



CDAS

CHILD DEVELOPMENT
ASSESSMENT SCALE

CHILD DEVELOPMENT ASSESSMENT SCALE 0 TO 5 YEARS OLD (CDAS)

**STANDARDIZATION STUDY
Summary Report**



**Centre de liaison sur l'intervention
et la prévention psychosociales**

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1. Introduction to the CDAS

The Child Development Assessment Scale (CDAS) is a tool used to determine whether a child aged 0 to 5 shows delayed cognitive/language, motor or social-emotional development.

The need for such an assessment tool was first expressed by practitioners and managers at the Centre Jeunesse de Montréal, who sought an assessment tool to systematize and better support their decision-making in situations of compromised early childhood development. In order to meet this need, child development researchers Andrée Pomerleau, Nathalie Vézina, Jacques Moreau, Gérard Malcuit and Renée Séguin from the Université du Québec à Montréal and the Université de Montréal undertook research in spring of 1998. The first step was to verify the existence of a tool that would meet the following criteria:

- Easy to use;
- Easy to interpret;
- Quick to administer to children;
- Accessible to professionals working with children;
- Inexpensive;
- Sound, thanks to good psychometric properties.

When the search for such a tool proved fruitless, the researchers decided to create a new one and to test it to ensure the quality of its psychometric properties. The process took over six years and resulted in the CDAS or Child Development Assessment Scale 0 to 5 years old.

Better Understanding the CDAS

Assessing a child using the CDAS takes approximately 30 minutes. The results situate and describe cognitive/language, motor and social-emotional skill development. Results located in the “comfort” zone indicate adequate development. Results in the “to be monitored” zone indicate that the child needs to be monitored carefully. Finally, those in the “referral” zone indicate the need to refer the child to a professional.

The CDAS can be understood as a “thermometer” that can indicate whether a child has a fever, but cannot explain whether it comes from a cold, toothache or meningitis. If the fever is too high or lasts too long, a doctor must be consulted. Like a thermometer, the CDAS is not a diagnostic tool, but rather a screening tool that indicates developmental delays in one dimension or another without identifying the cause.

The CDAS was originally developed and validated in order to meet youth protection workers’ needs associated with the assessment of young children. During this process, the researchers realized that the CDAS could be useful to other practitioners such as educators, educational advisors, psychoeducators, nurses and social workers in the early childhood network and health and social services centers (CSSS).

Psychometric properties

Generally speaking, the psychometric properties of this instrument are very good. Both score reliability over time and inter-assessor reliability are excellent. Temporal reliability for the cognitive/language and motor dimensions are quite acceptable, particularly for the assessment of children who can go through many changes over a short period of time. Furthermore, correlations with tests such as the Bayley (1993, mental and motor scale) and the Stanford-Binet (intelligence scale, 4th edition, Thorndike et al. 1986) show that the CDAS converges very satisfactorily with these recognized and validated tests for all age groups. Finally, internal consistency analysis shows excellent consistency in terms of intercorrelations between the various items composing the scales.

Sensitivity and specificity analyses show that cut-off scores for the three zones are defined so as to maximize detection performance and therefore counterbalance false negatives and false positives.

Lastly, large-scale standardization of the CDAS will allow the establishment of cut-off scores that are representative of the Quebec population for each age group.

2. Standardization of the CDAS

The results of the standardization study provide a “thermometer” for the development of children aged 0 to 5, graduated according to Quebec standards. Specific cut-off scores were determined and allowed a clear definition of the upper and lower limits of each of the zones (“comfort,” “to be monitored” and “referral”) for each of the three dimensions of child development.

Samples

The children who participated in the CDAS standardization were recruited in day care services (CPE day care centres and private day care), drop-in day care centers and community organizations across the following regions of Quebec:

- Montreal;
- Montérégie;
- Laval;
- Lanaudière;
- Laurentians;
- Quebec City: *Capitale-Nationale and Chaudière-Appalaches*;
- Northern Quebec: *Saguenay, Nord-du-Québec and North Shore*;
- Eastern Quebec: *Lower Saint Lawrence and Gaspé Peninsula*;
- Central Quebec: *Eastern Townships, Mauricie and Centre-du-Québec*;
- Western Quebec: *Outaouais and Abitibi-Témiscamingue*.

Children with special visual, auditory, psychopathological or communication needs for which day-care services receive an integration grant from the Ministère de la Famille, des Aînés et de la Condition féminine (MFACF) or for which parents receive additional financial assistance from the Régie des rentes du Québec (RRQ) were excluded from the sample. Children with insufficient French language proficiency to be able to understand basic routine instructions appropriate to their age were also excluded.

