



DCDDAILY-Q

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Manual

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Introduction

The DCDDaily-Q is a parental questionnaire, which enables investigation of specific Activities of Daily Living (ADL) difficulties in children with Developmental Coordination Disorder (DCD), i.e. how well children perform ADL, whether they have taken longer to learn ADL compared to peers, and how often they perform ADL. The questionnaire assesses a broad range of 23 essential ADL known to be difficult for children with DCD, covering the domains of ADL that are relevant for children: “self-care and self-maintenance,” “productivity and school” and “leisure and play”. The DCDDaily-Q is an addition to the DCDDaily. The DCDDaily is a measuring instrument with which professionals are enabled to assess children’s capacity in ADL in an objective and standardized way (Van der Linde et al., 2013). For optimal insight into children’s daily functioning, ADL assessment should address both children’s capacity in ADL and performance of ADL. Capacity in ADL, as assessed with a standardized clinical test, reflects what a child is capable of in a standardized environment, i.e. what children can do. Performance, assessed with a parental or teacher questionnaire, addresses the child’s daily life performance, i.e. what children actually do during everyday life. Both are of interest, as what children are able to do in a standardized test does not always reflect what they do in daily life according to parents or teachers. For example, in clinical assessment, children might perform either worse than during daily life due to the pressure they feel, or better, due to their focussed attention and the guidance of the assessor. Questionnaires on the other hand, may be subjective, although parents and teachers provide a valuable source of information. A combination of assessment tools is preferred to provide a more complete representation of children’s difficulties. The combination of a standardized clinical test and a questionnaire holds another advantage, as ADL may be addressed with questionnaires that are difficult to include in clinical assessments, such as swimming or riding a bike. The assessment of a comprehensive range of ADL is particularly important in children with DCD, as it is a heterogeneous disorder that is represented by a wide range of variation in everyday functioning.

The DCDDaily-Q can be used both in research and in clinical practice. In this Manual, we will describe how the DCDDaily-Q has been developed. Next, an overview will be given of the psychometric properties of the Quality subscale of the DCDDaily-Q, and norms will be provided for all three subscales. Lastly, how to use the DCDDaily-Q will be described.

1. Development of the DCDDaily-Q

The DCDDaily-Q has been developed in addition to the DCDDaily. The design of both instruments has been described in the thesis of Van der Linde (2014). In this manual, only the design of the questionnaire will be described.

First, it is important that the items included in a questionnaire are an adequate reflection of the ADL of a child. Otherwise, problems with ADL will be incorrectly diagnosed. This aspect of validity is called content validity, or the degree to which the content of a questionnaire measures the variable it claims to measure (Terwee, De Vet & Scholten, 2008). To illustrate the content validity of the DCDDaily-Q, a description of the target population, the goal, and the developmental process of the DCDDaily-Q will be given (see also Van der Linde et al., 2013).

The DCDDaily-Q has been developed for 5 to 8 year old children at risk for DCD. Together with the DCDDaily, the DCDDaily-Q is designed to examine whether children meet criterion B for the diagnosis of DCD: "The motor skills deficit in Criterion A significantly and persistently interferes with activities of daily living appropriate to chronological age (e.g., self-care and self-maintenance) and impacts academic/school productivity, prevocational and vocational activities, leisure, and play".

The design of the DCDDaily and DCDDaily-Q comprised four phases (extensively described in the article on the design of the DCDDaily: Van der Linde et al., 2013): (a) description of a theoretical model; (b) setting specifications for the instruments to fulfil, of which the following specifications were applicable to the questionnaire: "encompassing the domains of ADL relevant for children" and "actual daily activities for children five to eight years of age"; (c) literature study and expert interviews in order to select possible items for inclusion; (d) expert meeting to discuss the list of relevant items. A limited but broad range of ADL was included in the DCDDaily; a more complete range of ADL was included in the research version of the DCDDaily-Q. Subsequently, the number of items of the research version of the DCDDaily-Q was reduced, and the psychometric properties of the final version were investigated.

The design of the DCDDaily-Q comprised four phases. During the first phase, a theoretical model was described. Relating to the model of the International Classification of Functioning, Disability and Health (ICF), which is the universal framework for health-related conditions, ADL are defined as 'motor-based activities with a functional or meaningful goal that are performed on a daily basis (World Health Organization, 2007). Three domains of ADL were covered; "self-care and self-maintenance", 'productivity and school work', and "leisure and play" (Reed & Sanderson, 1999; Sugden, 2006).

