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Parent-, Teacher-, and Self-Rated Motivational Styles in ADHD Subtypes

Caryn L. Carlson, Jane E. Booth, Misung Shin, and Will H. Canu

ABSTRACT

The motivational styles of 25 children with attention-deficit/hyperactivity disorder, combined type (ADHD/C), 13 children with ADHD, inattentive type (ADHD/IA), and 25 nondiagnosed controls (NC) were compared using parent, teacher, and self-ratings. Both ADHD subtypes demonstrated motivational impairment characterized by a preference for easy work, less enjoyment of learning, less persistence, and a greater reliance on external than on internal standards to judge their performance relative to NC. Some motivational style differences between ADHD subtypes were also revealed, with the ADHD/C group more motivated by competitiveness and a desire to be perceived as superior to others and the ADHD/IA group less uncooperative and possibly more passive in their learning styles. When IQ was statistically controlled, these results were generally unchanged. The contributing role of motivational deficits to the generally poor academic functioning of children with ADHD is discussed, along with potential intervention implications of the divergent motivational styles of different ADHD subtypes.

The evolution of diagnostic terminology and criteria associated with attention-deficit/hyperactivity disorder (ADHD) is largely attributable to changes in the conceptualization of the core deficits associated with the disorder. Specifically, the division of symptoms into two primary clusters—inattention and hyperactivity/impulsivity—has resulted in ongoing debate about whether ADHD is best conceptualized as a uni- or as a multidimensional disorder. This debate was addressed in the most recent version of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV; American Psychiatric Association, 1994) with the introduction of three ADHD diagnostic subtypes: ADHD, combined type (ADHD/C; both hyperactivity/impulsivity and inattention present to a significant extent); ADHD, predominantly inattentive type (ADHD/IA; inattention significantly present, with subthreshold hyperactivity/impulsivity); and ADHD, predominantly hyperactive/impulsive type (ADHD/HI; hyperactivity/impulsivity present, with subthreshold inattention).

Much emphasis has been placed on the role of motivational factors in understanding the performance deficits of children with ADHD. The influential early work of Douglas (1972,1983,1989) highlighted the association between ADHD and difficulty in sustaining effort and motivation, particularly in the face of tedious tasks and minimal reinforcement. Barkley (1997) also emphasized motivational factors in his hybrid model of executive functioning in ADHD, with poor motivation conceptualized as stemming from a primary behavioral inhibition deficit leading to disruptions in the executive function of self-regulation of affect, motivation, and arousal.

Motivational deficits in children with ADHD have been consistently demonstrated. For example, children with ADHD often display poor motivation for schoolwork and avoidance of tasks requiring sustained self-application (American Psychiatric Association, 1994; Barkley, 1990). Despite reporting initial optimism when predicting their performance, they show lack of persistence in the face of failure and have been characterized as displaying a helpless task orientation (see Milich, 1994). Furthermore, children with ADHD have shown improved behavior or performance when tasks are made more salient, novel, or interesting (Douglas, 1985; Zentall, 1980, 1986).

No study has directly assessed motivational style in children with ADHD/ IA; however, suggestive evidence for potential deficits exists. Early studies on the DSM-III (American Psychiatric Association, 1980) attention-deficit disorder without hyperactivity (ADD/noH) subtype suggested that this group exhibits a cognitive—behavioral style characterized by passivity and lethargy (see Lahey, Carlson, & Frick, 1997). Moreover, a recent study found that the ADHD/IA group received higher teacher ratings than even the ADHD/C group on being apathetic or unmotivated (Carlson & Mann, in press).

Further examination of motivational factors in children with ADHD/C and ADHD/IA may be particularly relevant because motivation is a potential contributing factor to the poor academic performance that characterizes the majority of these children. It is well established that academic achievement problems and school failure are common in ADHD (American Psychiatric Association, 1994; Faraone, Biederman, & Lehman, 1993; Gaub & Carlson, 1997). Although studies assessing rates of academic problems in ADHD subtypes have not

consistently found differences in the prevalence of comorbid learning disabilities, there is some indication that children with ADHD/IA fare worse (Baumgaertel, Wolraich, & Deitrich, 1995; Brito, Pereira, & Santos-Morales, 1999). It has also been documented that the ADHD/IA group receives more school remedial help than children with ADHD/C (Barkley, DuPaul, & McMurray, 1990; Marshall, Hynd, Handwerk, & Hall, 1997).

The essential role of motivational processes in the acquisition and use of academic skills, above and beyond the actual ability level, has long been recognized (e.g., Dweck, 1986). Academic intrinsic motivation can be defined as the enjoyment of school learning and the orientation to master challenging tasks (Gottfried, 1985). This construct shows a positive relationship to school functioning and academic achievement throughout elementary and junior high school (Gottfried, 1985, 1990). Of particular relevance to the present study is the recognition that the specific motivations underlying achievement-related activities can vary considerably, such that distinctions can be made not only in the strength but in the orientation of individuals' achievement motivation (see Ryan, Connell, & Grolnick, 1992).

