

Dysregulation profile defined by Child Behavior Checklist in a sample of preschool children

Perfil de desregulación definido mediante el instrumento *Child Behavior Checklist* en preescolares

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Received: 12-3-2018; Approved: 15-11-2018

Abstract

Introduction: The dysregulation profile (DP) is a relevant clinical entity in the children and adolescent area since its association with future psychopathology. DP is defined by the Child Behavior Checklist (CBCL), combining internalizing symptoms (anxiety/depression) and externalizing ones (aggressiveness, attention problems). **Objectives:** To study the frequency of CBCL-DP in a sample of Chilean preschoolers. **Patients and Method:** A sociodemographic survey and CBCL 1.5-5 was applied to caregivers of children aged 30 to 48 months in a national representative sample of public health system users. Frequency was estimated using the Kim et al. method and an explanatory model was made using binary logistic regression of DP using the child, caregiver, and contextual variables. **Results:** The sample size was $n = 1,429$ preschool children and their caregivers. The frequency of DP was 11.6% (95% CI 9.9-13.5%). The variables that allow to classify DP in 88.6% of cases were: current depressive symptoms in the main caregiver (OR: 2.24; 95% CI 1.37-3.67); number of stressful events experienced by the main caregiver ($p = 0.005$); number of available elements for child development stimulation in the home ($p = 0.001$); number of chronic diseases of the child ($p = 0.006$). **Conclusions:** DP has a high frequency in preschoolers, which implies a relevant mental health burden. This finding points to the need for interventions in this area and also longitudinal monitoring of this subgroup.

Keywords:

Dysregulation profile;
Childhood Behavior
Checklist;
preschoolers

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How to cite this article: Rev Chil Pediatr 2019;90(2):157-165. DOI: 10.32641/rchped.v90i2.657

Introduction

Based on the psychopathology, there has been a permanent interest in identifying children and adolescents who present simultaneously mood, attention, and behavior alterations, as a separate clinical entity¹. The application of standardized clinical evaluation instruments, such as the Achenbach Child Behavior Checklist (CBCL)², has allowed identifying a symptomatic profile that is generically called the CBCL-dysregulation profile (CBCL-DP)³. This profile attempted to bring together the symptomatic fields of attention problems, anxiety/depression problems, and aggressive behavior^{4,5}.

Initially, this profile was associated with a higher frequency of bipolar disorder diagnosis in pediatric age according to DSM^{4,6}; however, long-term follow-ups have had difficulties in maintaining this association, mainly by emphasizing the search for mood episodes with clear onset and end, or delusions of grandeur presence in mental examination, to differentiate from an attention-deficit hyperactivity disorder (formerly attention-deficit disorder)⁷⁻⁹.

Despite this questioning, CBCL-DP has concept reliability beyond its diagnostic association in categorical terms, it constitutes a phenotypic homogeneity tool to compare studies in different populations¹⁰. Thus, genetic bases for the profile¹¹⁻¹³ and the possibility of longitudinal follow-up¹⁴ could even be considered.

In this last aspect, prospective cohorts have shown a significant evolution towards bipolar disorder^{4,15}. However, what is most interesting to analyze is the evolution towards severe and joint alterations of affective disorders, cognition and behavior, in what has been described as the “ABC” of developmental self-regulation (Affective, Behavioral, Cognitive)³.

Findings in longitudinal follow-up of patients have included diverse forms of psychopathology, in addition to the persistence over time of a consistent symptomatic pattern^{4,14,15}, where an increased suicidality has been observed in adolescence, higher substance use rate, impaired functionality, higher rate of Cluster B personality disorders in adulthood, higher rate of anxiety disorders diagnosis, major depressive disorder, and behavioral disorders¹⁶⁻¹⁹.

Interest has also emerged in the early identification of children with such characteristics²⁰. A study in preschoolers found several associations that involve important environmental factors²¹, such as the rate of psychopathology in parents and the presence of maladaptive parenting techniques, in addition to significant psychiatric symptoms in the state of mind and behavior already at that age.

It is important to point out that, in the psychopathological discussion, a new diagnosis for child and adolescent age has appeared, listed in the DSM-5 manual, called “Disruptive Mood Dysregulation Disorder”²². There is still some discussion about the implications of this diagnosis. However, the diagnostic criteria have not been tested for their association with the CBCL scale, in addition to considering specific age and temporal criteria, which do not make it comparable with the dysregulation profile described in the previous paragraphs.