Secondly, two specifications were set for inclusion of items in the DCDDaily-Q, based on literature: (I) the items are representative of the actual ADL of a child, and (II) the items are part of daily functioning in five to eight-year-old children. This age range was considered appropriate as DCD is often recognized around school-age (Cermak, Gubbay & Larkin, 2002).

During the third phase, a list of ADL was composed (based on a literature review and expert interviews) that (I) are part of daily life of 5 to eight-year-old children and (II) that were difficult to perform for children with DCD.

The fourth phase comprised an expert meeting to discuss the list of relevant ADL. The experts were occupational therapists (n = 2), physical therapists (n = 2), a paediatrician (n = 1), a clinical neuropsychologist (n = 1), and researchers in psychology, paediatric rehabilitation, human movement sciences (n = 3), all working in the field of DCD for more than ten years. A comprehensive list of 38 relevant ADL were included in the pilot version of the DCDDaily-Q.

From the 38-item research version of the DCDDaily-Q, first, eleven items were removed due to: an item-total correlation $< .30$ (putting on a jacket); because $< 10\%$ of the combined sample showed poor performance (opening and closing a lunchbox, putting on trousers, sweater and jacket, using stairs, climbing, and computer use); or because items did not discriminate between the DCD group and the control group (using, laying the table, tying shoe laces, cycling, and skating; see Appendix A). Second, four items were removed because: the highest factor loading was $< .40$ (putting on a backpack and walking with a chair); or because items had similar loadings on different factors (running and swimming). The resulting final version of the DCDDaily-Q comprises 23 items.

2. Psychometric properties of the DCDDaily-Q

Different tests were administered to assess the psychometric properties of the DCDDaily-Q. To assess the validity of the DCDDaily-Q, scores on the DCDDaily-Q were compared with scores on other instruments designed to measure motor development: the DCDDaily, the Movement ABC2 (MABC2), the MABC2 Checklist, and the DCD-Questionnaire (DCD-Q). All children were assessed with the DCDDaily and MABC2 Test. The DCDDaily-Q, MABC2 Checklist and Developmental Coordination Disorder Questionnaire (DCDQ) were sent to the parents, who returned these to the researchers after completion within three weeks after assessment. Three groups of five to eight-year-old children were selected. First, a normative reference group (n = 193) representative of five to eight-year-old mainstream school children in the Netherlands. Ten schools were selected from various geographic locations, accounting for possible differences between larger and smaller villages. Second, a group of 25 children with DCD was composed, diagnosed according to the criteria for DCD operationalized in the international clinical practice guideline for DCD (Blank et al., 2012). A third group was composed from children in the reference group to enable comparison of children with DCD and typically developing children, i.e. without any known clinical condition. First, children in the reference group were primarily selected for the control group when they had no known clinical condition such as uncorrected visual problems, and were not at risk for DCD (a score equal to or lower than the 16th percentile on the MABC2). Second, from this preliminary selection, children were randomly selected, blinded for outcomes, to match for age (within one year) and gender with the DCD group (n = 25).

Table 1 provides an overview of the psychometric properties that were examined, and which group(s) were used to examine each psychometric property. Prior to the assessment, all parents received a letter to inform them about the relevance of the study, and about which tests would be performed. After informed consent was obtained from their parents, children were subsequently assessed with the DCDDaily and MABC2 Test, in a separate room in their school or rehabilitation centre. Assessors were advanced students with a background in human movement sciences or physical therapy, who were trained in the assessment of the tests, but who had not been involved in the design of the instruments. See Table 2 for an overview of the scores of the children in each group on the different test/questionnaires.

Table 1. Overview of which tests were assessed for each group.

Test property	Reference group (n = 193)	DCD group (n = 25)	Control group (n = 25)
Determination of Norms	DCDDaily-Q		
Convergent validity	DCDDaily-Q DCDDaily M-ABC 2 M-ABC 2 Checklist DCD-Q	DCDDaily-Q DCDDaily M-ABC 2 M-ABC 2 Checklist DCD-Q	
Discriminant validity		DCDDaily-Q	DCDDaily-Q
Internal consistency	DCDDaily-Q		
Factor analysis	DCDDaily-Q		

Table 2. Number of children, gender division, mean total scores on MABC2, DCDDaily, DCDDaily-Q, MABC2 Checklist and DCDQ per group per age.

