



ELSEVIER

Contents lists available at SciVerse ScienceDirect

# Research in Developmental Disabilities



## Examining the relationships between attention deficit/hyperactivity disorder and developmental coordination disorder symptoms, and writing performance in Japanese second grade students



Wataru Noda<sup>a,\*</sup>, Hiroyuki Ito<sup>a</sup>, Chikako Fujita<sup>b</sup>, Masafumi Ohnishi<sup>c</sup>,  
Nobuya Takayanagi<sup>a</sup>, Fumio Someki<sup>d</sup>, Syunji Nakajima<sup>a</sup>, Satoko Ohtake<sup>e</sup>,  
Naoto Mochizuki<sup>a</sup>, Masatsugu Tsujii<sup>f</sup>

<sup>a</sup> Research Center for Child Mental Development, Hamamatsu University School of Medicine, Japan

<sup>b</sup> Department of Psychology and Human Relations, Nanzan University, Japan

<sup>c</sup> Department of Developmental Science, Faculty of Education and Regional Studies, University of Fukui, Japan

<sup>d</sup> Department of Education, City University of New York, College of Staten Island, United States

<sup>e</sup> Department of Early Childhood Education, College of Nagoya Women's University, Japan

<sup>f</sup> School of Contemporary Sociology, Chukyo University, Japan

### ARTICLE INFO

#### Article history:

Received 4 May 2012

Received in revised form 10 May 2013

Accepted 13 May 2013

Available online 27 June 2013

#### Keywords:

Attention Deficit/Hyperactivity Disorder

(ADHD)

Developmental Coordination Disorder

(DCD)

Writing

Elementary school students

Japan

### ABSTRACT

The purpose of this study was to explore the relationships between attention deficit/hyperactivity disorder and developmental coordination disorder symptoms and writing performance in Japanese second grade students from regular classrooms. The second grade students ( $N = 873$ ) in Japanese public elementary schools participated in this study. We examined a variety of writing tasks, such as tracing, copying, handwriting (Hiragana and Katakana), and spelling (Hiragana, Katakana, and Kanji). We employed the Japanese version of the home form ADHD-rating scale (ADHD-RS) and the Japanese version of the Developmental Coordination Disorder Questionnaire (DCDQ-J) to assess the developmental characteristics of the participating children. Seven writing performance scores were submitted to a principal component analysis with a promax rotation, which yielded three composite scores (Spelling Accuracy, Tracing and Copying Accuracy, and Handwriting Fluency). A multiple regression analysis found that inattention predicted Spelling Accuracy and Handwriting Fluency and that hyperactive-impulsive predicted Handwriting Fluency. In addition, fine motor ability predicted Tracing and Copying Accuracy. The current study offered empirical evidence suggesting that developmental characteristics such as inattention and fine motor skill are related to writing difficulties in Japanese typical developing children.

© 2013 Elsevier Ltd. All rights reserved.

## 1. Introduction

Writing is one of the basic academic skills that students should master during elementary school education. Because students need to integrate visual, motor, and conceptual abilities in the process of writing (Mercer & Mercer, 2005), some elementary school students struggle to master writing. Students with developmental disabilities such as attention

\* Corresponding author.

E-mail address: watarunoda@gmail.com (W. Noda).

deficit/hyperactivity disorder (ADHD) and developmental coordination disorder (DCD) have particular difficulties in writing (Graham, Harris, & Fink, 2000). The present study examined the relationships of ADHD and DCD symptoms with writing performance in Japanese public elementary school students from regular classrooms.

The core symptoms of ADHD in the DSM-IV-TR (American Psychiatric Association, 2000) are inattention, impulsivity, and hyperactivity. ADHD children tend to show continuing poor academic performance when they enter elementary school (McConaughy, Achenbach, & Gent, 1988). Previous studies have shown that ADHD children have handwriting (Barkley, 1998; Racine, Majnemer, Shevell, & Snider, 2008) and spelling difficulties (Kroese, Hynd, Knight, Heimenz, & Hall, 2000; Mayes, Calhoun, & Crowell, 2000). Although little is known about the mechanisms of ADHD-related writing difficulties, some studies have suggested that the attention component of ADHD is involved. Amundson and Weil (2001) identified sustained attention as a precursor of legible handwriting in typically developing children. In addition, Tsai, Meng, Hung, Chen, and Lu (2011) showed that attention impairments play an important role in the specific types of writing errors observed in Taiwanese children. By contrast, Resta and Eliot (1994) compared the writing performance of ADHD children with and without hyperactive behavior and found poorer visual-motor skills in ADHD children with hyperactive behavior than in those without it, but they found no differences in their handwriting abilities. There is little available evidence on the relationship between hyperactivity/impulsivity symptoms and writing.