Having identified this powerful marker of current and future psychopathology, and the lack of descriptions made in the Chilean population, even less so in the preschool population, this research is proposed with the objective to study the CBCL-DP frequency from a sample of Chilean preschoolers and subsequently to explore associations that help to understand its distribution in the studied population.

Patients and Method

Sample size and selection

Secondary data analysis was carried out with the collected information based on the results evaluation of the Program to Support Biopsychosocial Development, from the Social Protection Subsystem *Chile Crece Contigo* (“Chile grows with you”)²³.

The program is carried out in the public health care network and its objective is to monitor the children development since the gestation to the age of six. In this evaluation, data were collected from a representative sample of the Program users²³. The sample framework corresponded to children between 30 and 48 months of age (in 2013) who received their benefits from gestation, in public primary health centers in Chile. The public health sector serves 85% of the population aged 1-5²⁴. In order to obtain a representative national sample, a cluster sampling was carried out stratified in three stages. The first sampling unit was stratified by public communal networks of organized primary care services. The second sampling unit corresponded to the random selection of a facility to comply with the foreseen quota; if this was not sufficient, another facility of the same commune was selected. Finally, the study units correspond to the children treated in these facilities.

The estimated sample size was 1,400 of children aged 30-48 months at the time of the evaluation. This size allows obtaining national frequencies with at least 95% reliability, with a power close to 90% based on European prevalence of developmental problems of approximately 10%.

Construction of the variable “Dysregulation Profile”

For the CBCL-DP measurement, data from the CBCL application in its version for preschoolers aged 18 to 60 months were used²⁵. This instrument has high validity and reliability levels²⁶ and has been validated in this version for Chilean preschoolers²⁷. This instrument consists of 99 items that represent behaviors which are answered as 0 = not present in the child, 1 = the behavior is sometimes presented in the child, and 2 = it is always presented. A total gross score is established with the sum of each item, which is then standardized, using the proposed criteria by the manual²⁵.

The CBCL-DP variable was constructed following the recommendations of Kim et al.²¹: under this modality, each item mentioned above (attention problems, anxiety/depression, aggressiveness) was standardized independently. A new variable was then generated based on the standardized scores sum of each one and was studied with cut-off points from the standardized scores sum in $T \geq 180$. This method allows a comparison between both report samples in preschools of different nationalities.

Other used instruments

Child development was assessed with the Battelle Developmental Inventory 1 (BDI)²⁸, which is used for the development diagnosis between 0-8 years of age considering the personal-social, social adaptation, motor skills, communication, and cognition aspects. Battelle is considered altered if the instrument shows a significant age lag with respect to the expected accomplishments for the test reference. In the studied sample, the internal reliability of the instrument BDI (Cronbach's Alpha) was 0.96.

Other studied variables of interest come from the *Chile Crece Contigo* Survey²³. It includes family socio-demographic variables such as socioeconomic level measured by ESOMAR method²⁹, and family functioning, using a translation of the subscale of McMaster Family Assessment Device which evaluates family functioning³⁰⁻³³ and main caregiver variables, such as history of consumption of alcohol, drugs, and smoking. The internal reliability (Cronbach's Alpha) of the family functioning scale in this sample was 0.842.

In addition, the history of depression in pregnancy and depression diagnosis made by a physician at some point in life were included, and current depressive symptoms were evaluated through the Composite International Diagnostic Interview Short Form (CIDI-SF) for major depression³⁴, in the Spanish version used in three National Health Surveys of Chile³⁵. On the other hand, it was analyzed the caregiver perception of stressful events in the last twelve months, and perception of general health and domestic violence (psychological, financial, physical, and sexual abuse towards

the caregiver, and violence in general at home). Among the variables of the child was considered the presence of childhood chronic diseases according to the Survey. In addition, aspects relating to parenting available in the Survey were considered, such as the number of available elements at home to stimulate (which proposes a list of 12) and the parents' participation in stimulation areas (reading, singing, playing, visiting relatives, walking).

Statistical analysis

Based on an integrated database construction, the analysis was performed using the statistical software SPSS 17.0 and STATA. The frequency was studied according to the described methods with 95% confidence intervals. Secondly, an association was pursued between the several available exhibitions through the used instruments and the dysregulation profile emergence. Candidate variables were evaluated with bivariate analysis using chi-squared or T-student tests as appropriate. Statistically significant results were considered with $p\text{-value} < 0.05$. Additionally, an explanatory model was created using binary logistic regression with the conditional method, starting with those variables that were significantly associated in the bivariate analysis.