	N	Boys/ Girls	MABC2 Test % Mean	DCDDaily Mean (SD; range)	DCDDaily-Q 'quality' Mean (SD; range)	MABC2 Checklist Mean (SD; range)	DCDQ Mean (SD; range)
Reference group	193	90:103	47 (28; .5-99)	23 (4; 18-39)	31 (6; 23-48)	4 (5; 0-20) q=186 ¹	63 (10; 21-75) q=192 ¹
Age 5	41	23:18	40 (26; .5-98)	27 (4; 21-35)	35 (5; 26-46)	6 (5; 0-17)	59 (11; 21-74)
Age 6	63	26:37	46 (29; 1-99)	24 (4; 18-39)	31 (6; 23-48)	4 (5; 0-20)	63 (9; 30-75)
Age 7	51	22:29	50 (28; .5-98)	21 (2; 18-28)	29 (4; 23-37)	3 (4; 0-15)	66 (8; 45-75)
Age 8	38	19:19	53 (30; 5-95)	21 (3; 18-29)	28 (5; 23-44)	3 (5; 0-20)	64 (11; 37-75)
DCD group	25	21:4	6 (6; .1-16)	30 (6; 22-43)	46 (7; 28-60)	22 (13; 0-51) q=23 ¹	41 (16; 19-71) q=21 ¹
Age 5	4	4:0	5 (3; 1-9)	38 (6; 30-43)	44 (5; 40-51)	14 (7; 7-23)	59 (7; 52-66)
Age 6	5	5:0	6 (6; .5-16)	33 (4; 30-40)	46 (7; 35-55)	22 (11; 6-36)	39 (14; 22-59)
Age 7	9	7:2	9 (6; 2-16)	28 (4; 24-37)	48 (7; 38-60)	24 (15; 0-44)	37 (17; 19-71)
Age 8	7	5:2	1 (2; .1-5)	27 (4; 22-32)	44 (8; 28-51)	25 (16; 12-51)	38 (16; 19-61)
Control group	25	21:4	55 (27; 25-99)	24 (4; 19-34)	30 (5; 23-40)	3 (5; 0-20)	63 (10; 43-75)
Age 5	4	4:0	38 (18; 25-63)	30 (5; 23-34)	34 (3; 31-38)	5 (6; 0-13)	63 (12; 46-71)
Age 6	5	5:0	43 (19; 25-63)	26 (2; 25-30)	34 (7; 25-40)	8 (9; 0-20)	59 (10; 46-70)
Age 7	9	7:2	68 (28; 25-99)	22 (3; 19-27)	28 (3; 23-33)	2 (3; 0-8)	66 (7; 57-75)
Age 8	7	5:2	57 (28; 25-91)	21 (1; 20-22)	27 (5; 24-36)	1 (2; 0-4)	63 (12; 43-75)

¹q=number of complete questionnaires

Internal consistency

The internal consistency of a questionnaire reflects the extent to which the items are related, i.e. the homogeneity of the item set. First the internal consistency of the Quality subscale was determined for the reference group. The internal consistency of the 23 items of the DCDDaily-Q was found to be good (Cronbach's $\alpha = .85$) (Terwee, De Vet & Scholten, 2008). Next, the internal consistency of the subscales Participation and Learning were determined. Both were found to be good (0,76 and 0,94 respectively).

To further assess the internal consistency of the Quality subscale, a factor analysis was performed to assess which domains of ADL the DCDDaily-Q covers (See Table 3). In order to provide a reliable and valid questionnaire, item reduction and the factor structure of the DCDDaily-Q were explored stepwise. First, redundant items were excluded when item-total correlation was $< .30$; when $< 10\%$ of the combined sample showed poor performance; or when items did not discriminate between groups. Second, an exploratory factor analysis was performed and further items were removed when communality was $< .20$; when the highest factor loading was $< .40$; or when an item had similar loadings on different factors. Thirdly, the number of factors was determined using exploratory factor analyses following five criteria: (a) all potential model factors have Eigenvalues greater than 1.0; (b) a scree plot shows a change in slope; (c) the model explains a reasonable amount of variance in the data; (d) the model contains the smallest number of factors possible while grouping items together logically by content; (e) no factor contains fewer than 4 items. Finally, a Principal Component Analysis was performed with Varimax rotation of the forced number of factors, to result in the final version of the DCDDaily-Q.

