



Taxonomy of foster children in foster homes

STRIJKER, J., ZANDBERG, T., & VAN DER MEULEN, B.F.

Abstract

There is a lack of a reliable, valid, and clinically useful classification system of behavior problems displayed by foster children in foster homes. The aim of this study was to develop and to initiate the validation of a classification system in order to categorize behavior problems of foster children. Child Behavior Checklists (CBCL, Achenbach, 1991) were gathered from 91 foster children in the Netherlands. A cluster analysis was performed on the eight CBCL narrow-band syndromes. Four groups were found: normal, aggressive-delinquent-social problems, attention-social problems, and withdrawn-social problems. These taxa corresponded well with Achenbach's general taxonomy. However, both taxonomies lacked predictive validity for foster care.

Key words: taxonomy, CBCL, foster care

Classification is the grouping of similar things under a certain name. The name of each group ought to be an optimal representation of the characteristics of that group by means of one single (often abstract) concept. In using such a group name all information stored concerning that group should come to life again, such as the qualities of the group and those differentiating it from other groups. Hence typologies (conceptually generated systems of classification) and taxonomies (statistically and empirically generated classification systems) are important means of organizing our knowledge both in everyday life and in science. In youth welfare classification systems are also used, for instance the conceptual typology of parental rearing patterns (Maccoby & Martin, 1983). When dealing with problematic child behavior in welfare work, traditional psychopathological diagnostic methods, such as the DSM-IV (APA, 1994) have to be relied on most of the time. Disadvantages of this system are: the dichotomized way of scoring (the problem either does or does not fit in with the category), the use of the same cutting scores for every age group and each sex group, and the assumption that the discrimination of the conceptually classified traits between the various criterial groups is a significant one. These are among the reasons why Achenbach (1991) constructed the Child Behavior Checklist for children between the age of 4 and 18 (CBCL/4-18), using empirical and statistical methods to measure the severity of the child's psychopathology by summing up scores on problem items. An agency social worker, however, will often find a categorial system easier to understand than a set of sum scores. For this reason Achenbach and Edelbrock (1978) and Edelbrock and Achenbach (1980) examined the possibility of classifying children with emotional and behavior problems by using a number of differentiated types. By 'types' Achenbach means prototypes: (abstract) ideal types made up from a set of correlated features, rather than mutually exclusive categories (Achenbach, 1993; Achenbach & McConaughy, 1997). In this vision classification is the outcome of imperfect matching of the features of a case and the prototypes

making up the taxonomy. In order to generate prototypes Achenbach carried out a (centroid) cluster analysis on the syndrome scores of the CBCL/4-18 of children that had been referred to mental health care according to age (4-11 and 12-18) and sex (boys/girls). This analysis produced a taxonomy consisting of seven prototypes. This taxonomy enables children with emotional and behavior problems to be identified so that, for instance, (by prototype) the etiology of disorders and the outcomes in response of different intervention options could be studied. In foster care little attention has so far been paid to the development of classification systems. In 'Foster Children in a Changing World' (Thelen, 1995), which professes to give a survey of international developments in foster care, classification is nowhere mentioned. Foster care supervisors are confronted with a diversity of problems on a daily basis. Their idiosyncratic understanding contributes to a more or less intuitive discrimination of problem types (in children). Failing a coherent framework, each new foster care supervisor must develop a heuristic system on the basis of his or her own experience. The supervisor can't gather knowledge systematically, neither about the problems caused by certain types in foster homes, nor about what treatment programs are required. A typology, or rather a taxonomy is a prerequisite for diagnostic examination and treatment. The absence of a classification system implies that daily communication takes place in the form of descriptive stories. It is the lack of problem types in foster care, therefore, which has led us to this investigation, the central question being whether it is possible to construct a taxonomy of foster children. If this should be the case, the knowledge of conduct problems in foster children could be better organized, which would be a blessing for communication between the parties concerned. Apart from answering the central question we should also like to verify to what extent Achenbach's taxonomy (1993) is still practicable. This system of classification has two a priori disadvantages. Firstly: it is not yet known whether the same prototypes are to be found in Dutch children and adolescents; secondly: in constructing the classification system data were mainly used pertaining to children that had been referred to (American) clinics for child psychiatry and child psychology. In the Netherlands, however, the majority of foster children are only rarely referred to foster care organizations through Youth Mental Health Services. We therefore wonder if and to what degree Achenbach's taxonomy covers all problems manifested by foster children. Apart from the central question we should also like to answer the following question: if it should turn out to be possible to develop a classification system for foster children, in how far would it resemble Achenbach's taxonomy?

