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Original Article

Update of the normative data for the Chinese Child Development Inventory for children over 3 years old

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ABSTRACT

Objective: The Chinese Child Developmental Inventory (CCDI) is a convenient screening tool to identify children with possible developmental delays. The purpose of this study was to update the CCDI norms using a contemporary sample of children, and to compare it with existing CCDI normative data.
Materials and methods: Five hundred fifty-two children, 36.5–75.5 months old, from 30 kindergartens located in three districts (Xindian, Jhonghe, and Yonghe) of New Taipei City, Taiwan were assessed using the CCDI. The updated normative data were compared with existing CCDI norms using a quadratic linear regression model. In addition, smoothed percentile curves (5^{th}–95^{th}) were estimated using the lambda-mu-sigma method.
Results: Among the eight CCDI developmental dimensions, the average scores for general development, comprehension-conceptual, fine motor, situation-comprehension and expressive language (at <50 months old) were higher than the scores of the existing norms that are based on data from 1978; however, the score of the gross motor dimension was slightly lower. No differences in the average scores for self-help existed between the updated and previous norms.
Conclusion: The updated CCDI normative data will provide valuable information for physicians and other professionals working to identify developmental delays at early stages.
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1. Introduction

To identify children at risk of developmental delay at an early stage, physicians and professionals need to obtain all information related to the developmental profile of the children from their parents or main caregivers, or from developmental screenings [1–3]. An efficient developmental screening instrument should include precise and updated developmental normative data for the measured population, and it should be highly reliable, valid, and convenient to use [4]. In Taiwan, the Chinese Child Developmental Inventory (CCDI) is a very common screening instrument used in research and clinical practice for children 6–78 months old. The CCDI was derived from the Minnesota Child Development Inventory (MCDI) [5] and has been modified to eliminate specific cultural and socioeconomic attributes from the United States, and adapted to children living in northern Taiwan [6]. The CCDI includes 320 items of concrete behavioral descriptions in eight developmental dimensions: gross motor (GM), fine motor (FM), expressive language (EL), comprehension-conceptual (CC), situation-comprehension (SC), self-help (SH), personal-social (PS), and general development (GD). The CCDI has good reliability and validity, and has been used more than 30 years with normative data provided by Hsu et al [6]. Our recent study of the validity of diagnosis based on Hsu's norms found that this instrument still has a moderate to high level of specificity (57.6–95.1%), but the sensitivity of the EL for screening developmental language delay was only at an acceptable level (66%) [7]. Styles of rearing and parenting have changed over the past 30 years, and socioeconomic and

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environmental conditions are different, which could explain why the sensitivity of the CCDI has declined. In addition, previous studies have suggested that patterns of child development have also changed within this period [8,9]. Therefore, it is essential to reconstruct the normative data of the CCDI for screening purposes.

The CCDI normative data was recently updated using contemporary samples of children living in southern Taiwan in the Tainan area. The updated version has reliability and criterion validity, which confirms the potential of the CCDI in clinical use [9,10]. However, there is no evidence to show that the genetics, sociocultural background, and ways children are reared in Tainan are very similar to those in northern Taiwan. Thus, the main purpose of this study was to update CCDI normative data for children living in Taipei, and to compare these data with the data described by Ko et al [9] and Hsu et al [6] that were established more than 30 years ago using children living in northern Taiwan.

2. Materials and methods

2.1. Participants

Kindergarten children 36.5–75.5 months old were sampled using a stratified quota sampling method. Thirty kindergartens were proportionately recruited from three main areas—Xindian, Zhonghe, and Yonghe—in Taipei, Taiwan between June 2011 and April 2012. To compare these data with CCDI normative data from 1978, the children were classified into 26 groups according to sex by using the 3-month age groups defined by Hsu et al [6]. Inclusion criteria were the following: (1) age of 36.5 months to 75.5 months and (2) meeting sex by age stratification. To perform stratified quota sampling, we adopted a two-stage sampling framework to collect data on the sex and age of the children (Fig. 1). For the first step, the parents of 3539 kindergarten children from the selected kindergartens were approached to inquire whether they were willing to be contacted further for the study. The parents of 1252 children agreed to be contacted, and provided the sex and ages of their children. For the second step, we selected 789 children for sex and age group stratification by using the quota sampling method. In practice, only kindergarten teachers were allowed to meet these children and their parents. We then asked the teachers to collect the questionnaires. The research assistants initially explained the purpose of the study to the teachers of the selected kindergarten children. The teachers then delivered the questionnaires to the parents and asked the parents to return the questionnaires within 1 week. Parents were asked to complete an informed consent form and the questionnaire. The instructions for the questionnaire encouraged parents to telephone a trained assistant if they had any questions when filling out the questionnaire. A total of 664 questionnaires were returned with a response rate of 84.16%. We excluded 112 samples from the study because of unanswered

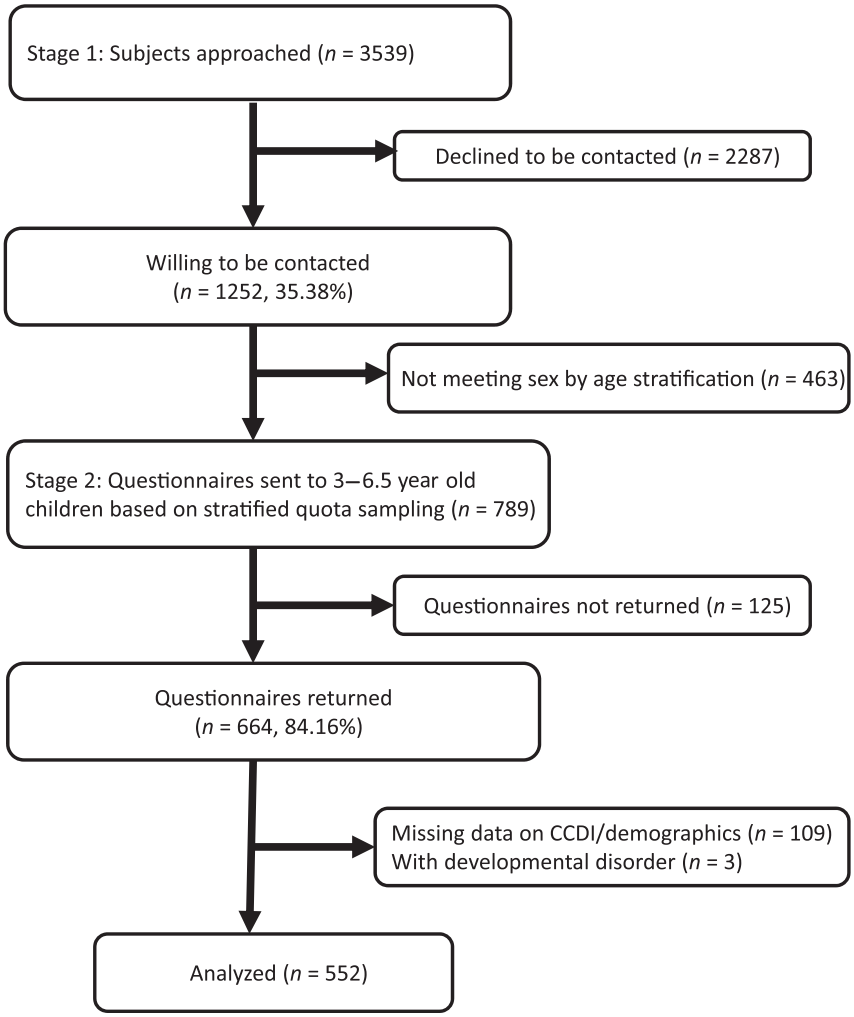

Fig. 1. Flowchart of the sampling framework. CCDI = Chinese Child Developmental Inventory.

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