The final version of the DCDDaily-Q comprised 23 items covering three underlying factors (see Table 2). Factor 1 was found to reflect fine motor activities; Factor 2 was found to reflect activities of self-care and self-maintenance; and Factor 3 was found to reflect gross motor playing activities. Cronbach's α was $> .70$ for each of the factors.

Table 3. Summary of the Principal component Analysis of the DCDDaily-Q.

	<i>Rotated factor loadings</i>		
	Fine motor activities	Self-care and self-maintenance	Gross motor playing activities
1. Buttering a sandwich	.37	.47	.21
2. Cutting a sandwich	.21	.46	.39
3. Pouring juice	.07	.60	.22
4. Opening a wrapper/package	.21	.45	.42
5. Eating soup with a spoon	.26	.59	.12
6. Washing hands	.19	.62	.07
7. Drying oneself after a shower or bath	.11	.62	.08
8. Brushing teeth	.05	.69	.25
9. Handling a key	.19	.51	.29
10. Putting on socks	.43	.44	.06
11. Writing	.66	.07	.28
12. Gluing paper using a glue stick	.70	.24	.15
13. Folding paper sheets/slips	.80	.25	.15
14. Colouring a picture	.78	.03	.22
15. Cutting paper using scissors	.71	.27	.21
16. Lego® building	.42	.24	.11
17. Moving pawns (on a board)	.46	.17	.44
18. Playing hopscotch	.28	.38	.51
19. Jumping a rope	.29	.25	.50
20. Throwing a tennis ball	.13	.19	.79
21. Catching a ball	.25	.07	.75
22. Kicking a football	.07	.23	.73
23. Playing marbles	.35	.16	.46
<i>Eigenvalues</i>	<i>8.02</i>	<i>1.68</i>	<i>1.41</i>
<i>% Variance</i>	<i>34.87</i>	<i>7.32</i>	<i>6.15</i>
<i>Cronbachs α, Reference group</i>	<i>.77</i>	<i>.70</i>	<i>.74</i>
<i>Cronbachs α, DCD group</i>	<i>.81</i>	<i>.75</i>	<i>.72</i>

Note: DCD = developmental coordination disorder

Convergent validity

Convergent validity refers to the degree to which scores on an instrument are related to scores on another instrument measuring the same construct (Gravetter & Forzano, 2003). The convergent validity of the DCDDaily-Q was assessed by calculating the correlation between the test and three other measures: the MABC2, the MABC2 Checklist and the DCD-Q.

The MABC2 Test is recommended for the operationalization of the first diagnostic criterion for DCD. It is designed to classify 3 to 16-year-old children according to degree of motor impairment.

Validity and reliability of the instrument are good (Henderson, Sugden & Barnett, 2007). The MABC2 Checklist and DCDQ are currently used for the operationalization of the second diagnostic criterion for DCD. The MABC2 Checklist is designed for teachers to identify 5 to 12-year-old children with motor difficulties. Validity and reliability of the instrument are good (Cairney, Missiuna, Veldhuizen & Wilson, 2008; Schoemaker, Niemeijer, Flapper & Smits-Engelsman, 2012; Schoemaker, Smits-Engelsman & Jongmans, 2003).

Convergent validity was determined by calculating correlation coefficients between mean DCDDaily-Q total scores and mean MABC2 Checklist total scores and mean DCDQ total scores, as well as mean MABC2 Test percentile scores and mean DCDDaily total scores for the reference group. Moderate but significant correlations were found between DCDDaily-Q total scores and the questionnaires (MABC2 Checklist: 0,489; DCDQ: -0,638) and tests (MABC2: -0,360; DCDDaily: 0,454). When the scores on a test are correlated with the scores on a gold standard for ADL, a correlation coefficient of 0.70 is considered to be acceptable. However, no gold standard exists to measure ADL.