In total, 4,318 children and their parents were contacted and asked to participate in the study. Exactly 1,280 (30%) of them accepted our invitation. A total of 859 children were chosen across all regions of the province. This sample was composed of 481 boys (56%) and 378 girls (44%). Most children were born in Quebec (94%) and the majority always spoke French at home (93%); they were mainly recruited from day care services (93%), most of which were CPE centres (85%), and were in day care full time (86%) for 7 to 10 hours per day (68%). The other children were selected from drop-in day care and community organizations. Table 1 shows the distribution of recruited children per region, whereas Table 2 shows the distribution of recruited children by age group.

Table 1
Distribution of recruited children by region

Region	Recruited children by region	
	n	%
1. Montreal	210	24.4
2. Montérégie	195	22.7
3. Laval	62	7.2
4. Lanaudière	64	7.5
5. Laurentians	40	4.7
6. Quebec City	54	6.3
7. Northern Quebec	69	8.0
8. Eastern Quebec	23	2.7
9. Central Quebec	87	10.1
10. Western Quebec	55	6.4
Total	859	100

Table 2
Distribution of recruited children by age group

Age group	Number of children	
	n	%
0-6 months*	15	1.7
6-12 months**	24	2.8
12-15 months	30	3.5
15-18 months	57	6.6
18-21 months	60	7.0
21-24 months	42	4.9
24-30 months	80	9.3
30-36 months	96	11.1
36-42 months	105	12.1
42-48 months	105	12.1
4 years	143	17.0
5 years	102	11.9
Total	859	100

*The recruited children in the 0-3 months and 3-6 months age levels were grouped together to form the 0-6 months group

**The recruited children in the 6-9 months and 9-12 months age levels were grouped together to form the 6-12 months group

The majority of the parents of children in the study lived in couples (92.7) and had a relatively high education level. In 94% of cases, the mother was the respondent. In our sample, 66.5% of the couples had an annual household income above \$60,000. More than 65% of the mothers and more than 79% of the fathers worked full time.

Results

The use of standard deviation is well established as a reliable measure for defining cut-off points. The lower and upper limits of the zones are therefore defined using average and standard deviation as a reference.

The zones are defined as follows:

- Comfort zone (blue):
Results situated between the maximum score on the CDAS (100) and a score corresponding to one standard deviation below the average.
- To-be-monitored zone (grey):
Results situated between the lower limit of the blue zone and a score corresponding to 2 standard deviations below the average.
- Referral zone (red):
Results situated between the lower limit of the grey zone and the minimal score on the CDAS.

Figure 1 below illustrates the way the upper and lower limits are defined for each of the three zones.

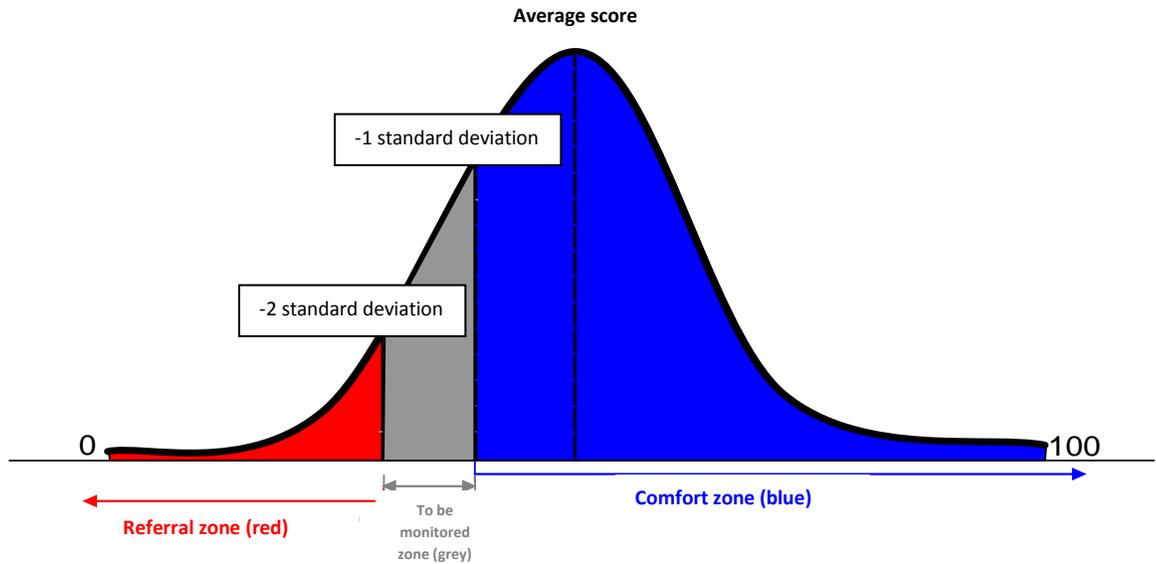


Figure 1. Definition of referral, to be monitored and comfort zones

Descriptive analyses provide averages and standard deviations that are used to establish cut-off points for the different zones (comfort, to be monitored and referral) for each dimension of child development. Table 3 sets out the cut-off points for each zone and for each dimension of development and each age group.

