Comparing the PPAT Drawings of Boys with AD/HD and Age-matched Controls Using the Formal Elements Art Therapy Scale

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Abstract

This descriptive, matched-pair pilot study explores whether children with AD/HD respond differently to a specific art directive compared to children without learning or behavioral disorders. Two groups of boys aged 6 to 11, one group diagnosed with AD/HD and the other with no known learning or behavior problems (n = 5X2), were asked to “Draw a Picture of a Person Picking an Apple from a Tree” (PPAT). Using the Formal Elements Art Therapy Scale (FEATS) containing 15 global art elements, five raters, blind to the hypotheses, evaluated their drawings. Statistical analysis (p = < 0.05) including Pearson coefficient to estimate inter-rater reliability, ANOVA, and logistic regression, indicated three FEATS elements in the PPAT that together would most accurately predict the artists into the AD/HD group: Color Prominence, Details of Objects and Environment, and Line Quality. Implications for these findings for art therapy research and practice are discussed.

Introduction

Attention Deficit Hyperactivity Disorder (AD/HD) is the most commonly diagnosed behavioral disorder among school age children (Jenson, 2001). Most studies find prevalence rates in the 4.2% to 6.3% range (Barkley, 1998). The disorder accounts for as many as 30% to 50% of child referrals to mental health services and results in significant impairment in family, peer, and academic functioning (Barkley, 1996). The American Psychiatric Association, in the Diagnostic and Statistical Manual of Mental Disorders (4th ed.), the DSM-IV, (American Psychological Association, 1994), reported that this disorder is much more common in males than females with male-to-female ratios ranging from 4:1 to 9:1 depending on the setting—general versus clinical populations. Prevalence rates differ across studies because of differences in sampling methods and the nature of populations studied (Barkley, 1998).

Description and Diagnosis

The DSM-IV (1994) describes the essential features of AD/HD as a persistent pattern of hyperactivity/impulsivity or inattention or both that is more frequent and severe than is expected in individuals at a comparable developmental level. For a diagnosis to be made, some hyperactive/impulsive or inattentive symptoms must be present before age 7, though many clients are diagnosed after symptoms have been present for many years. In addition, some impairment from symptoms must be present in at least two settings (e.g., school and home) and there must be clear evidence of interference with developmentally appropriate academic, social, or occupational functioning. Lastly, the disturbance must not occur exclusively during the course of psychotic disorders and cannot be better attributed to other mental disorders.

These are the children who have difficulty attending to details, listening, and organizing; they forget easily, are often distracted, fidget, can’t wait their turn, blurt out answers, and are always on the go. Associated features vary but may include temper outbursts, bossiness, stubbornness, frustration intolerance, moodiness, demoralization, rejection by peers, parent and teacher relationship problems, poor self-esteem, and excessive insistence that requests be met. The DSM-IV (1994) denotes three subtypes: Predominantly Inattentive, Predominantly Hyperactive, and the Combined Type. Many children have the Combined Type and this is the behavioral group studied in this research.

The National Institutes of Health (NIH) Consensus Conference, held in November 1998, developed an AD/HD Consensus Statement and reported it in the Journal of American Academy of Child and Adolescent Psychiatry in February 2000. The NIH AD/HD Consensus Statement acknowledges that a diagnostic test for AD/HD currently does not exist but that a diagnosis of AD/HD can be made reliably using well-tested diagnostic interview methods. A diagnostic approach usually includes parents’ complete report of the child’s developmental history; school personnel reports detailing the child’s school performance; mental status examination, often but not always including psychometric testing; physicians’ differential diagnosis and comorbidity evaluation; and the parents’ and teachers’ behavioral assessment of the child at school and at home. In spite of this comprehensive approach, partly because there is controversy regarding associated features of the disorder as well as the simultaneous presentation of comorbidities, diagnosis is frequently illusive and many times is mistakenly made (Hallowell & Rately, 1994; Levanthal, 1995; Murphy, 1995; Safran & Safran, 1995; Searight, Nahlik, & Campbell, 1995). Approximately two-thirds of children referred by schools for AD/HD have another co-occurring Axis I diagnosis such as Oppositional Defiant Disorder or Conduct Disorder (50%), mood disorders (15%), or anxiety disorder (25%). Clearly, at least one and often two comorbidities might exist in every AD/HD child (Levanthal, 1995).