Ethical considerations

The study was approved by the research ethics committee of the Eastern Metropolitan Health Service (at the request of the Ministry of Health) and required informed consent from the caregivers participating in the study. No additional funding was required to conduct this secondary analysis.

Results

The resulting sample consisted of 1,429 preschoolers users of the public health system. The average age of the preschoolers sample was 41.2 ± 4.8 months; 51.2% were male. The educational level of the main caregiver in years was 9.5 ± 3.6 . Table 1 describes the main characteristics of the studied population (Table 1).

The CBCL-DP frequency was 11.6% (95% CI 9.9-13.5%), which in males was somewhat higher than in females. The CBCL-DP was significantly associated with impairment in the Battelle cognitive aspect, family functioning, and the presence of depressive symptoms in the main caregiver. A trend towards a higher frequency was observed in the case of maternal depression history during pregnancy (Table 2).

Table 3 shows how the averages of some continuous variables differ in the case CBCL-DP. In a statistically significant way, there is a higher average of chronic

diseases in those with CBCL-DP, a higher number of stressful vital events experienced by the main caregiver in the last twelve months, and a higher number of suffered types of violence. By contrast, a higher number of areas of the main caregiver involvement in children's activities is observed in those children without CBCL-DP.

Finally, table 4 shows the CBCL-DP explanatory model using binary logistic regression. By entering all statistically significant variables in the bivariate analysis and observing behavior step-by-step, only four variables remain in the model: current depressive symptoms of the main caregiver, number of stressful events experienced in the last 12 months by the main caregiver, number of stimulation elements available at home (as protector), and the number of chronic diseases of the evaluated children, explaining 88.6% of the classification coincidences.

Discussion

This study is the first report on the national frequency of dysregulation profile according to CBCL in Chilean preschoolers between 36 and 48 months of age, users of the public health system. In addition, it is the first frequency report close to the prevalence estimate of the country. It points out that the frequency tends to be higher in males than in females, and that there are factors of the main caregiver that importantly explain the presence CBCL-DP. In our study, the educational level of the caregiver and the socioeconomic level by ESOMAR method did not show significant associations, possibly given the homogeneity in this aspect due to the type of population under study (Chilean public health sector).

The CBCL-DP presentation frequency in the sample is close to the only frequency reported in individuals of the same age, in the study of Kim et al. (21), who report a frequency in a sample of similar size (n=955), separated by the report of the mother (11.1% frequency with n=549), and of the father (6.4% frequency with n=406). The reported frequency in the total sample was 9.1%.

Given the results, a first theoretical model is proposed that interrelates the found associations (Figure 1).

In general, the variables are grouped into intrinsic elements of the child, the elements of the main caregiver, and the relational elements between them, which occur together in the environment, where factors are also identified. First of all, among the child's elements, the proposed model shows the number of chronic diseases in the child. It is hypothesized that the physical symptoms presence predisposes to discomfort that can be associated with the greater presence of behavioral

symptoms and indicators of internalizing discomfort, as has been observed in bronchial asthma³⁶, which has even had physiopathological mechanisms proposed from neuroendocrine systems³⁷.

Prenatal risk factors associated with this profile have also been reported, such as the educational level of the mother, passive smoking, and identification of mycoplasma in placental samples³⁸, which would fall within the category of intrinsic factors of the child, but which were not included in the studied factors in this sample.

Secondly, among the analyzed elements of the care-

Table 1. Sociodemographic characteristics of studied sample

Sociodemographic characteristics of children and their caregivers	Total sample n = 1429	
	Mean / %	SD
From the child		
Age (months)	40.95	4.6
Male sex	51.3	
Attends kindergarten	50.0	
Number of chronic diseases in infancy	1.1	1.3
From the main caregiver		
Age (years)	31.6	10.2
Male sex	2.5	
Civil Status		
Divorced	14.8	
Not divorced	85.2	
Employment		
Currently employed	82.2	
Currently unemployed	17.8	
Educational level		
Without elementary instruction	1.1	
Elementary instruction	20.4	
High school instruction	66.7	
Higher education	11.8	
Years of studying	9.5	3.6
Number of stressful vital events (max: 9)	1.2	1.5
From the family group		
Socioeconomic classification (ESOMAR)		
High	8.3	
Middle-High	14.1	
Middle	36.7	
Middle-Low	33.3	
Low	7.6	
Family functioning		
Better functioning	63.6	
Worse functioning	36.4	