Both ADHD/C and ADHD/IA subtypes have been found to show learning problems and motivational deficits. However, the two subtypes differ in a variety of ways that could contribute to different patterns of motivational style. For example, children with ADHD/C are more likely to show comorbid externalizing and impulsive behavior. Furthermore, the nature of the cognitive—attentional deficit appears to differ between subtypes, with the ADHD/C group characterized as distractible, sloppy, and disorganized and the ADHD/IA group characterized as drowsy, sluggish, and less alert (see Carlson & Mann, 2000; Lahey et al., 1997). Based on these considerations, we hypothesized that ADHD/C and ADHD/IA groups would both show motivational problems but that the nature of the deficits might differ between the subtypes based on their different symptom patterns and accompanying characteristics.

METHOD

Participants

Participants were 63 children between the ages of 9 and 12, including 25 non-diagnosed comparison controls (NC), 25 children who met criteria for ADHD/C, and 13 children who met criteria for ADHD/IA by parent and teacher report. Some participants had missing data for some measures; correct group ns for each measure are noted in tables. Participants who had previously received a clinician's diagnosis of ADHD were recruited from a local pediatric or neurology clinic or from a local ADHD parent support group. Children in the ADHD groups were required to meet diagnostic criteria according to structured parent interviews or rating scales and teacher rating criteria on the Child Attention Profile (or, for participants for whom this score was unavailable, the DSM-IV rating scale). Most of the children with ADHD were being treated with stimulant medication (the majority with methylphenidate); of the 25 ADHD/C children, 22 were on medication, 2 were not on medication, and 1 was missing data, and of the 13 ADHD/IA children, 11 were on medication and 2 were missing data.

Comparison controls were recruited from two sources: a local elementary school group selected by teachers as not exhibiting learning or behavior problems, and a group of children who had participated in previous studies at the developmental psychology research lab at The University of Texas at Austin. To be included, NC group children could not demonstrate clinically significant levels of ADHD symptoms (i.e., 5 or more IA or HI symptoms on the DSM-IV rating scale or meet criteria for other teacher or parent measures). From a pool of available controls, participants were chosen to match the ADHD groups on demographic variables as closely as possible. All participants scored 75 or above on the Wechsler Intelligence Scale for Children—Third Edition (WISC-III; Wechsler, 1991; see Note 1) IQ estimate.

Diagnostic and Descriptive Measures

Children in the ADHD groups were required to meet diagnostic criteria based on parent ratings. The majority of participants (n = 35) were included based on a structured interview about the presence or absence of DSM-IV ADHD, oppositional defiant disorder (ODD), and conduct disorder (CD) symptoms; for the remaining 3 participants, the diagnostic criteria were based on the Diagnostic Interview Schedule for Children (DISC; Shaffer et al., 1996; n = 2) or the DSM-IV checklist (n = 1). Consistent with DSM-IV criteria, children were required to display at least six inattention (IA) symptoms and at least six hyperactivity/impulsivity (HI) symptoms to be included in the ADHD/C group and at least six IA symptoms but fewer than six HI symptoms to be included in the ADHD/IA group. Moreover, children in both ADHD groups had to meet the DSM-IV requirements of showing symptom onset before 7 years of age and chronicity, pervasiveness, and impairment due to symptoms in two or more areas (see Note 2). Due to the high rates of expected comorbidity of ADHD with other externalizing disorders, the interview was also used to establish comorbid ODD (4 or more symptoms) or CD (3 or more symptoms) diagnoses. Previous research using this interview has found high interrater reliability (kappas of 1.0) for ADHD, ODD, and CD symptoms (Carlson, Mann, & Alexander, 2000).

Parents also completed the Revised Behavior Problem Checklist (RBPC; Quay & Peterson, 1983) and a DSM-IV symptom checklist. The RBPC is a widely used scale that has been demonstrated to show good test—retest reliability (2-month rate—rerate correlations across the 6 subscales ranged from .49 to .83, M = .67) and validity as assessed by correspondence to DSM-III diagnoses and behavioral observations. The DSM-IV checklist includes all 26 DSM-IV symptoms for ADHD and ODD and asks respondents to indicate on a 4-point scale the degree of symptom presence (0 = not at all; 1 = just a little; 2 = pretty much; and 3 = very much); symptoms rated as pretty much or very much counted as present. Similar checklists have been widely used for identifying ADHD subtypes according to DSM-IV criteria (e.g., Gaub & Carlson, 1997).