Additional national public school expenditures on behalf of children with AD/HD exceeded $3 billion in 1995 (NIH Consensus Statement, 2000). But, there is confusion in many schools about who should be involved in AD/HD diagnosis and treatment, what data are collected, how the physician and school should interact, who should coordinate evaluations, and who

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should take the first action or plan the evaluation—the physician or the school. Such reports raise questions about the reliability of school behavioral assessments for screening children with AD/HD and about accurate monitoring and reporting of individual drug trials among AD/HD children in school settings. Other than psychoeducational and/or psychometric testing, very few examples of objective data provided by the children during diagnosis and drug trials exist. However, heavy emphasis on behavioral assessments by teachers, parents, and families contribute to the diagnostic process and drug treatment trials in spite of inconsistencies (Niebur & Smith, 1993).

**Etiology**

Research has suggested a central nervous system basis for AD/HD, but further research is needed to firmly establish AD/HD as a brain disorder (Hallowell & Ratey, 1995; Murphy, 1995; NIH Consensus Statement, 2000; Searight, Nahlik, & Campbell, 1995). Currently, two promising lines of investigation focus on local areas of central nervous system deficit and neurotransmitter mechanisms. The positive response that children with AD/HD have to stimulant medications suggests the role of neurotransmitters as at least part of the etiology (Barkley, 1985; Leung, Robson, Fagan, & Lim, 1994). There appears to be a familial component to AD/HD, but no research to date investigated the statistical likelihood that AD/HD adults will have AD/HD children. Much of the literature suggests that 20% to 30% of children with AD/HD have a parent or sibling with the disorder, and AD/HD identical twin studies reflect a 50% concordance rate pattern (Hallowell & Ratey, 1994). With no identifiable cause, there is no prevention.

**Treatment**

A wide variety of treatments have been employed for AD/HD including, but not limited to, dietary management, herbal and homeopathic treatments, biofeedback, meditation, perceptual stimulation, various psychotropic medications, and psychosocial approaches. Psychosocial intervention and stimulant medication strategies have been the major foci of treatment research (NIH Consensus Statement, 2000). The Multimodal Treatment Study of Children with AD/HD (MTA), a cooperative treatment study performed by six independent research teams in collaboration with the National Institute of Mental Health (NIMH), Office of Special Education Programs in the U.S. Department of Education, and the Division of Services and Intervention Research (MTA Cooperative Group, 1999), is the largest (579 children with AD/HD) and longest (14 months) research endeavor reported to date. The MTA Cooperative Group compared (a) intensive medication management, (b) intensive behavioral therapy, (c) the combination of (a) and (b), and (d) standard community care treatments for AD/HD. Outcome measures were core AD/HD symptoms (hyperactivity/impulsivity and inattentiveness) and functional domain symptoms: oppositional/aggressive, social skills, internalizing (anxiety and depression), parent-child relations, and academic achievement. Results indicated that for most AD/HD symptoms combined treatment and intensive medication management were substantially superior to behavioral or standard community therapy interventions. There were slight advantages for the combination of intensive behavioral and intensive medication management treatments for some of the more functional domain symptoms listed above.

To avoid the statistical limitations of multiple outcome measurement and to increase statistical power and precision for the above NIMH MTA study, a post hoc investigation of using a single composite measure of treatment outcome (a composite score of the average of parent and teacher measures) at 14 months post baseline was conducted (Connors, 2001). Using this investigative model, clear statistical evidence showed that the combination of intense medication management and behavioral treatment was better than all other treatments.

Overall, earlier, smaller, and shorter research protocols noted strong support for multidisciplinary approaches to treatment with heavy emphasis on pharmacological and behavioral therapies (Barkley, 1985; Pelham & Murphy, 1986). Pharmacologically, stimulants, antidepressants, and antihypertensives have been the staples to treat the symptoms of AD/HD by improving concentration and attention and decreasing impulsivity. Stimulants, such as Ritalin, Dexedrine, and Cyclert, are the most commonly prescribed (Barkley, 1998). Nevertheless, not all children can be given drugs nor do all improve (Bass, 1996; Searight, Nahlik, & Campbell, 1995). Evaluation of treatment seemed largely based upon parent and teacher reports of behavior with little objective data provided by the children.