Two explanations can be given for the moderate but significant correlation between the DCDDaily-Q on the one hand and the DCDDaily Test and MABC2 on the other hand. First, both tests measure different motor activities: the DCDDaily-Q measures performance in ADL, while the MABC2 measures more general motor abilities. Second, parental reports may differ from objective information obtained through assessment by a clinician. Capacity in ADL, as assessed with a standardized clinical test, reflects what a child is capable of in a standardized environment, i.e. what children can do. Performance, assessed with a parental or teacher questionnaire, addresses the child's daily life performance, i.e. what children actually do during everyday life. However, what children are able to do in a standardized test (i.e. the DCDDaily and MABC2) does not always reflect what they do in daily life according to parents or teachers (Holsbeeke, Ketelaar, Schoemaker & Gorter, 2009).

Discriminant validity

An important aspect of the validity of the DCDDaily-Q is its ability to discriminate between children with and without DCD, or its discriminant validity. Discriminant validity of the DCDDaily-Q was determined by calculating differences between the DCD group and the control group for mean item scores and mean total scores of all three scales of the DCDDaily-Q. The final version of the DCDDaily-Q showed excellent discriminant validity. Parents rated the ADL performance of children in the DCD group to be significantly poorer than the performance of children in the matched control group, both for the DCDDaily-Q total score ($p < .001$) and all 23 item scores ($p \leq .005$; table 4). Figure 1 provides an overview of the differences in item scores between the groups.

Regarding the second scale of the DCDDaily-Q, "Learning", parental rating demonstrated delays in learning of ADL in children with DCD compared to peers: Significant differences were found between groups for mean DCDDaily-Q total learning scores ($p < .001$), mean domain scores (all: $p < .001$), and each of the 23 mean item scores (all: $p \leq .002$, see Figure 1). As it concerns the third scale "participation", children with DCD participate in ADL less frequently than their matched controls: Significant differences were found between groups for mean total participation scores ($p = .001$) as well as for the mean domain scores (self-care and self-maintenance ($p = .001$), fine motor activities ($p = .022$), and gross motor play activities ($p = .046$)). Considering the specific ADL, parents identified that children with DCD participated less frequently in 6 out of 23 activities: cutting a sandwich,

pouring juice, opening a wrapper / package, Lego® building, moving pawns, and kicking a football (see Figure 1). See the paper by Van der Linde et al. (2015) for more information.

Table 5 provides an overview of the results for each of the psychometric properties of the DCDDaily-Q.

Table 4: Mean scores (standard deviation) of the 23 items of the Quality subscale of the DCDDaily-Q of the TD and DCD groups.

“Self-care and self-maintenance”			“Productivity and school”			“Leisure and play”		
Item	TD group	DCD group	Item	TD group	DCD group	Item	TD group	DCD group
Buttering a sandwich	1.48 (0.65)	2.16 (0.55)	Writing	1.48 (0.65)	2.16 (0.75)	Lego® building	1.00 (0.00)	1.64 (0.70)
Cutting a sandwich	1.64 (0.70)	2.16 (0.55)	Gluing Paper	1.28 (0.46)	1.88 (0.44)	Moving pawns	1.16 (0.37)	1.76 (0.72)
Pouring juice	1.32 (0.48)	1.80 (0.41)	Folding paper sheets/slips	1.44 (0.51)	2.08 (0.70)	Playing hopscotch	1.28 (0.46)	2.08 (0.64)
Opening a wrapper/package	1.28 (0.46)	2.08 (0.64)	Colouring	1.28 (0.46)	1.88 (0.73)	Jumping a rope	1.96 (0.73)	2.72 (0.54)
Eating soup with a spoon	1.08 (0.28)	1.76 (0.60)	Cutting paper using scissors	1.32 (0.48)	2.12 (0.53)	Throwing a tennis ball	1.32 (0.56)	2.00 (0.76)
Washing hands	1.04 (0.20)	1.56 (0.71)				Catching a ball	1.44 (0.58)	2.04 (0.54)
Drying oneself after a shower or bath	1.20 (0.40)	2.04 (0.79)				Kicking a football	1.20 (0.41)	2.04 (0.74)
Brushing teeth	1.28 (0.46)	2.12 (0.60)				Playing marbles	1.36 (0.57)	2.08 (0.57)
Handling a key	1.08 (0.28)	2.00 (0.65)						
Putting on socks	1.08 (0.28)	1.72 (0.61)						

Note: higher scores reflect poorer performance; TD = typically developing; DCD = developmental coordination disorder.