Method

Research participants

The research group consisted of 91 foster children who were placed in a foster home over the period from 1-8-1996 to 1-12-1999 in the province of Zuid-Holland. Participation in the investigation depended on two criteria: 1) the expected period of residence in the foster home had to be no less than six months, and 2) if there were more biologically related foster children in the same family, one child only was selected at random. No further restrictions were laid down as to the child's age, the type of foster home (foster parents or kinship foster parents), the terms of placement (voluntary, family supervision or guardianship) and the intensity of foster care (regular foster care or therapeutic foster care). The average age of the foster children was 10.9 years ($SD = 4.0$). The percentage of boys was 41. The distribution of the foster children over the various categories of foster homes was: foster home 46% (the foster child and the members of the foster family do not know each other), and 54% kinship foster parents (the foster family belongs to the child's social network). The terms of placement were

divided as follows: voluntary 23%, family supervision 65% and guardianship 12%. The percentage of therapeutic foster homes was 12.

Measures

The Child Behaviour Checklist for children aged 4-18 (CBCL/4-18)

The CBCL/4-18 was constructed by Achenbach (1991) and translated into Dutch by Verhulst, Van der Ende & Koot (1996). Our investigation exclusively focused on the 118 specific emotional and behavior problems on this checklist. Each of the problems is preceded by 0, 1 and 2; by circling any one of these numbers the respondent indicates the severity of the child's problem. The emotional and behavior problems have been merged statistically into eight so-called 'narrow-band syndromes', namely 'withdrawn', 'somatic complaints' (without any medical ground), 'anxious/depressed', 'social problems', 'thought problems', 'attention problems', 'delinquent behavior' and 'aggressive behavior'. The foster children's scores on the eight narrow-band syndromes constitute the input of the cluster analysis. The raw sum scores for the eight small band syndromes have been standardized as to sex and age group and transformed into normalized standard scores (T-scores). T-scores > 70 are within the so-called clinical range, the range $67 \leq T \leq 70$ being termed the 'borderline range'. Second-order factor analyses carried out on the sum scores of the eight small band syndromes produced two so-called 'broad band syndromes', namely 'Internalizing' and 'Externalizing'. Finally the scores on almost all items can be summed to a Total Problem Score. The cut-off scores for the two broad band syndromes and the Total Problem Score are $T > 63$ for the clinical range and $63 \leq T \leq 60$ for the borderline range, respectively. The foster mothers of the regular foster homes answered the questionnaire three months after the foster child had been placed in their family and the foster mothers of the kinship placements did so the moment an agency social worker had been assigned to the foster family.

Data analysis

In order to calculate the sum scores and the T-scores of the narrow and broad band syndromes we used the cross-informant computer program for the CBCL/4-18, YSR and TRF (Arnold & Jacobowitz, 1993), which was adapted to Dutch standards by Verhulst, Van der Ende and Koot (1996). The computer program also calculated every child's ICCs (Intra-Class Correlation Coefficients) between its response pattern to the eight syndromes and the mean response pattern of each prototype in Achenbach's taxonomy (1993). ICCs > 0.445 were considered statistically significant by Achenbach (1993) (nominal alpha 0.05, one-tailed). ICCs were not calculated if the raw Total Problem Score is less than 30.

The section of results can be divided into three parts. In the first part a descriptive analysis is given of the severity of the foster children's problems with the aid of the scores on the narrow-band and broad-band syndromes and the Total Problem Score. A distribution in terms of percentage over Achenbach's prototypes is also given. In the second part of this section the outcome of the cluster analysis follows. By the term 'cluster analysis' a variety of multivariate procedures is meant which are mainly concerned with grouping objects into classes in such a way that variance within the classes is reduced to a minimum, whereas variance between the classes is brought to a maximum. Aldenderfer and Blashfield (1984) and Milligan and Cooper (1987) distinguished several cluster algorithms, and within an algorithm there is a choice again between several methods and similarity measures. We have selected Ward's method of the hierarchic agglomerative algorithm, since it yielded good results in most conditions (Edelbrock & McLaughlin, 1980). In order to make up for disadvantages attached to the use of the hierarchic agglomerative algorithm, such as its susceptibility to extreme scores and the presence of irrelevant variables, we also carried out the K-Means algorithm on the same data set. In order

to verify whether the structure found by means of a sequential execution of cluster procedures had any significance, this structure was validated in the third part of the section of results. It was then verified to what degree the groups that had emerged from the investigation coincided with the prototypes from Achenbach's taxonomy, calculated with the aid of the cross-informant program. To make a distinction between the two taxonomies, we used the term 'prototype' when referring to Achenbach's taxonomy and 'group' or 'taxon' (plural: 'taxa') in the case of the foster care taxonomy (Blackwelder, 1967).

Results

Descriptive analysis

Table 1 gives the descriptive data of the eight narrow-band syndromes, the two broad band syndromes and the Total Problem Score.

Table 1
Descriptive data of the foster children

Variable	M (SD)	Effect (r ²)	% cl. r ¹	Odds	M _{cl. gr.} ² (SD)	Effect (r ²)
Withdrawn	59,8 (9,7)	51%	8,8	4,7	45,8 (9,4)	17%
Somatic Complaints	55,9 (7,5)	38%	3,3	1,7	46,9 (7,3)	16%
Anxious/Depressed	59,7 (9,8)	50%	14,3	8,2	46,0 (8,8)	17%
Social Problems	63,5 (9,8)	66%	16,5	10,5	48,8 (8,7)	2%
Thought Problems	57,0 (9,0)	38%	12,2	6,7	47,6 (8,5)	7%
Attention Problems	63,1 (8,7)	74%	17,6	11,3	47,5 (7,9)	9%
Delinquent Behavior	60,6 (8,5)	62%	13,2	7,5	49,2 (8,4)	1%
Aggressive Behavior	60,4 (9,3)	56%	17,6	10,5	46,9 (8,0)	13%
Internalizing	58,7 (10,9)	39%	37,4	5,1	—	—
Externalizing	60,5 ³ (10,0)	53%	44,0	6,5	—	—
Total Problems	61,4 ³ (10,1)	56%	51,6	8,1	—	—

Note. ¹ Percentage of foster children in the clinical range; ² Mean Clinical T-score; ³ Scores within the borderline range.

The second column contains the mean values of the variables. The numbers between brackets are the standard deviations. In the standard population (of non clinical children) the T-score of 50 is attributed for standardization to the 50th percentile. In the third column the percentage of variance is given as the difference in size of group means between the standard deviation (T-score = 50) and the group of foster children. According to Cohen's criteria (1988) the difference for each variable between the standard population and the group of foster children is large (r² = 0.25 or 25%). The fourth column gives the percentage of children in the clinical range. The global problems (Internalizing, Externalizing and Total Problems) in terms of percentage are at least twice as high as the specific problems on the eight narrow band syndromes. The odds ratio in the fifth column stands for the ratio between the chance of a foster

child scoring on a variable in the clinical range versus the chance that a non clinical child will score in the clinical range, given the chance of not scoring in the clinical range on this variable. For example: an odds ratio of 7.5 for delinquent behavior means that the chance for foster children to fall in the clinical range for delinquent behavior is 7.5 times as large as for non clinical children (given the chance not to fall in the clinical range). The one but last column contains the standardized scores that emerged from the population of children who had been referred to Mental Health Services ($M = 50$, $SD = 10$). We can see that for every variable the group mean of foster children lies below the clinical standard mean of 50. The differences between the two groups, expressed in effect size (last column) are small according to Cohen's (1988) criteria for 'social problems' and for 'delinquent behavior' and moderate for the remaining syndromes. With the aid of the cross-informant program the ICCs have been calculated between the response pattern of the eight syndrome scales for each child and the response pattern of each prototype; following Achenbach (1993), ICCs > 0.445 have been considered statistically significant. For 41% of the foster children no ICCs could be calculated, their Total Problem Score being lower than 30. Of the remaining 54 children 44% were classified (the remaining 56% could not be attributed to any specific prototype). Four of the children fell in various prototypical categories and for this reason we have settled on the highest ICC. The distribution of the prototypes over the 24 foster children can be found in Table 2 (Achenbach named his prototypes after the highest peaks in the selected syndrome profiles).

Table 2
Distribution of prototypes

	% of the foster child classification	% of the total group of foster children
Withdrawn	4	2 (7)
Somatic	12	6 (8)
Social	12	6 (7)
Delinquent-Aggressive	46	20 (10)
Withdrawn-Anxious/Depressive-Aggressive	4	2 (4)
Social Problems-Attention Problems	18	7 (8)
Delinquent	4	2 (7)
Total	100	44 (51)

The prototypical category 'delinquent-aggressive' is the largest one in terms of percentage. If we presume that the group of foster children with a raw Total Problem Score > 30 make up a 'clinical population' ($N = 54$), we could compare this population with Achenbach's clinical population. This comparison can be found in the last column of table 2, the numbers between brackets representing the distribution in Achenbach's clinical population. The delinquent-aggressive type is twice as frequent in the group of foster children examined by us as it is in Achenbach's clinical group (20% versus 10%).

Cluster analysis

We carried out the cluster analysis on the raw scores of the eight narrow-band syndromes, because these show a greater deviation than the T-scores (Verhulst, Van der Ende & Koot, 1996). No statistically significant correlation was found between scores on the eight syn-

dromes and the age of the foster children. Although for both sex groups five out of eight mean values on the syndrome scales were statistically significant, the effects appeared too small ($< 1\%$) to justify separate analyses. After standardization of the raw scores according to unit of standard deviation the cluster analysis was carried out with Ward's method. With the aid of the dendrogram (a graphically hierarchic structure of the successive fusion steps of the cluster process) we determined the number of clusters, also taking into account the group size for each cluster. A choice of four clusters seemed the most appropriate solution. Next the mean values per cluster on the eight small band syndromes were set as the initial seed points in the K-Means procedure. The final outcome of the mean values on the eight syndrome scales were converted to T-scores per group. These have been plotted in Figure 1.

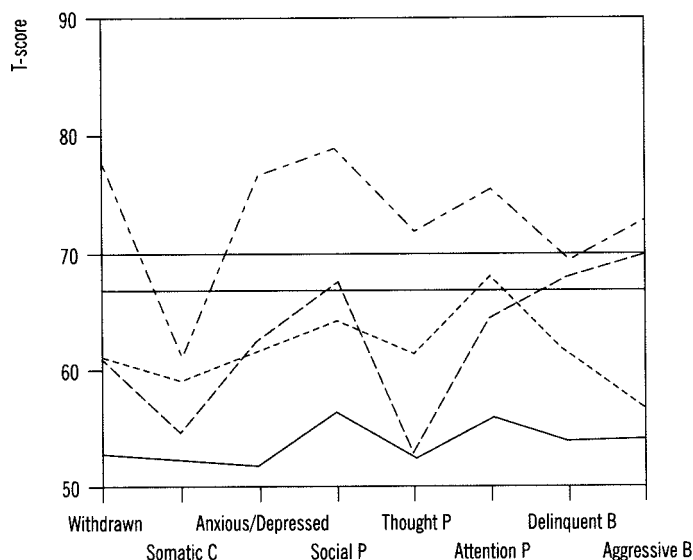


Figure 1

Plot of the group means on the cluster variate (N = 91)