**Art Therapy Approaches**

Several studies were especially helpful in designing this pilot. Pfeiffer (1994) noted improvement in the social competency of AD/HD elementary age students resulting from individual or dyad-format structured and unstructured activities that incorporated art therapy, verbal associations, and role playing. Rosal (1993) found that both cognitive-behavioral art therapy and art as therapy can be vehicles to help behavior disordered children change perceptions of control and power and, therefore, regulate their behavior. De Chiara (1990) demonstrated that a three-phase art program (body schema, body image, and spatial awareness) helped one AD/HD learning-disabled child make behavior adjustments and improve his body image concept. The most comprehensive art therapy approach identified for children with AD/HD was a multimodal educational, psychological, behavioral, and parental approach with emphasis on the chronic nature of AD/HD (Safran, Safran, & Finkelstein, 1994; Safran & Safran, 1995). This method, experienced in individual and group art therapy for AD/HD clients and family members, was producing successes.

Very few studies explored the use of creative art processes with children to confirm an AD/HD diagnosis or to estimate the success of their treatments. Wadeson and Epstein (1976) studied the effects of the stimulant drug Dexedrine on one child’s behaviors and art productions. They sought to understand how the intrapsychic experience is influenced by varying Dexedrine dosages and reported differences in the child’s expressiveness and relatedness. Epperson and Valum (1992) studied the effects of varying doses of psychostimulant medication on the expressive qualities of the artwork obtained in group sessions from eight children with AD/HD, aged 6 to 12 years old, using an Expressive Qualities Rating Form designed by Epperson. They discovered that stimulant medications had a significant influence on the expressive qualities in the art products obtained from children with AD/HD and that these changes in expressive qualities corresponded to observed behavioral changes. Smitheman-Brown and Church (1996) investigated behavioral changes and creative growth precipitated by art therapy employing a mandala as active centering device in the care of chil-
The Study

The literature and this author’s experience provided no evidence of the consideration of children’s creative skills within the diagnostic screening process for AD/HD or in the assessment of their follow-up treatment. Inquiry was needed into how children’s art productions, reflective of their emotional and behavioral status, could be reliably measured and incorporated into diagnostic processes and in the evaluation of individual pharmacotherapy trials.

The first purpose of this study was to use the FEATS to measure the possible differences in the PPAT drawing obtained from children with AD/HD who have not been placed on pharmacologic treatment compared to that of children with no known learning or behavioral problems. A second purpose was to pilot a research design to pave the way for future, more extensive inquiry into the possibility of using the art therapy process to help children participate in their diagnosis and treatment when the differential diagnosis of AD/HD is being considered.

The research hypotheses were:

1. Children with AD/HD who are not yet pharmacologically treated will respond differently on the Formal Elements Art Therapy Scale (FEATS), as applied to the Person Picking an Apple from a Tree (PPAT) drawing, than children with no known behavioral problems or learning disabilities.

2. PPAT drawing responses measured by the FEATS obtained from children with AD/HD who are not being pharmacologically treated will have similarities to others within their group but will be different from those of children with no known behavioral disorder or learning disabilities.

Five assumptions were fundamental to this study: (1) Children who employ the creative process will likely reflect their emotional and behavioral status in their artistic productions. (2) Children of similar chronological age have similar developmental artistic skills. (3) Some artistic representations of specific symptoms of chronic psychiatric disorders are likely to be expressed in an identifiable way within a specific art product. (4) It is feasible to ask for a specific drawing and quantify the results based upon formal elements of art to detect unique responses characteristic of clients with a specific diagnosis. (5) The art therapy process can be employed with some success to provide children with an opportunity to have direct input into their own diagnostic evaluation and to help gauge the value of their treatment.

Method

A descriptive, matched pair, pilot research design was employed (Mausner & Kramer, 1985) to contrast the artistic response of children with AD/HD (case group) to the PPAT as measured by the FEATS to that of children with no known behavioral problems or learning disabilities (control group).

Subjects

Finding children diagnosed with AD/HD but not treated pharmacologically was not easy given the limited 3 month study period. The six participants were encountered in a behavioral health system in a suburban Midwest industrial town. They met the research criteria protocol of being diagnosed with AD/HD, were between the ages of 5 and 12, and were not pharmacologically treated. One child was dropped from the study because psychoeducational testing revealed an I.Q. bordering on retardation. Ultimately, the case group included five male Caucasian children between the ages of 5 years, 10 months and 10 years, 11 months. Two subjects had comorbidities. Case Three was comorbid for possible Conduct and Adjustment Disorders. Case Five was comorbid for possible Depression and Adjustment Disorder. This was to be expected since approximately two-thirds of children referred from schools have comorbid Axis I diagnoses. The same two pediatric psychiatrists diagnosed all the children in the case group.

Thirteen male Caucasian children, accessed through a Midwest urban parochial school, who were between the ages of 5 and 12 and met the control group protocol of no known behavioral disorder or learning disability were offered the opportunity to participate in the study. The children’s ages ranged from 5 years, 11 months to 10 years, 11 months. Drawings from five of those children were paired to those of children in the case group by age to form the control group. None of the matched pairs was more than six months apart in age.

Both case and control group members were obtained from sites recognized for serving mid- to low-socioeconomic populations. Drawings obtained for the control group but not needed in the study were used to train raters. The research sites’ institutional review boards examined the study protocols, signed the release forms, and permitted the researcher to conduct the studies on site. The parents and participants in both groups were given a brief written and/or verbal explanation of the nature of the study and signed release forms.

Instrumentation

The guidelines for administering the PPAT included in the FEATS directions were consistently followed. "Draw a per-
AD/HD, PPAT, AND FEATS

son picking an apple from a tree.” No other instructions were provided. All artists were given the same materials: white drawing paper (12" x 18") and “Mr. Sketch” felt-tip markers with 12 colors (purple, pink, magenta, dark blue, light blue, dark green, light green, black, brown, yellow, orange, and red). Each child created his drawing in an individual art session, and these procedures were carried out in as parallel a manner as possible for the subjects in both groups. Information collected for the subjects was birth date, sex, gender, race, presence or absence of AD/HD, and comorbidities.

Raters and Rating Procedure

Five persons, who had considerable experience with children and strong interest and practice with art, were enlisted as raters. They included a nurse, an architect, an art historian, an interior designer, and a businessman; four were women and one a man. The raters were blind to the study hypothesis and the origin of the drawings. They were trained using the FEATS Rating Manual (Gantt & Tabone, 1995) that included three examples of adult drawings for each of the 15 rating scales. PPAT drawings, obtained from the children at the parochial school but not needed for the study, were used during training to give the raters experience in rating children’s drawings. All raters were trained in the same day at the same time; training took 2 hours and 15 minutes.

Immediately following the training, the 10 coded drawings were circulated to each of the raters who rated all 10 drawings using a copy of the FEATS Manual’s rating directions. Rating was completed in 1 hour and 45 minutes. The completed rating scales were confidentially stored for future computerization and statistical analysis.

The differences in the drawings were so visually apparent that the raters intuited there might be two distinct pairs of drawings. When the rating was completed, still blind to the hypotheses, the raters requested viewing the drawings in pairs to see if they could visually separate the case and control groups. There was 100% agreement in correctly sorting four of the pairs into case and control groups. Three raters correctly sorted the final pair of drawings. It appeared that even to the “naked eye,” case and control drawings were distinctly different. (See Figures 1 and 2.)

Results

Research quality is particularly important in a pilot study employing a small sample (n=5x2). As such, the author did the following: (a) randomized subjects optimally, given the setting and study time limitations; (b) matched cases to controls as closely as possible by age; (c) included only children differentially diagnosed by the same two pediatric psychiatrists; (d) collected the data in as parallel a manner as possible; (e) trained all raters

Figure 1
The child who drew the Case 1 drawing was 5 years 10 months. The child who drew the Control 1 drawing was 5 years 11 months.

Figure 2
The child who drew the Case 4 drawing was 6 years 7 months. The child who drew the Control 4 drawing was 6 years 3 months. The Case 4 drawing is masked in the left corner to protect child’s confidentiality.
during a single training session; (f) required raters to rate drawings simultaneously in a single session; and (g) insured that all rating data were accurately tabulated prior to computerization and statistical analysis.

ANOV

An analysis of variance (ANOVA) of the total FEATS scores was applied between and within groups to compare FEATS data. The between group variance (AD/HD cases versus control group) was significantly greater \((F=62.0383)\) compared to within group variance at a significance level of \(p = < 0.05\). (See Table 1.) This difference was supported by the following logistic regression analysis.

Logistic Regression Analysis

FEATS elements (variables) were analyzed individually using logistic regression analysis. The overall reliability \((p = < 0.05)\) for employing each FEATS element to accurately predict membership in the AD/HD group is given in Table 2. To extend the analysis for practical application, a logistic regression analysis was applied to identify the fewest number of the FEATS elements possible which, taken together, would accurately predict subjects into the AD/HD group. The cardinal rule in such analysis is to find as few elements as possible while obtaining the most powerful reliability of the model. The object of applying the resulting information practically would be to discover a simple system for clinical application.

The three FEATS variables that when taken together, best predicted membership in the AD/HD group were: #1, Prominence of Color; #11, Details of Objects and Environment; and #12, Line Quality. The control mean score was rated higher for each of the three variables than the case mean score by every rater, thus indicating there was less Prominence of Color, fewer Details of Objects and Environment, and reduced Line Quality in the case group drawings obtained from children diagnosed with AD/HD. In this study, the total model reliability computed in the classification table for AD/HD was 97% accurate. Specificity was 100% and, more importantly, sensitivity was 94%. Specificity is the likelihood of identifying those drawings that truly do not have low depiction of the combined FEATS variables and, using the statistical model described, correctly assigning them to the control group. Sensitivity is the likelihood of identifying those drawings that truly do have low depiction of the combined FEATS variables and correctly designating them as belonging to the case group. (See Table 3.)

Inter-rater Correlations Unweighted

Raters in this study were permitted to provide a rating between 1 and 5, thus evaluating on a continuum. For continuous data, the Pearson coefficient is considered the most accurate and conservative (Cohen, 1988). To compute the statistic, each rater’s scores were compared to those of all raters and statistical significance was measured, creating an interrater correlation matrix for both the case group (AD/HD) and the control group (no known behavioral problem or learning disabilities). All correlations were significant \((p = < 0.05)\) for both groups with no value less than \(.638\) for controls (range = \(.638\) to \(.856\)) and none less than \(.670\) for the cases (range = \(.670\) to \(.862\)). Thus, strong interrater correlation was confirmed.

### Table 1

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of Squares</th>
<th>d.f.</th>
<th>Mean</th>
<th>F</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>69.9213</td>
<td>1</td>
<td>69.9213</td>
<td>62.0383</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Within Groups</td>
<td>843.0467</td>
<td>748</td>
<td>1</td>
<td>1.1271</td>
<td></td>
</tr>
</tbody>
</table>

Note: Power > 0.8 (for alpha = 0.05 and beta = 0.01); n = 2 Group (Cohen, 1988); Mean = Mean of total FEATS scores for each group

### Table 2

<table>
<thead>
<tr>
<th>FEATS Variable</th>
<th>Reliability</th>
</tr>
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<tbody>
<tr>
<td>#1 Prominence of Color</td>
<td>88.25%</td>
</tr>
<tr>
<td>#2 Color Fit</td>
<td>70.39%</td>
</tr>
<tr>
<td>#3 Actual Energy</td>
<td>49.37%</td>
</tr>
<tr>
<td>#4 Implied Energy</td>
<td>68.61%</td>
</tr>
<tr>
<td>#5 Space</td>
<td>48.63%</td>
</tr>
<tr>
<td>#6 Integration</td>
<td>80.60%</td>
</tr>
<tr>
<td>#7 Logic</td>
<td>65.05%</td>
</tr>
<tr>
<td>#8 Realism</td>
<td>65.01%</td>
</tr>
<tr>
<td>#9 Problem-solving</td>
<td>76.40%</td>
</tr>
<tr>
<td>#10 Developmental Level</td>
<td>75.91%</td>
</tr>
<tr>
<td>#11 Details of Object and Environment</td>
<td>77.98%</td>
</tr>
<tr>
<td>#12 Line Quality</td>
<td>66.81%</td>
</tr>
<tr>
<td>#13 Person</td>
<td>70.10%</td>
</tr>
<tr>
<td>#14 Perseveration</td>
<td>51.78%</td>
</tr>
<tr>
<td>#15 Rotation</td>
<td>58.87%</td>
</tr>
</tbody>
</table>

\(p = < 0.05\)
Table 3
Classification Table for Combined FEATS Variable Model

<table>
<thead>
<tr>
<th>Explained</th>
<th>Reliability</th>
</tr>
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<tbody>
<tr>
<td>Observed</td>
<td>Controls</td>
</tr>
<tr>
<td>Controls</td>
<td>25</td>
</tr>
<tr>
<td>Cases</td>
<td>1</td>
</tr>
</tbody>
</table>

Model Total Reliability = 97% (Accuracy)

Elements (Variables) in the Logistic Regression Analysis Equation that Together Were Most Predictive in Designating Membership in the AD/HD Group

<table>
<thead>
<tr>
<th>Variable</th>
<th>B (Slope)</th>
<th>Significance</th>
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</thead>
<tbody>
<tr>
<td>Color Prominence</td>
<td>-13.8914</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Details of Objects and Environment</td>
<td>-7.5865</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Line Quality</td>
<td>-2.6416</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Constant</td>
<td>71.1307</td>
<td></td>
</tr>
</tbody>
</table>

Semiquantitative Analysis of Rater Fatigue

Because there were only 10 drawings to be rated, the raters completed rating procedures within 1 hour and 45 minutes. To gauge if interrater reliability was influenced by the order in which the raters viewed the drawings in this study and to design rater fatigue analysis for future larger studies, a multiple regression analysis was computed for the three FEATS variables that most accurately predicted membership in the AD/HD group. In this pilot study, the adjusted R square of -.579 was not significant (F=.9562) for rater fatigue; therefore, rater fatigue was not a factor in obtaining the ratings. Rater fatigue analysis will be useful in designing studies with more drawings to be rated and thus a greater possibility of rater fatigue.

Conclusions

Results support rejecting the null hypothesis that there were no differences in the AD/HD children's artistic responses to the PPAT as measured by the FEATS compared to those of children with no known learning or behavioral problems. The study results also support rejecting the hypothesis that there were no within group similarities in the artistic responses to the PPAT as measured by the FEATS for the combined case and control groups. Therefore, the following a priori study hypotheses were supported:

1. Children with AD/HD but not yet medicated will respond differently on the FEATS as applied to the PPAT drawing than children with no known learning or behavioral problems.
2. PPAT drawing responses as measured by the FEATS, which were obtained from children with AD/HD who are not yet pharmacologically treated and from children with no known learning or behavior problems, will have similarities to others within their groups but will have differences from those in the matched group.

The drawings of the children with AD/HD exhibited less Color Prominence (Element #1) than those in the control group. In their PPAT drawings, color was more often used to simply define an item or shape rather than to color-fill it. The drawings of the children diagnosed with AD/HD exhibited fewer Details of Objects and Environment (Element #11). Their PPAT drawings contained less extraneous material compared to those of the control group. The drawings of the children with AD/HD exhibited reduced control in Line Quality (Element #12) compared to the control group.

Interrater reliability correlations were strong for both groups at the significance level of $p < 0.05$. The strength of these correlations is promising for future use of this research design, including use of the FEATS to provide careful controls regarding rater training and rating practices. Although rater fatigue was not a statistically significant factor in this pilot study, fatigue may be an important factor if raters are expected to rate large numbers of drawings and must be evaluated, planned for, and assessed statistically with each individual study. It may be necessary to design ways for limiting rater fatigue such as breaks during rating, limiting the number of drawings to be rated at one time, or rating on sequential days.

The small number of pairs—five—was not sufficient to statistically evaluate if age difference between matched pairs of cases and controls was a factor in this pilot study. Pairs were matched as closely in age as possible (not more than 6 months apart). However, if a close age match could not be maintained in future studies, an analysis of the impact of age upon results would need to be measured.

The results of this pilot study suggest statistically significant support for accurately identifying differences in the responses of children with AD/HD to the PPAT drawing as measured by the FEATS in order to predict their membership into the AD/HD group. The statistical model is new; replication will test model validity and reliability. Using this research model with a larger sample would generalize the results to boys between the ages of 5 and 12. Future studies will need to include boys and girls in diverse age groups. In addition, the pilot shows genuine promise for ultimately identifying a drawing task and measurement system to aid in the confirmation of AD/HD in children and to evaluate children's drug trials. To reach that goal, more research is necessary, including recruiting a larger sample size and a second case group of children with AD/HD who are being pharmacologically treated.

Discussion

There were no statistically significant differences in the FEATS scores on the Actual Energy and Impaired Energy scales between the case and control drawings. That result is surprising because hyperactivity is a crucial feature in AD/HD. However, there was a difference in the observed behavior of the children during the creation of their drawings. The boys in the case group were easily distracted by motion or noise outside the room and they usually responded by impulsive physical movement. They
often talked while drawing, needed the art directive repeated, and
finished their drawings in less than 10 minutes. The boys in the
control group were more focused, spoke infrequently, did not
need the directive repeated, were not easily distracted, and took
longer to complete the drawing (sometimes 25 minutes).

The behavior of case group boys during drawing mirrored
the hyperactive/inattentive and impulsive features of AD/HD.
Their drawings exhibited less Color Prominence and fewer Details
of Objects and Environment that would have taken more time,
concentration, and attention to develop. The reduced drawing
time likely limited the selection of new colors and color-filling
drawing features. Their impulsive physical motion reduced Line
Control. These observations combined with the statistical analysis
seem to confirm the connection between the key features of
AD/HD and the FEATS combined variables in the children's
PPAT drawings.

A colleague with a doctorate in early childhood education
spontaneously remarked to me that during one year in which she
taught in an elementary school, she had eight children diagnosed
with AD/HD in her classroom. She found their art to be notably
different from the other children, and she saved their drawings
for future reference. The differences she observed were that the
children with AD/HD exhibited reduced line control, often drew
in one color, did not color-fill figures, and rarely drew extraneous
items in the pictures (Kathy Maxwell, personal communication,
February 28, 1996). While her observations were anecdotal, they
do identify the same features that were isolated using the statisti-
cal model.

Recommendations and Implications

This preliminary work strongly suggests that this research
design could be applied to future larger studies with sound suc-
cess, including adjustment to recruit cases from different settings
such as the offices of pediatricians, child psychologists, or child
psychiatrists. To replicate this study with reliable results, the
researcher must scrupulously control research practices. The
researcher will need to (a) randomize subjects optimally given the
setting limitations; (b) match cases to controls as close as possible
in age; (c) include as cases only children differentially diagnosed,
using similar clinical screenings; (d) collect the data in as parallel
a manner as possible; (e) train all raters during a single training
session or other parallel training methods; (f) require all raters to
rate drawings using optimal practices that reduce the chance for
fatigue; and (g) insure that all rating data are accurate and com-
plete for timely statistical analysis.

This pilot study could then be used as a model for future,
larger, well-controlled, and randomized studies to identify a sys-
tem of classification useful to confirm the diagnosis and to evalu-
ate pharmacotherapy for children with AD/HD. If the sample in
future studies is truly representative of the population it por-
trays, the results of the study might spearhead the practical use
of art therapy in helping to confirm the diagnosis of AD/HD.
One should consider including boys and girls in different age
groups. A second case group composed of children with
AD/HD who are being pharmacologically treated could be
included also to discover if children optimally treated pharma-
cologically produce PPAT drawings closely resembling those of
children with no known behavioral diagnosis or learning dis-
ability. Results from such an expanded study may refine how the
PPAT and FEATS may be used to assist in evaluating the chil-
dren's individual drug trials. A child being placed on drug trials
might serially create PPAT drawings to estimate the value of the
drug treatment over time. This important research would open
the door to children participating in tangible ways in their
screening for AD/HD and in the evaluation of their own drug
trials. It may provide an inexpensive art therapy tool, a clinical
classification system, to be used as a clinical aid in the diagnosis
and pharmacological treatment of AD/HD.

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