Table 2. Frequencies of dysregulation profile and association* with categorical variables

Study variable		Frequency	p
Sex	Male	13.2%	0.055
	Female	10.0%	
Batelle Classification Cognitive Area	Normal	9.9%	0.006
	Altered	15.5%	
Socioeconomic classification (ESOMAR)	B	8.7%	0.476
	Ca	11.7%	
	Cb	10.6%	
	D	11.2%	
	E	16.3%	
Family Functioning	Normal	9.3%	0.004
	Altered	14.7%	
Depressive symptoms in main caregiver	Yes	10.0%	< 0.001
	No	23.7%	
History of maternal depression during pregnancy	Yes	16.1%	0.051
	No	11.0%	
History of medical diagnosis of depression in main caregiver	Yes	13.1%	0.230
	No	10.9%	

* χ^2 test and Fischer test.**Table 3. Frequencies of dysregulation profile and association* with continuous variables**

Study variable	Dysregulation profile	Mean and Standard deviation	p
Number of chronic diseases in infancy	Yes	$m = 1.497$ $s = 1.529$	< 0.001
	No	$m = 1.043$ $s = 1.276$	
Participation of father figure in children activities	Yes	$m = 13.240$ $s = 4.152$	0.147
	No	$m = 13.762$ $s = 4.491$	
Participation of mother figure in children activities	Yes	$m = 16.067$ $s = 3.289$	0.158
	No	$m = 16.578$ $s = 3.301$	
Participation of main caregiver in children activities	Yes	$m = 15.951$ $s = 3.3120$	0.040
	No	$m = 16.470$ $s = 3.4884$	
Number of available stimulation resources at home	Yes	$m = 8.394$ $s = 2.580$	< 0.001
	No	$m = 9.506$ $s = 2.516$	
Number of stressful vital events lived by the main caregiver during last 12 months	Yes	$m = 1.624$ $s = 1.579$	< 0.001
	No	$m = 1.167$ $s = 1.4831$	
Number of addictive substances that main caregiver consumes (alcohol, tobacco, other drugs)	Yes	$m = 0.794$ $s = 0.880$	0.046
	No	$m = 0.685$ $s = 0.800$	
Number of types of violence suffered by main caregiver (physical, psychological, sexual, economic)	Yes	$m = 0.479$ $s = 0.8380$	< 0.001
	No	$m = 0.290$ $s = 0.6791$	

*T-student . m = mean; s = standard deviation.

Table 4. Explanation model for the dysregulation profile in preschoolers from 36 to 48 months of age

Variable included in equation	Beta	p	B (exp)	IC 95% B (exp)	
Current depressive symptoms in main caregiver (Yes/No)	0.808	0.001	2.243	1.370	3.672
Number of available stimulation resources at home (possible range: 0-12)	-0.147	0.001	0.864	0.811	0.919
Number of stressful vital events lived by the main caregiver during last 12 months (possible range: 0-9)	0.163	0.005	1.177	1.051	1.319
Number of chronic diseases in infancy (possible range: 0 – 1 or more)	0.156	0.006	1.169	1.045	1.307
Constant	-1.206	0.001	0.300		

giver appear the current depressive symptoms, which have been suggested as modulating of their ability to perceive the needs of the child and also predisposes to irritability of mood and in parenting, which has been widely studied in different populations³⁹. This may be related to the findings of Kim et al. study, where an association between more punitive and controlling parental behaviors and emotional dysregulation was reported²¹.

In this model, no elements have been found that can be classified entirely in the category of interacting elements. A proxy variable that is related in this aspect is the stimulation elements of the child since these elements can act as interaction modulators. In this sense, the stimulation quality has demonstrated significant effects on neurobiological development, both in animal and human models⁴⁰.

From external factors in this model, appears the number of stressful life events. Stressful environments have been suggested as modulators of neuroendocrine responses that are also related to long-term general health outcomes in individuals who experience it⁴¹. Stressful events are related to the onset of depressive symptoms and link the factors mentioned earlier in this model.

Thus, a factors confluence of the child, the caregiver, the interaction and the environment can be considered, which determine the risk of presenting this poor capacity for self-regulation described in this symptomatic profile. However, we must remember that, in the development, these aspects also modify psychological and neurophysiological factors⁴¹, which maintain a cycle where the child with dysregulation causes responses from the environment (caregivers), since they become part of the dynamics, and can lead to a factor of self-perpetuation in time.

While these results are important in relation to reporting frequencies and associations, they also have extrapolation limitations, since they do not include children users of the private health system. On the other hand, the explanatory model includes proxy variables to elements difficult to quantify in the dyadic interaction. It is also important to note that the Chilean population is undergoing significant changes in relation to migration, which are not represented in this database⁴².

As a projection, it is proposed to identify the model based on the suggested theory, in addition to carrying out a symptomatic re-evaluation of this population in later years, in order to check the evolution reported in the literature of other countries and possibly to study factors susceptible of intervention for the improvement of the mental health standards of this population. It is worth mentioning that to date there are no published studies that test interventions to modify the evolution of this symptomatology profile, which is proposed to encourage research in this area.

In conclusion, the CBCL-Dysregulation Profile, proposed as a construct that combines indicators of

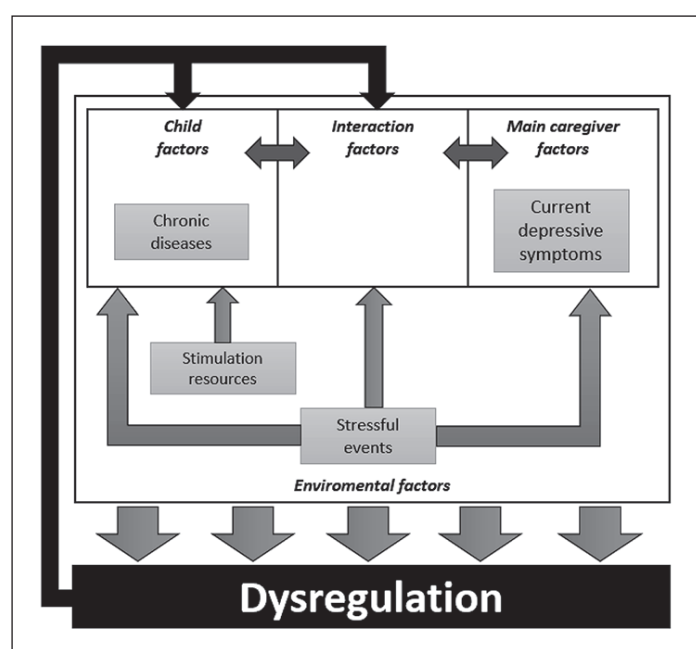


Figure 1. Theoretical model. From the found results and in relation to other studies, we propose a schematic representation of hypothetical relationships between study variables and presentation of the dysregulation profile in Chilean preschoolers.

psychopathology in cognitive, emotional and behavioral areas, has a high presentation frequency in this representative sample of Chilean preschoolers, users of the public health system. This implies an important mental health burden in the long term, given the international observations that show a high psychopathology incidence of varied nature. The need for interventions in this area to test their effectiveness, in addition to longitudinal monitoring of this subpopulation, may provide technical guidelines for the development of public policies in child and adolescent mental health.

Ethical Responsibilities

Human Beings and animals protection: Disclosure the authors state that the procedures were followed according to the Declaration of Helsinki and the World Medical Association regarding human experimentation developed for the medical community.

Data confidentiality: The authors state that they have followed the protocols of their Center and Local regulations on the publication of patient data.

Rights to privacy and informed consent: The authors have obtained the informed consent of the patients

and/or subjects referred to in the article. This document is in the possession of the correspondence author.

Financial Disclosure

This study was based on information available from the original study of data mining and analysis of child development data and their main social and economic determinants of children who participated in the support program to the bio-psycho-social development [“Levantamiento y análisis de información sobre desarrollo infantil y sus principales determinantes sociales y económicos de niños y niñas que participaron del Programa de Apoyo al Desarrollo Biopsicosocial del Programa Chile Crece Contigo”] of 2013, which was financed by the Social Development Ministry of Chile. There was no influence from this financing to this secondary study design, the data mining, analysis or interpretation of results, nor in the redaction, revision or approval of this manuscript.

Conflicts of Interest

Authors declare no conflict of interest regarding the present study.

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