The percentage of foster children in each group were: group 1 (the uninterrupted line) 39, group 2 (the dashed line) 24, group 3 (the dotted line) 26 and group 4 (the dot-dashed line) 11 resp. In figure 1 none of the mean values for group 1 was in the borderline or clinical range ($T < 67$). Of group 2 the mean values for the variables 'social problems', 'delinquent behavior' and 'aggressive behavior' were situated in the borderline range ($67 \leq T \leq 70$), and of group 3 only the mean value of 'attention problems' lies in this range. Group 4, finally, only had a mean value in the normal range for 'somatic complaints' and highest scores on 'social problems'. Naming the groups after their highest peaks, resulted in following labels: group 2 'aggressive-delinquent-social problems', group 3 'attention-social problems', and group 4 'withdrawn-social problems'. Group 1 did not have a peak, so we labeled this group as 'normal'. In groups 2 and 4 the co-morbidity of the problems was striking: children obtaining deviant scores in one area also obtained deviant scores in other areas.

Validation of the taxonomy

In order to examine whether the division into four groups was not merely a statistical artifact but also genuinely meaningful, we validated the cluster solution. For external validation we disposed of the variable 'COMHPG', which measures the severity of the foster child's psychosocial background problems prior to its placement in the foster home. The COMHPG has been established by means of the COM-procedure (Bogaart, Mesman-Schultz, Naayer & Zandberg, 1989), a standardized and validated checklist, to be completed by the child placement worker. As for the values of the COMHPG: the larger the number, the more unfavorable the child's psycho-social background, 0 being the mean value of children admitted to Dutch treatment centers. In the univariate ANOVA the difference in mean group values on the COMHPG was statistically significant ($M_1 = -0.98$, $M_2 = -0.28$, $M_3 = -0.76$, $M_4 = -0.06$, $F = 3.36$, $p < 0.05$). The classification into groups by means of cluster analysis was validated by this result. In addition, we carried out an analysis of correspondence (ANACOR, an explorative analysis for categorial variables) to get an indication of the correspondence between the four groups and Achenbach's prototypes (see Table 2). We selected those prototypes for analysis which had a prevalence of at least 10%. The prototypes selected were 'delinquent-aggressive behavior', 'social problems', 'social problems-attention problems' and 'somatic problems'. In Figure 2 the results of the ANACOR are presented.

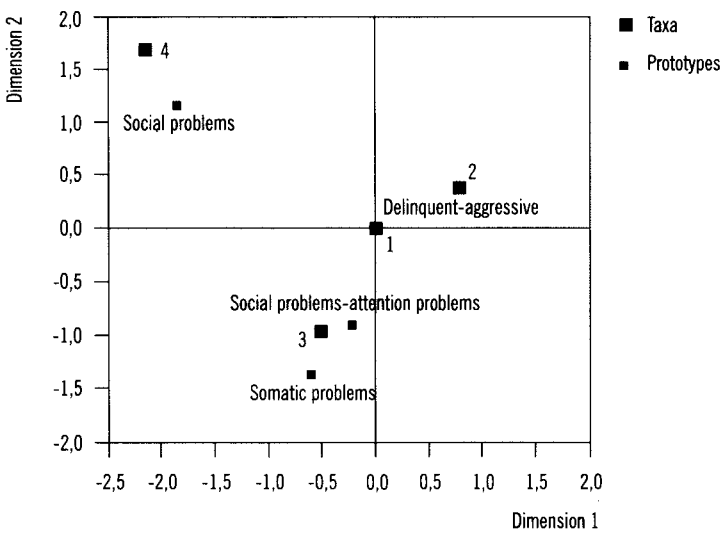


Figure 2
Combined scatter plot of Achenbach's prototypes and the taxa (N = 17)

Figure 2 shows that the smaller is the distance between the groups and the prototypes, the stronger is the correspondence. Group 2 ('aggressive-delinquent-social problems') coincided with the delinquent-aggressive prototype. Group 3 ('attention-social problems') was strongly linked with the prototypes 'attention problems' and 'somatic problems', whereas Group 4 ('withdrawn-social problems') was strongly linked with the 'social problems' prototype. Group

I had no specific associations with any of the prototypes. We could conclude that due to this correspondence the classification resulting from the cluster analysis was internally valid. In addition, we also examined the predictive validity of the taxonomy. To what extent do the groups predict the status of the placement after 18 months of foster care? This status was dichotomized in the categories 'current placement' (N = 59) and 'disrupted placement' (N = 32). No statistically significant correspondence with the status of the placement was found in either the four (selected) prototypes or the four taxa. The taxon 'aggressive-delinquent-social problems', however, appeared to be associated with the category 'disrupted' (Table 3).

Table 3
Distribution of the groups over status of placement

	'Normal' (N = 35)	'A-D-S' (N = 22)	'A-S' (N = 24)	'T-S' (N = 10)
Disrupted	25,7%	54,5%	29,2%	40,0%
Current	74,3%	45,5%	70,8%	60,0%
Totaal	100%	100%	100%	100%

Note. 'A-D-S': 'aggressive-delinquent-social problems'; 'A-S': 'attention problems-social problems'; 'T-S': 'withdrawn-social problems'.

Little is known about the cause of the many disrupted placements in the 'aggressive-delinquent-social problems' and the 'withdrawn-social problems' taxa. Epidemiologic investigation has shown that the aggressive and the delinquent syndrome are closely connected and research into heredity indicates that the aggressive syndrome is largely determined genetically (Achenbach & McConaughy, 1997). The prolonged manifestation of this combination of problems in foster children may explain the relatively large percentage of disrupted placements, particularly if it is not diagnosed in time. Placement in a family that knows how to handle these problems together with an intensification of supervision may help to reduce the percentage of disrupted placements. The taxon 'withdrawn-social problems' is characterized by serious overall behavioral and emotional problems. Apart from a specific foster home with intensive supervision the children grouped in this taxon need additional treatment.

Discussion

Using cluster analytic techniques, a taxonomy of foster children was developed. Both the internal and the external validity appeared to be promising. In order to determine the internal validity we classified the children according to Achenbach's prototypes. There appeared to be a relationship between the two taxonomies. This meant that Achenbach's taxonomy is not only valid for clinical populations of children who have been referred to mental health services. It can be used as well to classify children who, through Family Supervision Agencies, have ended up in youth care. It should be noted, however, that Achenbach's taxonomy identified only 19% of the foster children (N = 91), whereas our taxonomy covered all foster children.

The predictive validity of the taxonomies remained somewhat problematic: both taxonomies failed to make an adequate prognosis as to the status of foster placements. Presumably, foster children with an aggressive-delinquent profile were most likely to face a disrupted placement. Summarizing we may conclude that our classification system of foster children strongly overlapped Achenbach's taxonomy.

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Author note

Dr. **J. Strijker** is assistant professor at the Department of Orthopedagogics of the University of Groningen. Prof. dr. **T. Zandberg** is professor at the Department of Orthopedagogics of the University of Groningen. Dr. **B.F. van der Meulen** is associate professor at the Department of Orthopedagogics of the University of Groningen.

Corresponding author: prof. dr. T. Zandberg, Rijksuniversiteit Groningen, Department of Orthopedagogics, Grote Rozenstraat 38, 9712 TJ Groningen, the Netherlands. T.Zandberg@ppsw.rug.nl

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