The other developmental disability related to writing difficulties is DCD. The DSM-IV (American Psychiatric Association, 1994) defines DCD as “a marked impairment in the development of motor coordination, which interferes with daily living and studying.” Missiuna, Rivard, and Pollock (2004) described that students with DCD struggle with written classroom work and daily activities requiring motor coordination. Flapper, Houwen, and Schoemaker (2006) reported that children with ADHD and DCD, who displayed poor fine motor skills on a motor impairment screening tool (Movement Assessment Battery for Children; Henderson & Sugden, 1992), had poor handwriting. They also found that children with ADHD and DCD drew more fluently but with less accuracy in a graphomotor task than did control children. Chang and Yu (2009) found that children with DCD acquired automated handwriting more slowly than those without handwriting deficits. They suggested that children with DCD have difficulties performing the open-loop and closed-loop movements required for fluent handwriting.

Considering these previous findings, we hypothesized that ADHD and DCD symptoms were related to writing difficulties in Japanese elementary school students from regular classrooms. However, little research has addressed the relationships between ADHD and DCD symptoms and writing in Japanese students. The Japanese language uses two syllabaries (Hiragana and Katakana) and an ideograph system (Kanji). Hiragana symbols represent high-frequency words of Japanese origin, while Katakana symbols represent foreign words and foreign names (Kobayashi, Haynes, Macaruso, Hook, & Kato, 2005). These Japanese syllabary characters use a syllable-based orthography, in contrast to the English alphabetic system, which uses grapheme–phoneme relationships (for a discussion of Japanese syllabic structures, see Tamaoka & Terao, 2004). In addition to the Hiragana and Katakana characters, Japanese orthography includes Kanji characters, which are introduced to elementary school students in the middle of first grade. Kanji characters are ideographic and often have several pronunciations and multiple meanings (Kobayashi et al., 2005). Most Japanese texts include Hiragana, Katakana, and Kanji systems.

As discussed above, these Japanese characters differ from English in many aspects. Therefore, we may not be able to apply previous findings about the relationship between developmental characteristics and writing in English-speaking children to Japanese-speaking students. The present study aimed to examine whether ADHD and DCD symptoms relate to the writing performance in Japanese second grade students. We used a variety of writing tasks (tracing, copying, handwriting, and spelling) to examine the relationships between the specific writing problem areas and ADHD and DCD symptoms.

## 2. Method

### 2.1. Participants

Second grade students ( $N=873$ ) in regular classrooms (age 7–8) and their parents/guardians from all eight public elementary school in one suburban city participated in this study. The participants included 405 boys and 468 girls. We used a passive consent procedure consisting of a letter describing the study that was mailed to the parents; they were asked to sign the letter and return it if they did not want their child to participate. The parents/guardians received the questionnaire via the teachers. Implied assent was also obtained from the children; the survey materials clearly stated that a waiver or alteration would not adversely affect the rights or welfare of children, and they have agreed to participate in the research by participating in the writing tasks. The institutional review board of the Hamamatsu University School of Medicine approved this procedure.

### 2.2. Instruments

#### 2.2.1. Writing tasks

**2.2.1.1. Tracing and copying tasks.** Using a standardized screening test for measuring reading and writing achievement, the Screening Test of Reading and Writing for Japanese Primary School Children (STRAW; Uno, Haruhara, Kaneko, & Wydell, 2006), Fujita and Tsujii (2011) developed tracing, copying, and spelling tasks (for Hiragana, Katakana, and Kanji) that can be used in group classroom instruction. Fig. 1 shows the worksheet used in the tracing and copying task. We used these tasks to assess visual-motor integration, component that is relevant for writing. These tasks were identical to that described in Fujita

متن کامل مقاله

دریافت فوری ←

**ISI**Articles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات