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Everyday memory in children with developmental coordination disorder

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Children with developmental coordination disorder (DCD) have deficits in working memory, but little is known about the everyday memory of these children in real-life situations. We investigated the everyday memory function in children with DCD, and explored the specific profile of everyday memory across different domains. Nineteen children with DCD and 19 typically developing (TD) children participated in the study. Their everyday memory performance was evaluated using the Rivermead Behavioral Memory Test for Children, which showed that 52.6% of the children with DCD had everyday memory deficits. The overall everyday memory scores of the DCD group were significantly lower than those of the controls, particularly in the verbal and visual memory domains. Pearson correlation analysis indicated significant associations between verbal intelligence and memory scores. Analysis of covariance with verbal intelligence as a covariate showed no significant differences between groups in memory scores. Mediator analysis supported the notion that everyday memory deficits in children with DCD were fully mediated through verbal intelligence. We provide evidence of everyday memory deficits in most of the children with DCD, and hypothesize that language abilities are their underlying cause. The clinical implications of these findings and recommendations for additional research are discussed.

1. Introduction

Children with developmental coordination disorder (DCD) are characterized by significant impairment in the development of motor coordination, which substantially impedes academic achievement and daily functioning, but not because of neurological diseases or an intellectual deficiency (American Psychiatric Association, 2000). The estimated prevalence of DCD is between 1.8% and 19%, depending on the severity criteria used (Lingam, Hunt, Golding, Jongmans, & Emond, 2009; Zwicker, Missiuna, Harris, & Boyd, 2012). Because motor coordination is the product of a complex process of cognitive and physical operation, children with DCD may manifest deficits not only in motor abilities, but also in perceptual and cognitive function (Alloway, 2007; Van Waelvelde, De Weerdt, De Cock, & Smits-Engelsman, 2004), including reading disabilities, general learning disabilities, and attention and executive function deficits (Dewey, Kaplan, Crawford, & Wilson, 2002; Green, Baird, & Sugden, 2006; Wuang, Su, & Su, 2011; Zwicker et al., 2012). However, little is known about memory function in children with DCD.

Memory involves mental processes that encode, store, and retrieve information. Memory is composed of multiple and distinct systems, and can be categorized in different ways (Budson, 2009; Squire, 2004). According to the duration of information retention, memory is divided into sensory memory, short-term or working memory, and long-term memory.

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Moreover, based on the nature of the information being stored, long-term memory has been classified into several different types: semantic memory, episodic memory, and procedural memory. A distinction has also been made between retrospective memory and prospective memory. Given the multidimensional nature of memory, memory is not only required to support daily activities but is also crucial for learning (Gillen, 2008). It is, therefore, important to analyze the memory profiles of children with DCD.

Only a handful of recent studies (Alloway, 2011; Alloway, Rajendran, & Archibald, 2009; Alloway & Temple, 2007; Crawford & Dewey, 2008; Piek, Dyck, & Francis, 2007) have investigated the memory skills of children with DCD; most of them focus on working memory. Working memory, which is the ability to actively store and manipulate information for brief periods, is needed for complex tasks such as reasoning, comprehending, and learning (Baddeley, 2000). Working memory comprises an attentional control system aided by two subsidiary slave systems, which are responsible for the temporal storage of linguistic information and visuospatial structures (Baddeley, 2000). Tests that measure working memory generally require children to store and manipulate verbal (such as digits) or visuospatial (such as dot location and figure structures) information and then recall it. Studies (Alloway, 2011; Crawford & Dewey, 2008; Piek et al., 2007) have reported that children with DCD were less proficient in working memory than are typically developing children, especially in the visuospatial domain.

The research on memory deficits in DCD cited above has all been based on laboratory work. Memory is usually assessed using computer-based or paper-and-pencil tests in controlled experimental conditions. Although the evidence indicates that visuospatial working memory is closely related to academic achievement in children with DCD (Alloway, 2007, 2011; Alloway & Archibald, 2008; Alloway & Temple, 2007), such laboratory-based measures of memory may not resemble the memory performance in a real-life environment; therefore, it may lack adequate ecological validity. Even though it is clear that everyday activities need the mediation of working memory, it is still necessary to obtain a comprehensive profile of how their memory functions in the natural context of the real world to capture ecologically valid instances of their memory.

