. 性別: _____ 男 _____ 女

3. 種族: ____閩南客家外省原住民或其他請註明_____

4. 出生年月日:_____

5. 幼稚園或托兒所名稱:_____ 每學期學費支出:____

6. 老師姓名:_____

7. 孩子入幼稚園或托兒所之前的主要照顧者:

   甲、母親_____ 父親 ____ 祖父母 _____保姆 _____

   乙、其他請註明_____

8. 孩子目前與誰同住?

   請註明父母養父母祖父母或其他_____

9.孩子通常到那裡從事體能活動?

   ____公園 ___鄰近校園 ___其他請註明_____

10.請指出孩子從事體能活動的頻率?

____每天至少一次 ___每週至少一次___每月至少一次 ___很少 ___從來沒有

11.請將孩子的兄弟姐妹相關資料填入下列空格:

姓名	性別	出生年月日	是否同住
_____	_____	_____	__ 是 ___否
_____	_____	_____	__ 是 ___否
_____	_____	_____	__ 是 ___否
_____	_____	_____	__ 是 ___否

12 如果孩子不是與雙親同住請指出孩子與父母相處的頻率?____每天至少一次 _

每週至少一次___每月至少一次 ___很少 ___從來沒有

13 孩子出生過程是否順利?___ 是 ___否

   若否請描述_____

14 整體而言您認爲孩子的健康狀況如何?

___ 很差 ___不太好 ___還好 ___很好 ___極佳

15. 您認爲孩子是否有情緒或行爲方面的問題?___是 ___否

若是請描述_____

有關於父母的資料

1. 母親的姓名:_____ 年齡:_____

2. 教育程度: ___國小 ___國中 ___高中___大學 ___研究所以上

3. 目前是否有工作?___ 是 ___否 (若否跳至第六題).

4. 職業:_____職稱:_____

5. ____全職 ___半職

6. 請問您的前一個工作是?_____

7. 父親的姓名:_____ 年齡:_____

8. 教育程度: ___國小 ___國中 ___高中___大學 ___研究所以上

9. 目前是否有工作?___ 是 ___否 (若否跳至第十二題).

10. 職業:_____職稱:_____

11. ___全職 ___半職

12. 請問您的前一個工作是?_____

感謝您回答本問卷!

Appendix B

Background Questionnaire for Preschool Teachers

Information about the child: Child's Name_____

1. In general how do you rate the child's health?

   Poor ___Not so good ___Average ___Very good ___Excellent_____

2. To your knowledge, does this child have any emotional or other behavioral

   problems?_____yes ___no. If yes, please specify_____ __

3. How long have you taught this child?_____

Information about you and your preschool

13. Your name:_____ age:_____Gender:_____male ___ female

14. Your education:___High School ___College ___Graduate School. Major:_____

15. How many years of experience do you have in early childhood education?_____

16. What is the adult/child ration in your classroom?_____

17. What is the core educational philosophy of your preschool?_____

18. How long have you being the child's teacher?_____

19. Does your preschool support inclusion education for children with developmental

    delays? __ Yes __ No (If yes, answer the next question)

20. Is your classroom an inclusive setting?__ Yes __ No

    (If yes, please answer the next question)

21. Please describe these children's developmental problems: _____

_____

Thank you for providing this important information!

幼稚園或托兒所老師的背景資料問卷

孩子的姓名_____

有關孩子的資料

1. 整體而言您認爲這個孩子的健康狀況如何?

   ___ 很差 ___不太好 ___還好 ___很好 ___極佳

2. 整體而言您認爲這個孩子的發展狀況如何?

   ___ 很差 ___不太好 ___還好 ___很好 ___極佳

3. 您認爲孩子是否有情緒或行爲方面的問題?___是 ___否

   若是請描述_____

4. 請問您教這個孩子有多久?_____

有關老師的資料

5. 您的姓名:_____ 年齡:_____性別:_____男_____女

6. 教育程度:___高中 ___專科 ___大學_____研究所 科系:_____

7. 請問您有幾年的幼教經驗?_____年

8. 您班上的教師與學童人數比例爲何?_____

9. 您園所的核心教育理念爲何?_____

10. 您園所是否支持融合教育理念? __ 是 __ 否 (若是請繼續回答下個問題)

11. 您班上目前實施融合教育嗎? __ 是 ____ 否 (若是請繼續回答下個問題)

12. 請問班上有那些發展遲緩的兒童: _____

感謝您回答本問卷!

Appendix C

The 36-month ASQ Satisfaction Survey

Instruction: Please complete this survey after filling out the ASQ questionnaire.

1. How long did it take you to complete the questionnaire? Please check one.

Less than 10 minutes____ 10-20 minutes____ 20-30 minutes____

30min. to 1 hour____ more than 1 hour____

2. It was easy to understand the questions. Please check one.

Yes_____ Sometimes_____ No_____

Please list the questions that were difficult to understand.

Question Number	Comments
_____	_____
_____	_____
_____	_____
_____	_____

3. The questions were appropriate for the child's age.

Yes_____ Sometimes_____ No_____

Please list the questions that were not appropriate for the child's age.

Question Number	Comments
_____	_____
_____	_____
_____	_____
_____	_____

4. The questionnaire.....Please check all that apply.

was fun to do____ was interesting_____ took too long_____

helped me think about my child's development_____

was a waste of my time_____ didn't tell me much_____

5. Would you like to fill out another questionnaire when the child gets older?

Yes_____ No_____ If yes, please provide your address below:

Address:_____

6. How would you change this questionnaire to make it better?

_____

_____

36 個月依齡發展問卷滿意度調查

請於填寫完 36 個月依齡發展問卷後，回答:

1. 請問您花費多久時間填寫完 36 個月依齡發展問卷？請擇一。
   少於 10 分鐘____　10-20 分鐘 ____　20-30 分鐘____
   30 分鐘到 1 小時____　多於 1 小時____
2. 您認爲 36 個月依齡發展問卷上的問題很容易了解嗎？
   是_____　有時後_____　否_____
   請將不容易了解的題目標示於下列空格中，並稍加說明。
   問題題號　說明
   _____　_____
   _____　_____
   _____　_____
   _____　_____
   _____　_____
3. 您認爲 36 個月依齡發展問卷上的問題是否合乎孩子的發展年齡？
   是_____　有時後_____　否_____
請將您認爲不合乎孩子發展年齡的問題標示於下列空格中，並稍加說明。
   問題題號　說明
   _____　_____
   _____　_____
   _____　_____
   _____　_____
   _____　_____
4. 您認爲 36 個月依齡發展問卷上的問題.....可覆選
   滿有趣____　滿好玩_____　花費時間太久_____
   幫助我注意孩子的發展_____
   浪費我的時間_____　對我沒什麼幫助_____
5. 您是否願意填寫下一份依齡發展問卷？
   是_____ 否_____　回答是者，請提供您的郵寄住址:
   住址:_____
6. 您認爲該如何改進此問卷使之更完善？
   _____
   _____
   _____
   _____
   _____
   _____

Appendix D

The 36-Month ASQ (Sample do not photocopy!)

36 Month • 3 Year Questionnaire

On the following pages are questions about activities children do. Your child may have already done some of the activities described here, and there may be some your child has not begun doing yet. For each item, please check the box that tells whether your child is doing the activity regularly, sometimes, or not yet.

Important Points to Remember:

- ☑ Be sure to try each activity with your child before checking a box.
- ☑ Try to make completing this questionnaire a game that is fun for you and your child.
- ☑ Make sure your child is rested, fed, and ready to play.
- ☑ Please return this questionnaire by _____
- ☑ If you have any questions or concerns about your child or about this questionnaire, please call: _____ .
- ☑ Look forward to filling out another questionnaire in _____ months.

ASQ

The 36-Month ASQ Continued (Sample do not photocopy!)

36 Month • 3 Year Questionnaire

Please provide the following information.

Child's name: _____

Child's date of birth: _____

Today's date: _____

Person filling out this questionnaire: _____

What is your relationship to the child? _____

Your telephone: _____

Your mailing address: _____

_____

City: _____

State: _____ ZIP code: _____

List people assisting in questionnaire completion: _____

_____

Administering program or provider: _____

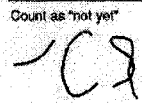
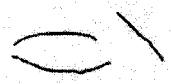
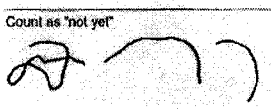
ASQ

The 36-Month ASQ Continued (Sample do not photocopy!)

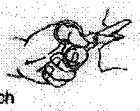
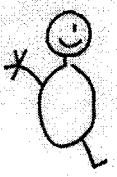
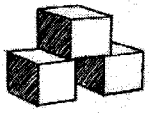
	YES	SOMETIMES	NOT YET	
COMMUNICATION *Be sure to try each activity with your child.*				
1. When you ask her to point to her nose, eyes, hair, feet, ears, and so forth, does your child correctly point to at least *seven* body parts? (She can point to parts of herself, you, or a doll.)	❑	❑	❑	___
2. Does your child make sentences that are three or four words long? Please give an example: _____	❑	❑	❑	___
3. Without giving him help by pointing or using gestures, ask your child to "Put the shoe *on* the table" and "Put the book *under* the chair." Does your child carry out both of these directions correctly?	❑	❑	❑	___
4. When looking at a picture book, does your child tell you what is happening or what action is taking place in the picture? (For example, "Barking," "Running," "Eating," and "Crying") You may ask, "What is the dog (or boy) doing?"	❑	❑	❑	___
5. Show your child how a zipper on a coat moves up and down, and say, "See, this goes up and down." Put the zipper to the middle and ask your child to move the zipper *down*. Return the zipper to the middle and ask your child to move the zipper *up*. Do this several times, placing the zipper in the middle before asking your child to move it up or down. Does your child consistently move the zipper up when you say "up" and down when you say "down"?	❑	❑	❑	___
6. When you ask, "What is your name?" does your child say both her first and last names?	❑	❑	❑	___
		COMMUNICATION TOTAL		___
GROSS MOTOR *Be sure to try each activity with your child.*				
1. Without holding onto anything for support, does your child kick a ball by swinging his leg forward? 	❑	❑	❑	___
2. Does your child jump with both feet leaving the floor at the same time? 	❑	❑	❑	___
3. Does your child walk up stairs, using only one foot on each stair? (The left foot is on one step, and the right foot is on the next.) She may hold onto the railing or wall. (You can look for this at a store, on a playground, or at home.) 	❑	❑	❑	___

ASQ

The 36-Month ASQ Continued (Sample do not photocopy!)

	YES	SOMETIMES	NOT YET	
GROSS MOTOR *(continued)*				
4. Does your child stand on one foot for about 1 second without holding onto anything? 	❑	❑	❑	___
5. While standing, does your child throw a ball *overhand* by raising his arm to shoulder height and throwing the ball forward? (Dropping the ball or throwing the ball underhand does not count.) 	❑	❑	❑	___
6. Does your child jump forward at least 6 inches with both feet leaving the ground at the same time? 	❑	❑	❑	___
		GROSS MOTOR TOTAL		___
FINE MOTOR *Be sure to try each activity with your child.*				
1. After she watches you draw a line from the top of the paper to the bottom with a pencil, crayon, or pen, ask your child to make a line like yours. Do not let your child trace your line. Does your child copy you by drawing a single line in a vertical direction? Count as "yes"  Count as "not yet" 	❑	❑	❑	___
2. Does your child thread a shoelace through either a bead or an eyelet of a shoe? 	❑	❑	❑	___
3. After he watches you draw a single circle, ask your child to make a circle like yours. Do not let him trace your circle. Does your child copy you by drawing a circle? Count as "yes"  Count as "not yet" 	❑	❑	❑	___
4. After she watches you draw a line from one side of the paper to the other side, ask your child to make a line like yours. Do not let your child trace your line. Does your child copy you by drawing a single line in a horizontal direction? Count as "yes"  Count as "not yet" 	❑	❑	❑	___

The 36-Month ASQ Continued (Sample do not photocopy!)

	YES	SOMETIMES	NOT YET	
FINE MOTOR *(continued)*				
5. Does your child try to cut paper with child-safe scissors? He does not need to cut the paper but must get the blades to open and close while holding the paper with the other hand. (You may show your child how to use scissors. Carefully watch your child's use of scissors for safety reasons.) 	❑	❑	❑	___
6. When drawing, does your child hold a pencil, crayon, or pen between her fingers and thumb like an adult does? 	❑	❑	❑	___
		FINE MOTOR TOTAL		___
PROBLEM SOLVING *Be sure to try each activity with your child.*				
1. While your child watches, line up four objects like blocks or cars in a row. Does your child copy or imitate you and line up *four* objects in a row? (You can also use spools of thread, small boxes, or other toys.) 	❑	❑	❑	___
2. If your child wants something he cannot reach, does he find a chair or box to stand on to reach it?	❑	❑	❑	___
3. When you point to the figure and ask your child, "What is this?" does your child say a word that means a person? Responses like "snowman," "boy," "man," "girl," and "Daddy" are correct.  Please write your child's response here: _____	❑	❑	❑	___
4. When you say, "Say seven three," does your child repeat *just* the two numbers in the correct order? *Do not repeat the numbers.* If necessary, try another pair of numbers and say, "Say eight two." Your child must repeat just one series of two numbers for you to answer "yes" to this question.	❑	❑	❑	___
5. Show your child how to make a bridge with blocks, boxes, or cans, like the example. Does your child copy you by making one like it? 	❑	❑	❑	___
6. When you say, "Say five eight three," does your child repeat *just* the three numbers in the correct order? *Do not repeat these numbers.* If necessary, try another series of numbers and say, "Say six nine two." Your child must repeat just one series of three numbers for you to answer "yes" to this question.	❑	❑	❑	___
		PROBLEM SOLVING TOTAL		___

The 36-Month ASQ Continued (Sample do not photocopy!)

	YES	SOMETIMES	NOT YET	
PERSONAL-SOCIAL *Be sure to try each activity with your child.*				
1. Does your child use a spoon to feed herself with little spilling?	❑	❑	❑	___
2. Does your child push a little shopping cart, stroller, or wagon, steering it around objects and backing out of corners if he cannot turn?	❑	❑	❑	___
3. When she is looking in a mirror and you ask, "Who is in the mirror?" does your child say either "Me" or her own name?	❑	❑	❑	___
4. Can your child put on a coat, jacket, or shirt by himself?	❑	❑	❑	___
5. Using these exact words, ask your child, "Are you a girl or a boy?" Does your child answer correctly?	❑	❑	❑	___
6. Does your child take turns by waiting while another child or adult takes a turn?	❑	❑	❑	___
			PERSONAL-SOCIAL TOTAL	___

OVERALL *Parents and providers may use the space below or the back of this sheet for additional comments.*

1. Do you think your child hears well? YES ❑ NO ❑
   If no, explain: _____
2. Do you think your child talks like other children her age? YES ❑ NO ❑
   If no, explain: _____
3. Can you understand most of what your child says? YES ❑ NO ❑
   If no, explain: _____
4. Do you think your child walks, runs, and climbs like other children his age? YES ❑ NO ❑
   If no, explain: _____
5. Does either parent have a family history of childhood deafness or hearing impairment? YES ❑ NO ❑
   If yes, explain: _____
6. Do you have any concerns about your child's vision? YES ❑ NO ❑
   If yes, explain: _____
7. Has your child had any medical problems in the last several months? YES ❑ NO ❑
   If yes, explain: _____
8. Does anything about your child worry you? YES ❑ NO ❑
   If yes, explain: _____

36 個月問卷

以下問題是兒童所做的一些活動。您的小孩或許已經在做這些動作，或者有些動作還沒有開始去做。請依照您的小孩目前實際狀況，在會、有時候、或尚未開始做，的格子裡打勾

請記得以下要點：

1. 請在每一題作答之前，讓您的小孩試試該項活動。
2. 請試著把填寫此問卷當作一個您與小孩的親子遊戲。
3. 請在___月____日前寄回本問卷。
4. 如果您對您的小孩或本問卷有任何問題，請打電話到 _____。
5. 您的下一個問卷將在_____個月後寄來。

36 個月問卷

小孩的姓名：_____

小孩的出生年月日：_____年_____月 _____日

填寫問卷者的姓名：_____

您與小孩的關係：_____

您的電話：_____

您的聯絡住址： _____

若有人協助您完成本問卷，請將他們的姓名填寫於下列空格中：

_____

今天的日期：_____年_____月 _____日

依齡發展問卷執行單位：_____

依齡發展問卷： 一個由父母填寫的兒童發展監測系統

作者：Diane Bricker, Jane Squires, and Linda Mounts

溝通：請記得，讓您的小孩試一試每項活動。 總分：_____

	會	有時候	尚未開始做
1. 您的小孩會不會至少指出七個正確的身體部位（眼睛、鼻子、嘴巴、耳朵、頭髮、肚子、、、等）？（他可以指著你的、娃娃的、或他自己的身體）	☐	☐	☐
2. 您的小孩是否會將三個或四個詞連起來形成有意義的短句？請寫下一個例子_____	☐	☐	☐
3. 在沒有示範與肢體語言暗示的情況下，對您的小孩說：「把鞋子放在桌上！」「把書放在椅子下！」您的小孩會不會正確地完成這二項指示？	☐	☐	☐
4. 看圖畫書時，您的小孩會不會告訴你圖片中的動作？例如：作蛋糕、跑步、哭、吃東西等動詞。您可以問孩子：小狗（小男孩）正在做什麼？	☐	☐	☐
5. 先示範如何使拉鍊上下移動，然後將拉鍊頭移到中點，叫您的小孩把拉鍊拉下去。然後再將拉鍊頭移到中點，叫您的小孩把拉鍊拉上去。可以多玩幾次，觀察您的小孩會不會持續遵照「往上」或「往下」的指示？	☐	☐	☐
6. 當您問：你叫什麼名字？您的小孩會不會同時說出他的全名(姓與名)？	☐	☐	☐

粗動作：請記得，讓您的小孩試一試每項活動。 總分：_____

	會	有時候	尚未開始做
1. 沒有扶著任何東西的情況下，您的小孩會不會抬起腳由後向前踢球？	☐	☐	☐
2. 您的小孩跳躍時，二腳會不會同時離地？	☐	☐	☐

3. 您的小孩會不會一腳一階上樓梯？（可以扶著牆壁或扶手）（您可以在遊戲場、商店、或家裡觀察這個動作） ☐ ☐ ☐

4. 您的小孩會不會單腳站立持續一秒鐘？（不可以扶著任何東西） ☐ ☐ ☐

5. 您的小孩會不會將手舉到肩高然後向前丟球？（手從下面丟球，或者球掉下來，都不算） ☐ ☐ ☐

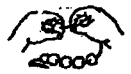
6. 您的小孩會不會向前跳六英吋（約 15 公分）跳躍時，二腳必須同時離地？ ☐ ☐ ☐

精細動作：請記得，讓您的小孩試一試每項活動。 總分：_____

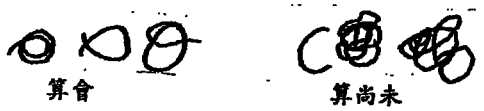
	會	有時候	尚未開始做
1. 看著您在紙上畫一條垂直線後，叫您的小孩畫一條一樣的直線，他會不會在垂直方向跟著畫一條直線？（不可以延著你的線畫）	☐	☐	☐

算會 算尚未

2. 您的小孩會不會將鞋帶穿過一個鞋帶洞或一粒珠子？ ☐ ☐ ☐



3. 看著您在紙上畫一個圓圈後，叫您的小孩畫一個一樣的圓圈，他會不會跟著畫一個一樣的圓圈？（不可以延著你的圓圈畫） ☐ ☐ ☐



算會　　算尚未

4. 看著您在紙上畫一條水平線後，叫您的小孩畫一條一樣的直線，他會不會在水平方向跟著畫一條直線？（不可以延著你的線畫） ☐ ☐ ☐

算會　　算尚未

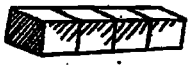
5. 您的小孩會不會試著用剪刀剪紙？（請使用兒童安全剪刀。）（小孩必須能一手拿著紙一手使剪刀打開、合起來，他不須要真的剪開紙。您可以示範給孩子看） ☐ ☐ ☐

6. 畫畫時，您的小孩會不會將筆握在姆指與其他四指之間，像大人一樣？ ☐ ☐ ☐

解決問題：請記得，讓您的小孩試一試每項活動。　總分：____

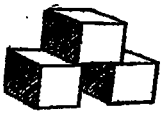
	會	有時候	尚未開始做
1. 當您的小孩看著您把四個積木或小玩具排一列	☐	☐	☐