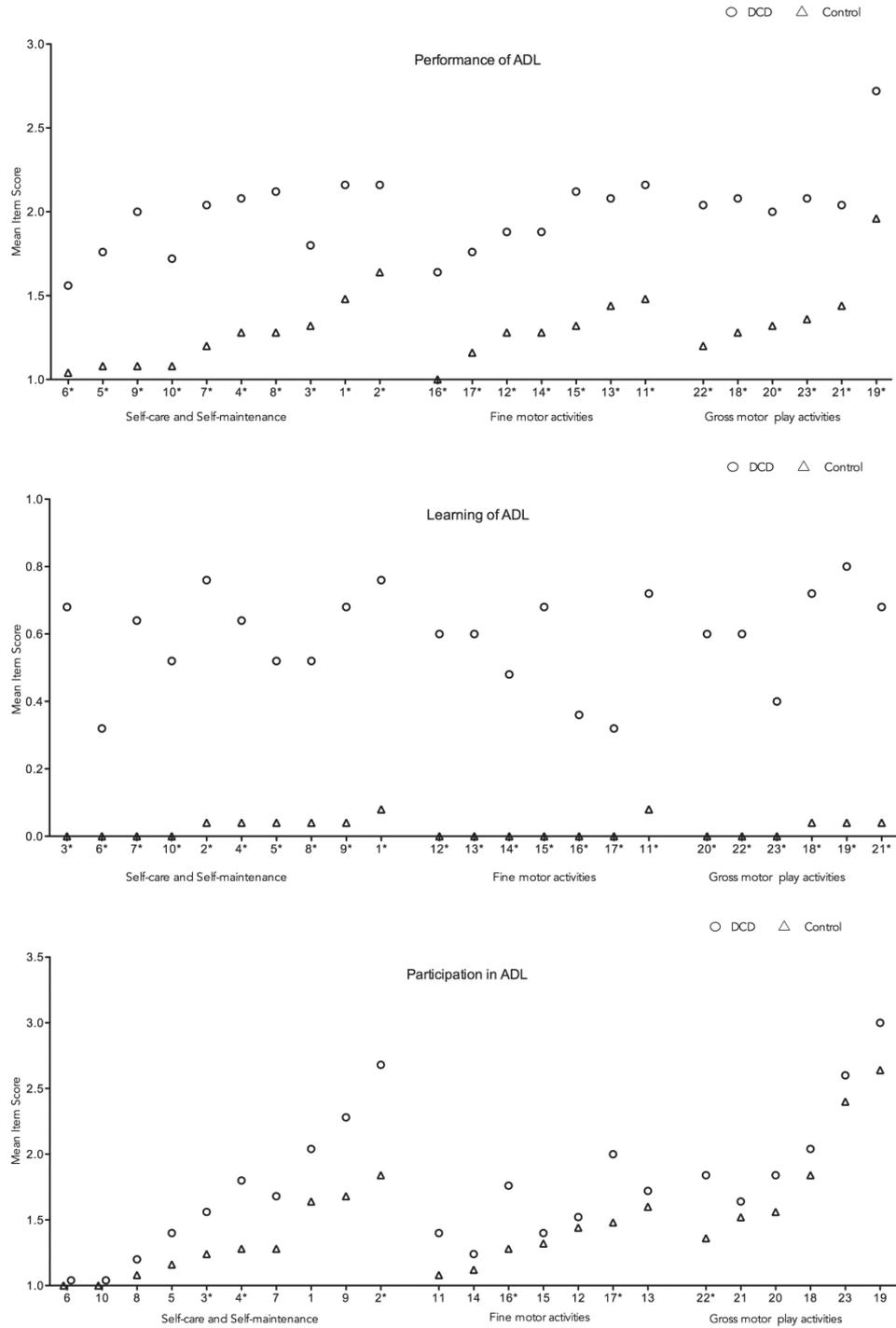


Figure 1: Differences between the DCD and control group per scale and per item.

Table 5. Overview of the psychometric properties of the DCDDaily-Q.

Psychometric property	Test value	Interpretation
Validity		
Concurrent validity		
- DCDDaily	$\rho = 0.454^*$	Moderate correlation
- M-ABC 2	$\rho = -0.360^*$	Moderate correlation
- M-ABC 2 Checklist	$\rho = 0.489^*$	Moderate correlation
- DCD Q	$\rho = 0.638^*$	Moderate correlation
Discriminant validity:		
ADL of DCD group is worse than ADL of TD group according to parents:		
- Total scores	$p < 0.001$	Discriminates between children with and without DCD
- 23 Item scores	$p \leq 0.005$	Discriminates between children with and without DCD
Children with DCD took longer to learn ADL		
- Total scores	$p < 0.001$	Discriminates between children with and without DCD
- 23 item scores	$p \leq 0.005$	Discriminates between children with and without DCD
Children with DCD participate less in ADL		
- Total scores	$p < 0.001$	Discriminates between children with and without DCD
- 6 item scores	$p \leq 0.005$	Discriminates between children with and without DCD
Reliability		
Internal consistency	$\alpha = 0.85$	Homogeneity of items
Factor analysis		3 factors

*Significant correlation ($p < 0.001$)

3. Scoring and Normative data

Record form DCDDaily-Q[©]

Note: If a 4 is scored for participation, Quality is scored 3.

Activity	Participation (score 1,2,3, or 4)	Quality of performance (score 1,2, or 3)	Acquisition of ADL (fill in '1' if the box has been ticked)
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			
16.			
17.			
18.			
19.			
20.			
21.			
22.			
23.			
Total score			

Age of child	
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Norms

Table 6: Mean total scores for age and gender for the three scales of the DCDDaily-Q.

Age	Gender	N	“Participation” scale Mean (SD)	“Quality scale” Mean (SD)	“Learning” scale Mean (SD)
5	Boys	23	39,1 (7,1)	34,5 (4,9)	0,56 (1,12)
	Girls	18	38,9 (6,8)	34,8 (4,7)	0,00 (0,00)
	Total	41	39,0 (6,9)	34,6 (4,8)	0,32 (0,87)
6	Boys	26	36,9 (5,3)	32,1 (5,6)	0,46 (1,24)
	Girls	37	35,5 (6,2)	29,8 (5,6)	0,27 (0,90)
	Total	63	36,1 (5,8)	30,8 (5,7)	0,35 (1,05)
7	Boys	22	33,9 (5,5)	29,3 (3,7)	0,59 (1,37)
	Girls	29	32,6 (4,8)	28,1 (3,9)	0,07 (0,37)
	Total	51	33,2 (5,1)	28,6 (3,8)	0,29 (0,97)
8	Boys	19	35,4 (5,2)	29,3 (5,4)	0,68 (1,73)
	Girls	19	32,1 (5,5)	26,9 (4,8)	0,58 (1,26)
	Total	38	33,7 (5,5)	28,1 (5,2)	0,63 (1,49)

Normative data for the Scale measuring ‘Participation in ADL’

The “participation in ADL” scale of the DCDDaily-Q measures how often children participate in specific ADL according to their parents. For all 23 items, parents fill out whether their child performs an activity ‘regularly’ (score 1), ‘sometimes’ (score 2), ‘seldom’ (score 3), or ‘never’ (score 4). The total score on this scale varies between 23 and 92, the higher the score the less often they participate in ADL. First, the effects of age and gender were investigated. A significant effect of age was found ($F(3, 193) = 8,925,550, p < 0,001$). Post-hoc analyses revealed that 5 and 6 year old children participated significantly less in ADL than 7 to 8 year old children, who did not differ from each other. For that reason, separate norms were calculated for 5 and 6 year old children for the “Participation scale”. In addition, a non-significant effect was found for gender ($F(1, 193) = 3,285, p = 0,072$) - participation in ADL of boys was not less than that of girls, according to parents. See Table 8 for cut-off scores and their interpretation.

Table 8: Cut off values for the total score on the “Participation” scale of the DCDDaily-Q.

	Age 5	Age 6	Ages 7 and 8	Interpretation Participation in ADL
≥ 95^e percentile	≥ 50	≥ 45	≥ 43	Frequency of participation in ADL is significantly less according to parents.
85^e -95^e percentile	47	44 43	42 41 40	Frequency of participation in ADL is less according to parents.
0-85^e percentile	≤46	≤42	≤ 39	Frequency of participation in ADL is comparable to peers according to parents

Normative data for the Scale measuring ‘Quality of performance’

Parents rate their children’s performance on a three-point scale for each item (1 = good, 2 = medium, 3 = poor). The DCDDaily-Q total score is the sum of the 23 item scores, ranging from 23 (good) to 69 (poor). The questionnaire was designed such that each item can be marked “good” when the child usually performs the activity without trouble, and “poor” when the activity cannot usually be performed without dropping things, knocking things over, or falling, or when the child is not able to complete the activity. To determine cut-off points, the effects of age and gender needed to be investigated first. See Table 6 for an overview of mean total scores per age and gender. A significant effect was found for age ($F(3,193)= 15.042, p <.001$). Post-hoc analysis revealed that 5 and 6 year-old children significantly differed from the older age groups, which did not differ from each other. For that reason, separate norms were calculated for the 5 and 6 year-old children for the “Quality scale”. In addition, a non- significant effect was found for gender ($F(1, 193)= 3,571, p = 0,06$). See Table 7 for cut-off scores and their interpretation.

Table 7: Cut off values for the total score on the “Quality” scale of the DCDDaily-Q.

	Age 5	Age 6	Ages 7 and 8	Interpretation Quality of performance of ADL
≥ 95^e percentile	≥ 43	≥ 40	≥ 37	Performance of ADL is significantly poorer according to parents.
85^e -95^e percentile	42 41 40 39	39 38 37	36 35 34 33 32	Performance of ADL is poorer according to parents.
0- 85^e percentile	≤38	≤36	≤ 31	No difficulty in performance of ADL according to parents.

Normative data for the Scale measuring ‘Learning of ADL’

The scale “Learning of ADL” measures whether children needed more time than peers to learn 23 ADL according to parents. For each of the 23 ADL two responses are possible: 0= my child did not need more time; 1= it took my child longer to learn the ADL. Effects of age and gender on the total scores were first investigated. No significant effect for age was found (Age: $F(3,193)= 0,808$, $p=0,491$). However, a significant effect for gender was found ($F(1,193)= 4,576$, $p=0,034$). Boys took longer than peers to learn 23 ADL according to their parents. However, as the interaction between age and gender was not significant, no separate norms for age and gender needed to be determined (Table 9).

Table 9: Cut off values for the total score on the “Learning” scale of the DCDDaily-Q.

Ages 5, 6, 7 and 8	Interpretation Learning of ADL
≥ 95^e percentile	≥ 2 Learning of 2 or more ADL took longer compared to peers according to parents.
85^e -95^e percentile	1 Learning of 1 ADL took longer compared to peers according to parents.
Tot 85^e percentile	0 No delays in learning of ADL according to parents.

Interpretation of the total scores on the “Quality” scale of the DCDDaily-Q

- If the child scores at or above the 95th percentile the child is very likely to have movement difficulties requiring intervention. Complementary assessment is required with a standardized motor test (MABC2 or DCDDaily) to determine the severity and extent of the motor difficulties. In addition, it is recommended to gather additional information about motor performance of a child, for instance from school teachers.
- If the child scores between the 85th and 95th percentile, the child is at risk of having movement difficulties. Additional information from school teachers may reveal whether the motor difficulties are also noticeable at school, and whether complementary assessment is necessary.
- Scores below the 85th percentile imply that no problems exist with performance of ADL.

Uses of the DCDDaily-Q

1. To recognize problems in ADL, which may reflect an underlying movement disorder, such as DCD. Further assessment is required to confirm DCD.
2. To assist in the diagnostic process of DCD. According to the diagnostic criteria for DCD, the diagnosis can only be made if a child encounters problems with the performance of ADL at home or at school. The DCDDaily-Q may give a first indication of whether these problems are present.
3. To set goals for intervention. The DCDDaily-Q may reveal which specific ADL a child encounters problems with. Accordingly, therapists can consult parents and children to make clear whether a child needs help for a specific ADL.
4. To monitor the effectiveness of intervention. Although test-retest reliability has not yet been investigated, asking parents to fill out the DCDDaily-Q after intervention may give insight into the effectiveness of the intervention as it concerns ADL.

Who can work with the DCDDaily-Q?

Professionals, such as rehabilitation doctors, paediatricians, physical therapists, and occupational therapists can ask parents to complete the DCDDaily-Q to get an impression of problems with ADL at home. Also, teachers can ask parents of these pupils to complete the questionnaire if they suspect the pupil has problems with ADL. The DCDDaily-Q may reveal whether these problems are also present at home. As the role of teachers to recognize motor difficulties becomes more important, use of the DCDDaily-Q can become a useful tool to determine whether further assessment is required. Finally, the DCDDaily-Q can be used in research.

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