

# Behavioral Assessment of Inattention and Hyperactivity in Taiwanese Preschoolers: Comparison among Multiple Informants

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## Abstract

- Objective:** To examine the correspondence among assessments by different informants as well as to evaluate the reliability and validity of two rating scales for disruptive behaviors (inattention and hyperactivity) as used in a screening process for preschoolers with attention problems and hyperactive behaviors.
- Method:** Four instruments were used: the Child Attention Profile (CAP), the Home Situations Questionnaire (HSQ), the School Situations Questionnaire (SSQ), and the Child Behavior Checklist-Direct Observation Form (DOF). Subjects were 1,091 preschoolers recruited from 17 kindergartens in southern Taiwan. Their Parents completed both the HSQ and CAP. Their teachers were asked to nominate the three most disruptive children in their classes and completed the SSQ and CAP for the nominated children. Fifty-eight high-risk children and 116 matched peers were observed by trained observers using the DOF.
- Results:** The results showed adequate internal consistency for the four instruments. There is satisfactory consistency between various behavior ratings within but not across informants. The findings support adequate validity for the HSQ and CAP in discriminating high-risk and control children.
- Conclusion:** Given situational variations, it is important to assess children's behaviors across situations and informants. Limitations of this study and directions for future research are discussed.
- Key words:** Child Assessment; Inattention; Hyperactivity; Multiple Informants; Preschooler

## Introduction

Attention-deficit/hyperactivity disorder (ADHD) entails the display of developmentally inappropriate levels of inattention, hyperactivity, and impulsivity causing functional impairment across two or more settings (Ame-

rican Psychiatry Association [APA], 1994). Children with ADHD are at risk for developmental delays in self-regulation, poor academic performance and social skills, behavior problems, and conflict in parent-child and teacher-child interactions (Barkley, 1997, 1998; Danforth, Barkley, & Stokes, 1991; Fergusson & Horwood, 1995;

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Hinshaw, 1992; Mariani & Barkley, 1997; Taylor, 1994). School-age ADHD children have been found to have high comorbidity with conduct disorder and learning disabilities (Leober, 1990; Pelham & Murphy, 1986) and are at greater risk for antisocial behavior in adolescence (Tremblay, Pihl, Vitaro, & Dobkin, 1994). Those who display hyperactivity and impulsivity early in life are at a significantly greater risk for numerous psychological and social problems requiring long-term treatment (Weiss & Hechtman, 1993).

Using the Chinese versions of Conner's Rating Scale (CTRS), one study has screened 4,290 children randomly selected from primary schools in southern Taiwan (Wang, Chong, Chou, & OYang, 1993). It reported an estimated 9.9% prevalence rate of ADHD in Taiwan, which is significantly higher than the 3-5% prevalence rate of ADHD in U.S. (APA, 1994; Cantwell, 1996). More researches on ADHD have been conducted in Taiwan during the past two decades (Chou, Wang, & Chen, 1993). It has been found that school-age ADHD children tended to have lower IQ and academic abilities as well as perform poorer on motor functions and higher-level cognitive functions than normal children (Huang, Wang, Guo, & Tsai, 1994). Compared to normal peers, they showed greater amounts of manipulative behaviors and impulsivity (Wang, Huang, & Wang, 1995) as well as relatively poor attentive process in on-task behaviors (Huang, Lin, Weng, & Wang, 2000). Unfortunately, there is a lack of long-term prospective studies to examine the risk and protective factors for these children (Tsai & Gau, 1999). In addition, all the aforementioned studies focused on school-age children only; relatively fewer studies concern young ADHD children in Taiwan. This is understandable for the vast majority of ADHD referrals in Taiwan are of school-age children. It is a common phenomenon that children with ADHD are first brought to child mental health clinics by their parents under the urging of their teachers who have suffered from their misbehaviors. On the contrary, preschoolers with ADHD in Taiwan are usually under-identified. Some of them might be brought to child mental health clinics because of severely disruptive behaviors, but many are ignored by their parents or teachers because it is believed things will get better as these preschoolers mature.