後，他會不會學你將四個積木或小玩具並排？



2. 當您的小孩搆不著他要的東西，他會不會去找椅子或盒子來墊腳？ ☐ ☐ ☐
3. 指著本題下的圖，問您的小孩：「這是什麼？」您的小孩會不會答出與人相關的答案？例如：雪人、男孩、女孩、人、爸爸都可以。請把孩子的答案填上_____ ☐ ☐ ☐

4. 對您的小孩說：「說七、三」您的小孩會不會只答說：「七、三」(順序要對)。如果需要再問一次，用不同組的號碼如「八、二」，您的小孩必須正確答出你說的二個數字才能在會的格子打勾。 ☐ ☐ ☐
5. 先示範如何用積木(或盒子或罐頭)蓋一座橋，如圖。您的小孩會不會也照樣做一個？ ☐ ☐ ☐



6. 對您的小孩說：「說五、八、三」您的小孩會不會只答說：「五、八、三」(順序要對)。如果需要再問一次，用不同組的號碼如「六、九、二」，您的小孩必須正確答出你說的三個數字才能在會的格子打勾。 ☐ ☐ ☐

個人與社會互動：請記得，讓您的小孩試一試每項活動。 總分：____

	會	有時候	尚未開始做
1. 您的小孩會不會拿湯匙餵自己吃東西，只有少許食物會灑出來？	☐	☐	☐

2. 您的小孩會不會推著買菜車、學步車或娃娃車繞過障礙物，到路盡頭倒退，如果他選不會轉彎的話？	☐	☐	☐
3. 當孩子看著鏡子時，你問他：誰在鏡子裡？您的小孩會不會回答：「我」或他自己的名字？	☐	☐	☐
4. 您的小孩會不會自己穿上外套、夾克、或襯衫？	☐	☐	☐
5. 問您的小孩：「你是女孩或男孩？」您的小孩會不會正確的回答這個問題？	☐	☐	☐
6. 您的小孩會不會在還沒有輪到他時在旁邊等？（比如說等著上廁所或溜滑梯）	☐	☐	☐

整體而言：家長或者主要照顧者可以利用下面及背面空白處，寫下其他補充的意見及看法。

	是	否
您的小孩是不是聽得見？	☐	☐
若否，請說明：_____		
您認為您的小孩說話是不是與同年齡的孩子一樣？	☐	☐
若否，請說明：_____		
大多數時候，您都能瞭解您的小孩說的話？	☐	☐
若否，請說明：_____		
您認為您的小孩走路、跑步及攀爬的動作是不是與同年齡的孩子一樣？	☐	☐
若否，請說明：_____		
孩子雙親的任一方，是否有耳聾或聽力障礙的病史？	☐	☐
若有，請說明：_____		
您的小孩在過去的幾個月裡是否有任何醫療方面問題？	☐	☐
若有，請說明：_____		
您的小孩是否有任何使您憂心的問題？	☐	☐
若有，請說明：_____		

Appendix E

The 36-month ASQ item cultural and developmental appropriateness checklist

- Please review if the: following items are culturally and developmentally appropriate for a typical developing 36-month-old child.
- Questions to keep in mind when reviewing the questionnaire:

1. Is the test item easily understood?
2. Is the test item culturally appropriate?
3. Is the test item developmentally appropriate for 36-month-old children?

- Place a check mark under agree or disagree.
- If you disagree, please provide rationale.

Item	Agree	Disagree	Rational	notes
Communication 1				
Communication 2				
Communication 3				
Communication 4				
Communication 5				
Communication 6				
Gross Motor 1				
Gross Motor 2				
Gross Motor 3				
Gross Motor 4				
Gross Motor 5				
Gross Motor 6				
Fine Motor 1				
Fine Motor 2				
Fine Motor 3				

Fine Motor 4				
Fine Motor 5				
Fine Motor 6				
Problem Solving 1				
Problem Solving 2				
Problem Solving 3				
Problem Solving 4				
Problem Solving 5				
Problem Solving 6				
Personal Social 1				
Personal Social 2				
Personal Social 3				
Personal Social 4				
Personal Social 5				
Personal Social 6				
Additional Comment:				

Thank you for your thoughtfully inputs and contribution!