Everyday memory refers to the day-to-day application of memory skills to meet the challenges of daily life (Magnussen & Helstrup, 2007). It involves many fractionated components of memory and reflects a functional role of memory, typically in social contexts (Cohen, 2008). Examples of everyday memory in children include recalling names and telephone numbers, remembering the instructions of teachers, and remembering to do homework. Compared with conventional laboratory-based tasks, measurements of everyday memory often use tasks simulating what people do every day and involving more complex and practical materials (Cornish, 2000). Furthermore, according to the child and youth version of the International Classification of Functioning, Disability and Health (ICF-CY), everyday memory abilities are not just one of the basic mental functions, but are more related to activity domains, such as completing a complex task (World Health Organization, 2007). As to neurodevelopmental disorders, everyday memory deficits have been found in adolescents with a very low birth weight (Narberhaus et al., 2007) and with autism spectrum disorders (ASD) (Jones et al., 2011). There is also an increased risk of everyday memory difficulties in 5-year-old children born preterm (Briscoe, Gathercole, & Marlow, 2001). However, little is known about how everyday memory functions in children with DCD.

We investigated everyday memory function in a sample of children with DCD, and explored the specific profile of everyday memory across different domains. The reliable and valid standardized Rivermead Behavioral Memory Test for Children (RBMT-C) (Wilson, Ivani-Chalian, & Aldrich, 1991) was used to evaluate everyday memory. The RBMT-C has been widely used as an assessment tool in different clinical populations (Briscoe et al., 2001; Chevignard et al., 2009; Jones et al., 2011; Kihara et al., 2009). We hypothesized that children with DCD would show everyday memory deficits, especially in the verbal, visual, and spatial domains.

2. Methods

2.1. Participants

2.1.1. Children with DCD

The DCD group consisted of 19 children with DCD (Table 1). They were recruited by occupational therapists and identified as having motor difficulties based on their Movement Assessment Battery for Children-Second Edition (MABC-2) scores (Henderson, Sugden, & Barnett, 2007). Children with MABC-2 total scores below the 15th percentile were classified as having DCD (Henderson et al., 2007). Children comorbid with neuromotor or significant medical problems, autism, attention-deficit/hyperactivity disorder (ADHD), or intellectual disabilities (IQ < 85) were excluded. Intelligence was measured using the Peabody Picture Vocabulary Test-Revised (PPVT-R) (Dunn & Dunn, 1981) and the Test of Nonverbal Intelligence-Third Edition (TONI-3) (Brown, Sherbenou, & Johnsen, 1997). Scores of both tests provided an index of general intelligence for verbal and nonverbal intelligence.

2.1.2. Typically developing (TD) children

The TD group comprised 19 typically developing children (Table 1). They were recruited from several kindergartens and schools, and were age-matched with the DCD group. All the MABC-2 scores of the TD-group children were above the 15th percentile. Children with any neurodevelopmental disorder, medical disorder, or intellectual disabilities (IQ < 85) based on the PPVT-R and the TONI-3 were excluded.

Table 1
Basic demographic data, IQ scores, and MABC-2 performance in both groups.

	DCD ($n = 19$)			TD ($n = 19$)			$t(36)$	p	d
	M	SD	Range	M	SD	Range			
Age (years)	6.33	1.16	5.0–8.92	6.41	1.25	5.0–8.75	.20	.84	.10
Gender (male/female)[a]	17/2			16/3				.63	
Verbal IQ: PPVT-R (135)[b]	109.63	8.86	98–133	121.63	7.71	108–133	4.48	<.001	1.46
Nonverbal IQ: TONI-3 (130)[b]	101.89	12.32	81–121	108.11	13.11	88–135	1.51	.14	.49
MABC-2 percentile rank scores									
Manual dexterity score (99)[c]	6.48	7.80	.1–25	58.88	28.01	9–99	7.63	<.001	2.93
Ball skills score (99)[c]	6.08	7.21	.5–25	56.66	22.66	.5–84	8.99	<.001	3.39
Balance score (99)[c]	14.14	7.21	.5–63	73.81	25.12	37–99	8.27	<.001	2.87
Total scores (99)[c]	3.53	3.29	.5–9	71.28	23.17	16–99	12.62	<.001	5.12

Note. DCD, children with developmental coordination disorder; TD, typically developing children; *M*, mean; SD, standard deviation; PPVT-R, Peabody Picture Vocabulary Test-Revised; TONI-3, Test of Nonverbal Intelligence-Third Edition; MABC-2, Movement Assessment Battery for Children-Second Edition.

[a] Number of males and females; a χ^2 test was used for analysis.

[b] Numbers in parentheses are maximum scores.

[c] Numbers in parentheses are maximum percentile rank score.

2.2. Measures

2.2.1. Intelligence

The PPVT-R and the TONI-3 were used to estimate intelligence. The PPVT-R is a measure of receptive vocabulary without reading (Dunn & Dunn, 1981). The child is asked to choose which of four pictures corresponds to a word reported orally by the experimenter. The Chinese version for 3- to 12-year-old children (Lu & Liu, 1998) was used in the present study. Because of the significant correlation between scores on the PPVT-R and the Wechsler Intelligence Scale for Children-Revised, especially the verbal scale, the PPVT-R score was used as an indicator of verbal IQ. The TONI-3 is a language-free intelligence test that measures general intelligence, abstract reasoning, aptitude, and problem solving (Brown et al., 1997). The Chinese version for 4- to 16-year-old children (Wu, Tsai, Hu, Wang, & Kuo, 2006) was used in the present study to measure nonverbal intelligence. The TONI-3 consists of 62 abstract problem-solving test items arranged in order of difficulty, and the child needs to choose the correct answer from 4 to 6 possible responses on each item.

2.2.2. Motor skills

The MABC-2 is a reliable and useful measure for identifying movement deficits in children and adolescents (3–16 years old) with DCD (Henderson et al., 2007). It consists of eight fine and gross motor tasks grouped into three subtests: manual dexterity, ball skills, and balance. The impairment score of each task is summed to yield a total impairment score that can be converted into a percentile score based on the norm. Higher total impairment scores or lower percentile scores indicate more motor skill problems. Children with percentile scores at or below the 5th percentile are classified as motor impaired, and between the 5th and 15th percentiles as "at risk" of movement difficulty.

2.2.3. Everyday memory

The RBMT-C (Wilson et al., 1991) is used to evaluate the everyday memory skills required in daily life and is appropriate for children from 5 years to 10 years and 11 months old. It consists of the following 11 subtests and covers verbal, visual, and visuospatial memory in immediate, delayed, and prospective conditions:

- Subtests 1 and 2: Remembering a Name (the child, after a delay, is asked to remember the first and second name of the person shown in the photograph).
- Subtest 3: Remembering a hidden belonging (a packet of gold stars is hidden and the child is required to ask for these stars at the end of the test and recall where they have been hidden).
- Subtest 4: Remembering an Appointment (an alarm is set and the child is required to ask a specified question when the alarm rings after 20 min).
- Subtest 5: Picture Recognition (the child is shown 10 drawing objects and, after a delay, is asked to recognize them from a set of 20 pictures).
- Subtest 6: Story Recall (the child listens to a short story and then recalls it, both immediately and after a delay).
- Subtest 7: Face Recognition (the child is shown pictures of five faces and, after a delay, is asked to recognize them from a set of 10 faces)
- Subtest 8: Remembering a Short Route (the child is shown a route around the room by the researcher and, both immediately and after a delay, is asked to retrace the route).
- Subtest 9: Remembering to Deliver a Message (the child has to remember to place an envelope in a specific place while retracing the route of subtest 8).
- Subtests 10 and 11: Orientation Questions (the child is asked to answer questions relating to person, time, and place).

The RBMT-C takes approximately 30 min to complete. For each subtest, the raw score was converted into a standardized profile score depending on the age of the child. For the standardized profile score, performance on each subtest was ranked as 0 (impaired), 1 (borderline), and 2 (normal), which were summed to give a total profile score used to classify everyday memory functioning as in the normal, borderline, or impaired ranges (Wilson et al., 1991). According to the third edition of the RBMT for adults (Wilson et al., 2008), five composite scores were additionally created by summing the standardized profile scores of each of the following domains: verbal memory (Remembering a Name, Story Recall: Immediate and Delayed Recall), prospective memory (Remembering the Hidden Belonging, Remembering an Appointment, and Remembering to Deliver a Message), visual memory (Picture Recognition and Face Recognition), spatial memory (Remembering a Short Route: Immediate and Delayed Recall), and orientation. These composite scores allowed us to identify whether everyday memory deficits in children with DCD were domain-specific.

2.3. Procedure

Ethical approval for this study was provided by the hospitals and academic institutions involved. After all the participants had provided signed informed consents, they were individually evaluated by 2 occupational therapists (authors IC and HL) for two 1-h sessions. All participants also took the MABC-2, TONI-3, PPVT, and RBMT-C.

2.4. Statistical analyses

All data were analyzed using SPSS 17.0 for Windows. Significance was set at $p < .05$. First, independent t-tests and χ^2 tests were used to compare between-group demographic data, and all scores from the MABC-2, TONI-3, PPVT, and RBMT-C. Cohen's d for each score was calculated to indicate the standardized differences between the means of the two groups. The d values considered to represent small, medium, and large effects are .3, .5, and .8, respectively (Cohen, 1992). Next, Pearson correlation coefficients for all participants were calculated to explore a possible association between intelligence, motor skills, and measures of the RBMT-C. When verbal or nonverbal IQ scores, or movement scores, were significantly related to memory scores, analysis of covariance (ANCOVA) with the IQ score or movement scores as a covariate was used to examine whether intelligence or motor skills mediated performance on measures of the RBMT-C between groups. If so, a mediator analysis (Baron & Kenny, 1986) was done to evaluate the significance of the mediation effect and the degree (full vs. partial) of mediation.

The mediator analysis involved four steps in which several regression analyses were done: (1) Did the group affect memory scores? (2) Did the group affect IQ scores or movement scores? (3) Did IQ scores or movement scores affect memory scores? (4) Did the group still affect memory scores after controlling for IQ scores or movement scores? If there were significant influences from steps 1 through 3, step 4 was done. If, in step 4, the group no longer had any effect on memory scores, then motor skills or intelligence was considered a full mediator, which indicated that everyday memory differences between groups could be fully explained by motor skills or intelligence. If, however, the group effect was still significant, then motor skills or intelligence was considered a partial mediator, and the group was considered to have had an impact on memory performance that could not be attributed to motor skills or intelligence.

3. Results

3.1. Characteristics between groups compared

There were no significant differences between groups in age, gender, and nonverbal IQ score, but there were for verbal IQ and movement scores (Table 1). Although both verbal and nonverbal IQs were within normal ranges, DCD-group children had a significantly lower mean verbal IQ than did TD-group children. DCD-group children had significantly lower MABC-2 percentile rank scores on all subtests and total percentile rank score than did TD-group children (Table 1). A repeated-measures ANOVA showed no significant effect of subtest on MABC-2 scores for DCD-group children ($F(2, 36) = .56$, $p = .62$, $\eta_p^2 = .02$).

3.2. Everyday memory performance between groups compared

χ^2 tests indicated that the range distributions of total profile scores of the RBMT-C in the two groups were significantly different ($p = .006$). Ten (52.6%) DCD-group children and 1 (5.2%) TD-group child had everyday memory deficits (Table 2). t-Tests showed that DCD-group children scored significantly lower than TD-group children on total profiles and in the verbal memory and visual memory domains. The effect sizes were medium-to-large. DCD-group children also had slightly lower scores than did TD-group children on spatial memory, but they had higher scores on prospective memory. While neither difference was significant, the effect sizes of both memory scores were small-to-medium (Table 3).

Because DCD-group children had a significantly lower verbal IQ and movement scores than did the TD-group children, the association between these variables was examined. Pearson correlation analysis showed that only verbal IQ was significantly

Table 2
The distribution of the total profile scores of the RBMT-C for normal, borderline, and impaired ranges in both groups.

Range[a]	DCD (n = 19)		TD (n = 19)	
	n	%	n	%
Normal	9	47.4	18	94.6
Borderline	9	47.4	1	5.3
Impaired	1	5.3	0	0

Note. RBMT-C, Rivermead Behavioral Memory Test for Children; DCD, children with developmental coordination disorder; TD, typically developing children.
[a] p = .006.

Table 3
Total profile scores and composite scores of the RBMT-C in both groups.

	DCD (n = 19)			TD (n = 19)			t(36)	p	d
	M	SD	Range	M	SD	Range			
Total profile scores (18–22)[a,b]	16.05	3.10	11–22	18.05	1.87	13–21	2.41	.02	.78
Verbal memory (6)[a]	2.63	1.92	0–6	4.00	1.20	0–6	2.63	.01	.86
Prospective memory (6)[a]	4.58	.96	3–6	4.21	.98	2–6	1.70	.25	.38
Visual memory (4)[a]	3.26	1.24	0–4	3.95	.23	3–6	2.37	.02	.77
Spatial memory (4)[a]	3.79	.92	0–4	4.00	.00	4–4	1.70	.32	.32
Orientation (2)[a]	1.79	.63	0–2	1.89	.46	0–2	.59	.56	.18

Note. RBMT-C, Rivermead Behavioral Memory Test for Children; DCD, children with developmental coordination disorder; TD, typically developing children; M, mean; SD, standard deviation.
[a] Numbers in parentheses are maximum score.
[b] Different maximum scores for different age groups.

correlated with the total (r = .461, p = .004), verbal memory (r = .501, p = .001), and visual memory (r = .480, p = .002) scores the RBMT-C. No other significant correlations were found (rs < .3; ps > .1). Three subsequent and separate ANCOVAs with verbal IQ as the covariate were used to compare the total, verbal memory, and visual memory scores between groups. No significant group differences were found in [total score (F(1, 35) = .66, p = .42, $\eta_p^2 = .02$), verbal memory score (F(1, 35) = .77, p = .39, $\eta_p^2 = .02$), and visual memory score (F(1, 35) = .46, p = .50, $\eta_p^2 = .01$)], which suggested that verbal IQ mediated performance on the RBMT-C.

3.3. Mediator analysis

To clarify the mediator role of verbal abilities, 3 individual mediator analyses were done to determine the extent to which verbal IQ explained total, verbal memory, and visual memory scores on the RBMT-C between groups. Using the 4-steps approach presented in the final paragraph of Methods, the results of the first 3 simple regression analyses on each memory measure showed significant influences from steps 1 through 3 (Fig. 1). The final multiple regression analysis of the total score, with group and verbal IQ as predictors, was significant (F(2, 35) = 5.14, p = .01), which indicated that the mediation effect of verbal IQ was significant. However, in this model, group IQ did not continue to be a significant predictor of total scores when paired with verbal IQ (p = .42) (Fig. 1a). Similarly, the final multiple regression analyses were also significant for verbal memory scores (F(2, 35) = 6.39, p = .004) and visual memory scores (F(2, 35) = 5.52, p = .008), and supported their significant mediation effects. Again, group IQ had no effect on verbal memory (p = .39) or visual memory scores (p = .50) when IQ scores were controlled (Fig. 1b and c). In summary, these results suggested that verbal IQ was a full mediator and that it completely mediated the association between groups and total, verbal memory, and visual memory scores on the RBMT-C.

4. Discussion

The present study reports preliminary data on everyday memory performance in children with DCD. We found that approximately half of the children with DCD showed everyday memory deficits. The overall everyday memory scores of the DCD group, as indexed by the RBMT-C, were significantly lower than those of the controls, essentially in the verbal and visual memory domains. While taking into account the contribution of verbal intelligence, the scores of DCD-group children were similar to those of TD-group children. Such findings were supported by the mediator analyses, and suggest that everyday memory deficits in children with DCD were fully mediated through verbal intelligence. In addition, because 47.4% of the DCD-group children had everyday memory scores within the normal range, it seems likely that everyday memory deficits are not a general feature of children with DCD.

Although both the verbal and nonverbal IQs of the DCD group were within normal ranges, their verbal intelligence was significantly lower than that of the age-matched controls, and this influenced their everyday memory performance. We

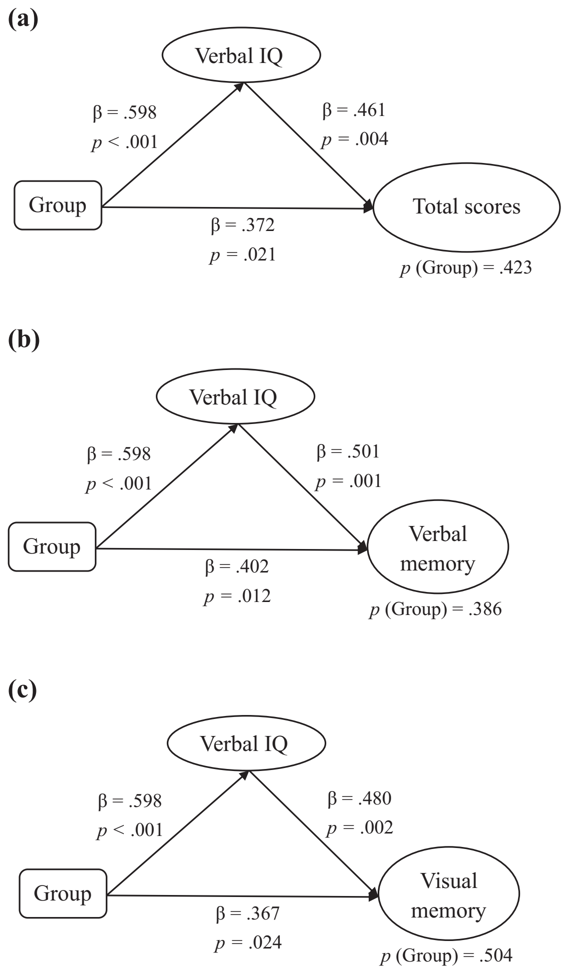

Fig. 1. Mediation analysis showing that verbal IQ was a full mediator for (a) total score, (b) verbal memory scores, and (c) visual memory scores of the RBMT-C. The value of p (group) indicates whether group still affected changes in RBMT-C scores after controlling for verbal intelligence. Standardized β parameter estimates are shown.

speculate that this finding can be attributed to the nature of everyday memory tasks, which are believed to require the concomitant integration of several memory abilities in daily contexts that often involve social interaction and communicative demands (Cohen, 2008; Jones et al., 2011; Magnussen & Helstrup, 2007). The effect of verbal ability on everyday memory performance has been reported in individuals born prematurely. Scores on the RBMT-C in a sample of 5-year-old preterm children were comparable to those of full-term control children, but they were closely associated with language ability (Briscoe et al., 2001). Another study (Narberhaus et al., 2007) also found that intelligence affected RBMT scores in adolescents born prematurely with very low birth weights, and that full-scale IQ explained everyday memory deficits even though their intelligence was within the normal range.

In the present study, the children with DCD scored lowest on verbal domain tasks on the RBMT-C. These tasks ask children to remember a name and repeat a short story about a picture, both immediately and at a later time in the testing session. In addition to memory, these tasks place a greater emphasis on the linguistic abilities of comprehension and expression. After viewing the raw data from each participant, we found that the scores of 9 DCD-group children with normal everyday performance all fell within the normal range on story-recall subtests. In contrast, 7 of 10 DCD-group children with everyday memory deficits scored zero. Furthermore, despite the verbal intelligence of these children being within the normal range, all their parents expressed concerns about the expressive difficulties of these children at home and at school. Therefore, children with DCD with expressive language difficulties might be impaired in RBMT-C verbal domain tasks.Earlier laboratory-based studies (Alloway, 2007, 2011; Alloway & Archibald, 2008; Alloway & Temple, 2007; Crawford & Dewey, 2008) report that children with DCD have general working-memory impairments across verbal and visuospatial domains, and that such impairments are probably responsible for their everyday memory deficits, primarily in verbal, visual, and spatial domains. In addition, most research (Alloway, 2011; Alloway et al., 2009; Crawford & Dewey, 2008) indicates that the visuospatial working memory is more vulnerable than the verbal working memory in DCD; therefore, we may speculate that children with DCD will perform worse on the visual and spatial domains than on the verbal domain of the RBMT-C. Nevertheless, we found that the mean scores for spatial memory were higher than those for verbal and visual memory, and even comparable to those in the TD group. Because of the lack of working memory measures in this study, we could not directly identify the association between working memory and everyday memory in children with DCD. It appears, however, that they had different everyday memory and working memory profiles, and that their low everyday memory scores could not be totally explained by their impaired working memory.

The reasons that children with DCD scored higher on spatial memory subtests on the RBMT-C may be due to the nature of the assessment tasks. The laboratory-based tasks used for evaluating visuospatial working memory in previous studies were novel and artificial; for example, remembering and pointing to the target location in a presentation of dynamic stimuli (Alloway, 2007, 2011; Alloway & Archibald, 2008; Alloway & Temple, 2007). Such tasks require more visuospatial memory and an above-average level of eye-hand coordination than do familiar and natural tasks; moreover, they were unfamiliar to the DCD-group children. All the above factors would lead to an assessment of impaired visuospatial working memory in children with DCD. By contrast, the tasks of the spatial memory domains on the RBMT-C simulate real-world situations that typically confront a child; e.g., remembering a short route in a room with a table, a window, and a door. These tasks are usually familiar to DCD children. It seems likely that the familiarity of context provided cues, motivation, and, therefore, improved their memory performance.

Additionally, it is surprising that DCD-group children scored slightly higher than TD-group children on the prospective memory domain of the RBMT-C, and that the effect size reached medium level. After checking the individual data of the three subtests in both groups, we found that the major difference between groups existed in the remembering-an-appointment subtest. In this test, an alarm is set first, and then the child is required to ask a specified question: "Are you going to see me again?" when the alarm sounds. Most of the DCD-group children could ask the question without a prompt; however, all but 1 TD-group child needed a prompt. Because prospective memory in everyday contexts usually relies on social motivation (Baddeley, 1997), the difference between both groups may be explained by considering their motivation. All the children with DCD were recruited from clinics and hospitals by occupational therapists. They were familiar with the therapeutic environment and had had happy experiences working with therapists. It is possible that the experimental process and environment of this study elicited pleasant feelings in DCD-group children, just like their happy experience during their usual therapy program, and that their expectations of returning may have increased their motivation to remember to ask this specific question, thereby improving their scores on this subtest.

5. Conclusion

The present study is the first to investigate everyday memory in children with DCD. The preliminary data show that about half of the DCD-group had everyday memory deficits, primarily in verbal and visual memory tasks; these deficits were mediated by verbal intelligence. The findings have some important implications. First, although the complexity of daily activities involves various memory domains, it seems that children with DCD can complete most of these activities independently, and that they need assistance in activities that require more verbal abilities. Secondly, because of the closed relationship between everyday memory and verbal abilities, children with DCD and linguistic difficulties are more vulnerable in everyday memory, and they need efficient strategies to support their daily activities. Finally, the RBMT-C is an ecologically valid tool that gives objective information about everyday memory performance in children with DCD. Frequent use of the RBMT-C for children with DCD to realize their memory difficulties in activities of daily living is recommended. Additional studies with larger study populations are needed. Future research might focus on the association of everyday memory with working memory, or activities of daily living in children with DCD; on cognitive factors that may influence the everyday memory of children with DCD, such as attention and executive function; and on comparing everyday memory profiles of children with DCD with those of other clinical populations, for example children with ASD or ADHD.

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