It has been suggested that it is important to screen

and identify ADHD children during their preschool years. First, DSM-IV's diagnostic criteria of ADHD require the onset of this disorder occurs before age seven. Second, reports from parents and clinicians support the existence of a relation between early behavioral difficulty and later hyperactivity and adjustment problems (Campbell, Breaux, Ewing, & Szumowski, 1986; Campbell, March, Pierce, & Ewing, 1991; McGee, Partridge, Williams, & Silva, 1991). Third, it has been reported that the prevalence rate of ADHD among preschoolers is comparable to their school-age counterparts. In one study, Pineda et al. (1999) found among 181 four- to five-year olds 2.8% had ADHD of combined type, 1.7% inattentive type, and 13.8% hyperactive-impulsive type. Finally, early identification of ADHD during preschool years could help to implement early intervention programs for these children at risk, thus, could possibly decrease delinquent and aggressive behaviors for an extended period, perhaps even through middle school (Tremblay, Pagani-Kurts, Masse, & Vitaro, 1995; Kellam, Rebok, Ialongo, & Mayer, 1994).

Accurate identification of ADHD depends on reliable and valid instruments to assess ADHD symptoms and associated problems. Behavior rating scales and questionnaires completed by parents and teachers are the most widely used techniques in assessing childhood psychopathology. For example, parents and teachers are often asked to indicate the frequency and/or severity of various problem behaviors based on their observations at home or at school. Delineation of situations where problem behaviors occur helps to assess pervasiveness and plan treatment (DuPaul & Barkley, 1992). Among various instruments, the Child Behavior Checklist (CBCL), a standardized and empirically based assessment tool used to evaluate children's behavioral and emotional problems, is one of the most widely used (Achenbach, 1986). Items derived from the Inattention and Overactivity dimensions of the CBCL-Teacher Report Form have been used to construct the Child Attention Profiles (CAP), which is used to assess ADHD symptoms (Barkley, 1988). In ADHD literature, there were two instruments specifically designed to evaluate the amount of the specific home and school situations where children and adolescents exhibited problem behaviors and to assess the severity of these problem behaviors (Barkley & Edelbrock, 1987). One is the Home Situations

Questionnaire (HSQ; Barkley, 1987) for parents; the other is the School Situations Questionnaire (SSQ; Barkley, 1987) for teachers. Besides using parents and teachers as informants, trained observers are sometimes included in studies as another source of information. Trained observers can often provide different views on children's behavior as they tend to be more objective as observers than teachers and parents. The Direct Observation Form (DOF; Achenbach, 1986), a derivation from the CBCL, is designed to be used by trained observers when evaluating problem behaviors of children.

Studies that included multiple informants have found that the highest correlations between global measures were for those derived from the same informant (Achenbach, McConaughy, & Howell, 1987; Verhulst & Van der Ende, 1991), while the patterns of associated features in a given disorder vary markedly between parent-identified and teacher-identified features (Achenbach et al., 1987; Offord, Boyle, Racine, & Szatmati, 1996). Indeed, modest agreement between different informants' ratings of a given child's functioning has often been documented in the literature and raised con-

cerns in both research and clinical practice (Achenbach et al., 1987; Lee, Elliot, & Barbour, 1994; Offord et al., 1996; Youngstrom, Loeber, & Stouthamer-Loeber, 2000). Therefore, it is important for clinicians to take this "informant phenomenon" into consideration when assessing a childhood disorder such as ADHD.

This study tries to collect data about ADHD children from multiple informants by employing various rating scales and/or questionnaires designed for parents, teachers, and trained observers. The purpose of this study is to examine the concordance among assessments by different informants as well as to evaluate the reliability and validity of two rating scales for disruptive behaviors (inattention and hyperactivity) as used in a screening process for preschoolers with attention problems and hyperactive behaviors. It is hypothesized that correspondence in assessment is high within informants but low across informants.

## Method

### Subjects

A random sampling procedure was undertaken to select subjects from both public kindergartens and

Table 1  
Demographic characteristics of final sample ( $N = 1,091$ )

	<i>M (SD)</i>	<i>Range</i>	<i>n</i>	<i>%</i>
<b>Age (in year)</b>				
Children	5.7 (1.23)	2-8		
Father	37.4 (4.43)	25-67		
Mother	34.5 (4.28)	23-67		
<b>Gender</b>				
Boy			583	53.4
Girl			508	46.6
<b>Informants</b>				
Father			216	19.8
Mother			844	77.4
Other family members			17	1.5
Missing			14	1.3
<b>Education of father (in year)</b>				
< 9			133	12.2
9-12			423	38.8
12-16			430	39.4
> 16			76	7.0
Missing			29	2.7
<b>Education of mother (in year)</b>				
< 9			152	13.9
9-12			571	52.3
12-16			317	29.1
> 16			26	2.4
Missing			25	2.3

private preschools. The size of the school, the age of the children, 1,244 preschool children were randomly selected from 17 kindergartens in a metropolitan area in southern Taiwan. Through a series of data collection procedure, the final sample included 1,091 valid data sets. Out of these 1,091 children, there were 583 boys (53.4%) and 508 girls (46.6%). Their mean age was 5.7 years ( $\pm 1.23$ ), with a range from 2 to 8 years. The mean age of their fathers was 37.4 years ( $\pm 4.43$ ) and of their mothers was 34.5 years ( $\pm 4.28$ ). Most fathers have high school (38.8%) or college education (39.4%), while most mothers have high school education (52.3%). Data were mostly collected from mothers (77.4%). The demographic characteristics of the final sample ( $N = 1,091$ ) are shown in Table 1.