Appendix F

The Letter to the Participant

EARLY IDENTIFICATION OF PRESCHOOL CHILDREN
WITH DEVELOPMENTAL DELAYS IN TAIWAN

Dear parent (teacher),

Your preschool is cooperating with Dr. Megan McClelland and Huei-Ling Tsai of Oregon State University on a study of early identification of children with developmental problems. The main purpose of this study is to investigate if the Ages and Stages Questionnaire (ASQ) would be appropriate to adapt as an instrument for developmental screening purpose in Taiwan. In order to achieve this goal, we are asking for your participation in this project.

The participation of you and your child is requested. With this letter, you will find a 36-month-old ASQ and a background information questionnaire. The test activities on the ASQ are fun for children. We strongly encourage you to try each item on the ASQ with your child. The expected time to complete the questionnaires is approximately 10-15 minutes.

The results obtained from our research will be strictly confidential and no information about your child or family will be revealed. While we are unable to share individual test results with parents, we can provide a summary report of this project. If the individual result indicating the need for further developmental evaluation, you will be contacted by the researcher.

If you agree to participate, please complete the enclosed questionnaires and return to the preschool. We would appreciate it if you could return the questionnaires as soon as possible. If you have any questions, please feel free to contact Huei-Ling Tsai at (08) 736-7557.

Thank you for your cooperation.

Megan McClelland, Ph.D.
Assistant Professor
Human Development and Family Sciences
Oregon State University

Huei-Ling Tsai, M.N.
Instructor
Child Care Department
National Pingtung University of
Science and Technology

如何早期發現發展遲緩的幼童：
一份三十六個月的依齡發展問卷在台灣施行的適切性研究

親愛的家長(老師)

您的園所與美國奧瑞崗州立大學人類發展與家庭科學系 Megan McClelland 博士及屏東科技大學幼兒保育系講師蔡惠玲合作，進行三十六個月的依齡發展問卷在台灣施行的適切性研究。本研究的目的是，期望能找到一份經濟、有效的兒童發展篩檢工具，以落實台灣的早期療育工作。因此，我們需要您的協助與參與。

在信封裡有一份三十六個月的依齡發展問卷，一份問卷滿意度調查表，及一份背景資料問卷。預估填寫問卷的時間為：十五到二十分鐘。發展問卷裡的施測項目，對幼兒而言相當有趣。我們建議您把施測項目當做促進親子互動的遊戲來進行。

每位參與者都會收到一份研究摘要報告。本研究確保參與者的隱私，研究結果報告不會暴露任何個別幼兒或家庭資料。但是，如果個別幼兒的發展篩檢顯示需要進一步評估，我們會主動與您聯繫。

如果您同意參與，請將二份問卷填寫後儘快交回您的園所。如果您有任何疑問，可逕電蔡惠玲詢問，電話是：(08) 736-7557

謝謝您的合作！

美國奧瑞崗州立大學
人類發展與家庭科學系助理教授
Megan McClelland 博士

國立屏東科技大學
幼兒保育系講師
蔡惠玲

Appendix G

The Profile of the 11 Taiwanese Children with Diagnosed Developmental Delays

Child ID	Developmental Profile	Attending Preschool	Primary Care Provider	Living Arrangement
134	Not talking Not walking	No	Father and grandparents	Parents
135	Not talking yet, just say "ma ma" Walk at 19 months old	Yes	Nanny	Nanny
136	Walk at 32 months old Congenital Heart Disease	No	Mother	Parents
137	Walk with assistance Communication problem	Yes	Mother	Parents
138	Hearing problem Weakness on the right extremities	No	Mother	Parents
139	Communication problem Vision problem Walking with assistance	No	Great-aunt	Great-aunt
140	Cerebral Palsy Seizure	No	Father Mother: Indonesian	Parents and grand parents

The Profile of the 11 Taiwanese Children with Diagnosed Developmental Delay Continued

Child ID	Developmental Profile	Attending Preschool	Primary Care Provider	Living Arrangement
141	Epilepsy	No	Mother and grandparents	Mother and grandparents
142	Developmental delayed	No	Parents and grandparents	Parents and grandparents
143	Premature baby (6M) Communication problem Fine motor problem	No	Parents	Parents
144	Down Syndrome	Yes	Mother	Mother