Table 3**Cut-off points for the three zones, for each age level and each dimension assessed.**

	Cognitive			Motor			Social-Emotional		
	Red	Grey	Blue	Red	Grey	Blue	Red	Grey	Blue
0-3 mois	0-33	34-50	51-100	0-23	24-41	42-100	0-66	67-78	79-100
3-6 mois									
6-9 mois	0-26	27-42	43-100	0-28	29-46	47-100	0-58	59-69	70-100
9-12 mois									
12-15 mois	0-39	40-53	54-100	0-14	15-38	39-100	0-70	71-79	80-100
15-18 mois	0-24	25-43	44-100	0-15	16-36	37-100	0-73	74-81	82-100
18-21 mois	0-26	27-44	45-100	0-31	32-49	50-100	0-72	73-80	81-100
21-24 mois	0-19	20-45	46-100	0-29	30-48	49-100	0-70	71-79	80-100
24-30 mois	0-27	28-43	44-100	0-22	23-42	43-100	0-71	72-81	82-100
30-36 mois	0-31	32-50	51-100	0-22	23-42	43-100	0-65	66-78	79-100
36-42 mois	0-49	50-63	64-100	0-24	25-42	43-100	0-71	72-81	82-100
42-48 mois	0-44	45-60	61-100	0-25	26-45	46-100	0-72	73-82	83-100
4 ans	0-38	39-55	56-100	0-34	35-50	51-100	0-70	71-80	81-100
5 ans	0-16	17-34	35-100	0-34	35-52	53-100	0-74	75-83	84-100

Certain differences can be observed between the cut-off points developed during the CDAS sensitivity and specificity study (Dupuis et Martel, 2006) and the new cut-off points resulting from the standardization study. More specifically, some zones are broader (positive Delta) and some are more limited (negative Delta).

In the **cognitive** dimension, for 8 age groups out of 14, it can be seen that the red zone (referral) is more limited than it was previously. The blue (comfort) and grey (to be monitored) zones for the same 8 age groups have expanded. As a result, fewer children will be situated in the referral zone, but more children will be in the to-be-monitored zone or considered to show normal development.

The situation is almost the same for the **motor** aspect, in which the red zone (referral) has diminished for 8 age groups out of 14. Here again, the blue zones (comfort) and grey zones (to-be-monitored) have grown. In this case, too, fewer children will be in the referral zone, but more will be in the to-be-monitored zone or considered to show normal development.

Finally, for the **social-emotional** dimension, all of the red zones (referral) are more limited, primarily owing to the expansion of blue zones. Once again, fewer children will be in the referral zone, but more will be in the to-be-monitored zone or considered to show normal development.

3. Conclusion

The effectiveness of a detection tool such as the CDAS is ascertained based on its ability to identify all children exhibiting problems and to make sure that none of them will fall through the cracks of detection (false negatives). Indeed, it would be very unfortunate to fail to detect a child's developmental delay and deprive him or her of the essential services required to remedy the situation.

At the same time, the tool should not identify problems in children who have none (false positives). It is important to avoid overburdening specialists by referring children who do not actually require special services, without mentioning the impact that false positives can have on the parents. Suggesting that parents consult a specialist for their child, when unnecessary, is likely to cause unnecessary alarm.

Establishing rigorous cut-off points offers a way to avoid both types of errors. Moreover, the grey zone of the CDAS also minimizes such risks. Children in this zone will not avoid detection but will not overburden specialists either.

The CDAS standardization study has offered an opportunity to develop new and more precise cut-off points that are more representative of the Quebec population.

It is important to keep in mind, however, that the results presented here are based on a population considered to be normal. A greater number of referrals will be required when the CDAS is used for clinical purposes. Since the CDAS should be used in cases of doubt concerning a child's development, a clinician can expect to see a higher proportion of children situated in the grey or red zones compared to the results presented in the standardization study.

Summary Report drawn from:
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Standardization Study
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Centre de liaison sur l'intervention
et la prévention psychosociales

Written by:
Renée Latulippe, Project Director
Centre de liaison sur l'intervention et la prévention psychosociales
(CLIPP)