#### *Instruments*

##### ***Child Attention Profile (CAP)***

Originally developed to assess stimulant drug effects, the CAP (Barkley, 1988) consists of 12 items measuring two dimensions: inattention (7 items) and hyperactivity (5 items). Parents or teachers are asked to rate each item on a 3-point Likert scale: not true (0), sometimes true (1), or often true (2). Three scores can be computed from CAP: inattention, hyperactivity, and total score. The development of the Chinese version of CAP is described in another study (Chao, Huang, & Tu, 2004a). The Chinese version of CAP has adequate internal consistency (Cronbach  $\alpha = .84$ ) and 20-day test-retest reliability ( $r = .54$  for total score,  $r = .50$  for inattention, and  $r = .63$  for overactivity) (Chao, Huang, & Tu, 2004a).

Since both parents and teachers have been asked to complete the CAP in this study, the CAP protocol by parents is referred to as CAP-P and by teachers as CAP-T henceforth.

##### ***Home Situations Questionnaire (HSQ)***

The HSQ (Barkley, 1987) was specifically designed to evaluate where children may exhibit problem behaviors at home and to assess the severity of problem behaviors (Barkley & Edelbrock, 1987). It is comprised of 16 items that identify specific situations common in the home environment (e.g., getting dressed and playing alone). Parents are first asked to indicate whether his or her child exhibited disruptive behaviors in each of the 16 situations around home or other settings (yes/no). For those situations where a problem exists, parents then rate

the severity of the problem on a 9-point scale ranging from mild (1) to severe (9). Three scores can be derived from this measure, i.e., total score, number of problem situations (total number of "yes"), and mean severity (total score divided by number of problem situations). The development of the Chinese version of HSQ is described in another study (Chao, Huang, & Tu, 2004b). Satisfactory internal consistency and test-retest reliabilities have been documented for the HSQ (Altepeter & Breen, 1989) and the Chinese version of the HSQ (Cronbach  $\alpha = .89$ ;  $r = .70$  for total score,  $r = .47$  for number of problem situations, and  $r = .57$  for mean severity) (Chao, Huang, & Tu, 2004b).

##### ***School Situations Questionnaire (SSQ)***

The SSQ (Barkley, 1987) was designed to evaluate where children may exhibit problem behaviors at school. It is comprised of 12 items that identify specific situations common in the school environment (e.g., doing seatwork and playing at the playground). Teachers are first asked to indicate whether the child displays behavior problems in each of the 12 situations around the classroom and in other school settings (yes/no). For those situations where a problem exists, teachers then rate the severity of the problem on a 9-point scale ranging from mild (1) to severe (9). Three scores can be derived from this measure, i.e., total score, number of problem situations (total number of "yes"), and mean severity (total score divided by number of problem situations). This scale has been found sensitive to the effects of stimulant medication interventions (Barkley, 1990).

##### ***Direct Observation Form (DOF)***

The DOF (Achenbach, 1986) was designed to be completed by an experienced non-participant observer. The observer makes a narrative description of child's behaviors in the classroom, during recess, or in other group settings over a 10-minute period. At the end of the 10-minute period, the observer rates the child on 96 items of problem behaviors. A 4-point scale (0-3) is used to rate the problem behaviors (e.g., 0 for not observed, 1 for slight or ambiguous occurrences, 2 for mild to moderate intensity and less than 3-minute duration, 3 for severe intensity or greater than 3-minute duration). Three scores can be computed from the DOF: total score, internalizing score, and externalizing score.

##### ***Procedure***

With the permission of the school committees,

researchers first contacted teachers by phone and, then, packets of questionnaires were distributed to parents through teachers. A brief description of the study, informed consent form, and a set of questionnaires were included in the packet. Out of 1,244 subjects in the initial sample, a total of 1,208 (97.1%) sets of questionnaires were returned. After excluding incomplete questionnaires, 1,091 (90.3%) valid protocols were further analyzed.

Teachers from the aforementioned kindergartens were asked to nominate the three most disruptive children in their classes and to complete the CAP-T and SSQ for each of the nominated children. Out of 1,091 children with complete data set, the top 5% ( $n = 58$ ) were screened out as at high risk for ADHD. That is, they had obtained relatively higher scores either on the CAP-P (total score) or the HSQ (mean severity). These 58 high-risk children were then observed in their classes by trained observers using the DOF. For each high-risk child, there were two matched controls selected from the same classes. The 116 control children were matched to their high-risk counterparts in

terms of age and gender. All the high-risk children and their controls were observed three times, each for 10-minute interval. The scores obtained from the high-risk child were then compared with the average scores obtained from the two control children as an index of the high-risk child's deviance from the behavior of peers in the same setting.

A total of eight observers were trained to conduct the observations. Before they were allowed to go into the field, they all achieved an inter-observer reliability of .90 on their ratings of a videotape of an ADHD child in class. They were blind to the previous rating results and the procedure for subject selection. Each observer completed the DOF for two or three children.

## Results

### Reliability

The internal consistency reliability was evaluated for the CAP-P, CAP-T, HSQ, and SSQ. Table 2 shows that the range of these internal consistency coefficients (Cronbach  $\alpha$ ) is .80 to .89.

Table 2

*Internal consistency coefficients of parent and teacher rating scales*

Scale	<i>n</i>	Items	
CAP-P	1091	12	.84
CAP-T	239	12	.80
HSQ	893	16	.89
SSQ	194	15	.89

### Correlations across and within informants/scales

The correlations across informants, i.e., the correlations between parent and teacher ratings on the same kind or different kinds of scale, were all nonsignificant, except for the overactivity score on the CAP (parent-teacher  $r = .24$ ,  $p < .01$ ). On the other hand, the correlations within informants, i.e., parent ratings across two kinds of scale and teacher ratings across two kinds of scale, were all significant ( $p < .01$ ) (Table 3).

### Comparisons between disruptive/high-risk vs. non-disruptive/control children

Teacher's nomination for disruptiveness in the school was used as an index to divide the subjects into

two groups: disruptive children vs. non-disruptive children. A comparison of parent ratings of these two groups was made. The results showed that parent ratings of disruptive children were significantly higher than those of non-disruptive children on all scores of both the CAP and HSQ ( $p < .01$ ) (Table 4).

In addition, behavior ratings by trained observers were also used to examine the differences between the high risk children, who were identified on the basis of their relatively higher scores on the CAP-P or HSQ, and their matched controls. The high-risk children all received significantly higher DOF scores from the trained observers than control children ( $p < .01$ ) (Table 5).

Table 3

Correlations between ratings on different kinds of scale by the same informants

CAP	Situation Questionnaire			
	<i>n</i>	Total score	Problem situations HSQ	Mean severity
CAP-P	824			
Total score		.60**	.55**	.50**
Inattention		.56**	.51**	.47**
Overactivity		.53**	.48**	.45**
CAP-T	187			
Total score		.58**	.66**	.48**
Inattention		.49**	.56**	.42**
Overactivity		.48**	.54**	.37**

\*\*  $p < .01$ 

Table 4

Comparison of parent ratings between disruptive vs. non-disruptive children as nominated by teachers

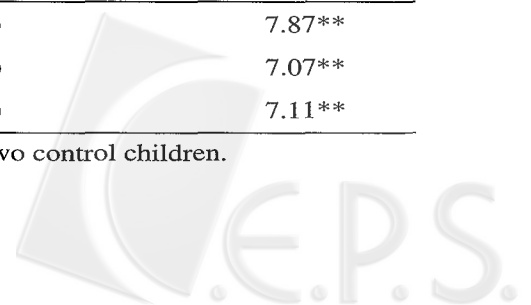
Scale	Disruptive		Non-disruptive		<i>t</i>
	<i>n</i>	<i>M (SD)</i>	<i>n</i>	<i>M (SD)</i>	
CAP-P	130		961		
Total score		8.44 (4.67)		6.29 (4.16)	5.76**
Inattention		4.35 (2.59)		3.38 (2.47)	4.18**
Overactivity		4.08 (2.43)		2.91 (2.15)	5.44**
HSQ	86		807		
Total score		24.95 (21.28)		14.42 (15.43)	4.82**
Problem situations		7.62 (4.40)		5.60 (4.22)	4.20**
Mean severity		2.88 (1.73)		2.07 (1.45)	5.77**

\*\* $p < .01$ 

Table 5

Comparison of observer ratings on the DOF between high-risk children and control children ( $n = 58$ )

	High-risk <i>M (SD)</i>	Control <sup>a</sup> <i>M (SD)</i>	<i>t</i>
Total mean score	13.47 (8.55)	7.26 (4.23)	7.87**
Internalizing score	3.34 (2.53)	1.62 (1.15)	7.07**
Externalizing score	4.48 (3.57)	2.05 (1.90)	7.11**

<sup>a</sup>The scores of control group is derived from the average scores of the two control children.\*\* $p < .01$ 

## Discussion

In this study, both groups of parents and teachers filled out similar sets of behavior rating scales. Parents completed the CAP-P and HSQ, while teachers filled out the CAP-T and SSQ. In addition, trained observers rated children in the school settings using the DOF. The results showed that children were viewed consistently within the same group of informants. That is, each group of informants rated the children in the same way on different measures. On the other hand, parent-teacher concordance on children's behavior is low and mostly non-significant except for the overactivity score on the CAP. It seems that the assessments from parents and teachers provide different information regarding the child evaluated. In general, the finding of this study is consistent with previous studies. The only exception with the overactivity scores on the CAP might be partly due to the observable and disruptive nature of overactive behaviors that might be commonly existing both at home and school.

On the other hand, the lack of correlations between the HSQ and SSQ scores might be a result of situational variations between the home and school settings. There is reason to believe that children's presentation of behavior problems varies across settings such as the home or school (Kazdin & Kagan, 1994; Kolko & Kazdin, 1993). Thus, it is important to assess ADHD children's behaviors across situations.

Due to limited availability in funding and psychiatric services, this study used the teacher's nomination for disruptiveness and behavior observations by trained raters, instead of formal diagnosis by child psychiatrists, as validity indices for the ADHD risk. It is found that disruptive children as nominated by their teachers, compared to their non-disruptive counterparts, received significantly higher scores on both the CAP and HSQ from their parents. This indicates a correspondence between teachers and parents in terms of their views of their children's behavior problems. Furthermore, compared to the control group, the high-risk children, who received higher ratings on the CAP or HSQ from their parents, also obtained significantly higher scores on the DOF from the trained observers. The findings support the discriminant validity of the CAP and HSQ in evaluating children's behavior problems.

This study provides some preliminary data on the parent-teacher concordance and psychometric property of the CAP and HSQ in evaluating attention problems and hyperactive behaviors of preschoolers. There is still much work to be done in this area in order to further our understanding of and improve our clinical practice with ADHD children. It is suggested that two lines of research are needed in the future. Fundamental developmental studies that incorporate behavioral observations and functional analysis of children's behaviors in the home and/or school settings could allow researchers to further understand the nature and range of behavioral differences in normal children. And prospective studies which follow up the high-risk children from preschool years to adolescents could reveal more information on the developmental course of inattention and hyperactivity as well as the usefulness of the assessment instruments.

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# 台灣學齡前兒童注意力問題與過動行爲 之行爲衡鑑：多元訊息提供者之比較

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## 摘要

**目的：**本研究主要在比較篩檢學齡前兒童的注意力與衝動過動問題時，由不同訊息提供者所得之評量結果，並探討兩種干擾行爲評量表的信效度。

**方法：**以台灣南部某大都會為研究地區，從17所幼稚園隨機取樣1,091名學齡前兒童為研究對象，請父母填寫『家庭情境問卷』與『兒童注意力量表』作為篩檢工具，並請教師對班級中行爲問題最為嚴重的3名兒童填寫『學校情境問卷』與『兒童注意力量表』。篩出在『兒童注意力量表』或『家庭情境問卷』上得分為全體之前5%的高危險群兒童58名，再進行『兒童行爲檢核表-直接觀察評量』，並與對照組116名兒童做比較。

**結果：**研究顯示來自相同訊息提供者的各評量值之間達顯著相關，而不同訊息提供者間之評量，除了在『兒童注意力量表』的過動分數上達顯著相關外，其餘均無相關。此外，在觀察者所評量的『兒童行爲檢核表-直接觀察評量』分數上，高危險群組均顯著高於控制組，顯示『兒童注意力量表』與『家庭情境問卷』有合宜的區辨效度。

**結論：**除針對本研究之限制與未來之研究方向加以討論外，並建議臨床工作者於評估兒童行爲時，應考慮學校與家庭的情境變異性，儘量自不同訊息提供者收集跨情境之資料。

**關鍵詞：**兒童衡鑑、注意力問題、過動行爲、多元訊息提供者、學齡前兒童