In an effort to corroborate diagnoses made via parent interview, children were required to meet teacher rating criteria on either the Child Attention Profile (CAP; Barkley, 1990) or the DSM-IV checklist; teachers were asked to complete ratings based on their observations of children's behavior off medication (or, for children whom the teacher had not observed off medication, based on behavior when medication was “wearing off,” if possible; teachers who could not make

such ratings indicated that ratings were based on behavior on medication). The CAP is a 12-item checklist organized into two scales (Inattention and Overactivity) that was composed of items from the original Teacher Report Form (Achenbach & Edelbrock, 1986). The CAP has been shown to be sensitive to stimulant drug effects and to be particularly useful in classifying ADHD children into subtypes (see Barkley, 1990, 1998, for additional psychometric information). Consistent with Barkley et al. (1990), the criteria for inclusion in the ADHD/C group were set at scores at or above the 93rd percentile on the Inattention (≥ 8) and the Overactivity (≥ 6) scales, and the criteria for inclusion in the ADHD/IA group were set at scores at or above the 93rd percentile on the Inattention scale (≥ 8) and at or below the 84th percentile on the Overactivity scale (≤ 4). Teacher rating criteria were met for all children in the ADHD/IA group, and for 22 of the 25 children in the ADHD/C group. Of the remaining 3 ADHD/C children, teacher ratings were not received for 1 child, and 2 children were included despite not meeting criteria because teachers reported they could not rate the child off medication.

To assess intellectual and academic functioning, children completed the Arithmetic and Reading scales of the Wide Range Achievement Test—Third Edition (WRAT-3; Jastak & Wilkinson, 1993) and the Block Design and Vocabulary subtests from the WISC-III (Wechsler, 1991) with a prorated Full Scale IQ obtained based on Sattler's (1992) formula. For descriptive purposes, children were experimentally classified as having a learning disability in a particular subject area if they displayed both low ability (WRAT-3 standard score ≤ 85) and a significant discrepancy (<ge> 15 points) between their estimated Full Scale IQ and one of the WRAT-3 standard scores. Although the issue of defining learning disabilities remains a topic of debate, our classification incorporates the low achievement criteria that have been advocated by some researchers (see discussion by Kavale & Forness, 2000) and was deemed adequate for our purposes because learning disabilities were not the focus of this study but were included descriptively only to assess the comparability of groups with regard to disability status. Socioeconomic status was based on Duncan's Socioeconomic Index of Occupational Status (SEI; Stevens & Featherman, 1981).

Table 1 presents demographic and descriptive data. Analyses of variance (ANOVAs) were used to compare groups on age, IQ, SEI, and rating measures, and chi-square analyses were used to compare groups on categorical descriptive variables. For significant ANOVAs, follow-up pairwise t tests were conducted to compare groups; the results of these are reported in the text.

Groups did not differ significantly in age, gender, ethnicity, or SEI. Relative to the NC group, the ADHD/IA group obtained significantly lower IQ estimates, and the ADHD/C group showed a trend ($p = .09$) to score lower. On WRAT-3 Arithmetic and Reading scales, children with ADHD/C scored lower than controls, although the overall F for the Arithmetic score showed a trend of $p = .07$. There were no group differences in the prevalence of learning disabilities.

As found in previous research on the ADHD subtypes (see Carlson & Mann, 2000), the ADHD/C group had significantly higher rates of ODD and showed a trend for higher rates of CD diagnoses. The rates of ODD and CD found for the ADHD/C group are consistent with other studies, which have reported comorbid ODD/CD rates between 42.7% and 93% (Jensen, Martin, & Cantwell, 1997).

On the RBPC, children in the ADHD/C group were rated as more divergent than controls on all factors; children with ADHD/IA were rated as more divergent than controls on all factors except Psychotic Behavior and Socialized Aggression. Relative to the ADHD/IA group, children with ADHD/C received higher ratings on all factors except Anxious/Withdrawn. On the parent DSM-IV checklist, the ADHD/C group received higher HI ratings and showed a trend ($p = .07$) to receive higher IA ratings than the ADHD/IA group. For teacher ratings on the CAP, the children with ADHD/C received higher Inattention and Overactivity scores than those with ADHD/IA.

Motivational Measures

Because the examination of potential ADHD subtype differences in motivational style was considered exploratory in nature, motivational measures were chosen to include a breadth of potentially relevant constructs, including both child characteristics and parental motivational practices. Some measures were included based on their use in previous research with children with ADHD (e.g., Harter's scale).

Teacher Rating of Academic Achievement Motivation (TRAAM; Stinnett & Oehler-Stinnett, 1992). Teachers completed this 45-item questionnaire assessing different aspects of academic motivation. The scale provides scores on six factors: Amotivation (e.g., does only the minimum that is required for task completion), Mastery (e.g., enjoys learning new things), Competition (e.g., likes to be the best on academic tasks), Cooperation (e.g., works cooperatively with other students on group projects), Academic—Cognitive skills (e.g., lacks basic academic skills), and Academic Work Completion (e.g., completes math assignments without teacher prompting). The TRAAM demonstrates good internal consistency (alphas = .79−.98) and has been shown to correlate with teacher judgments of student academic performance (rs = .41−.80) and WRAT-R subtests (rs = .33−.42). Parents also completed a shortened version of the TRAAM that included only the first four subscales.

Children's Academic Intrinsic Motivation Inventory (CAIMI; Gottfried, 1986). This self-rating scale was designed to measure children's enjoyment of learning. The general score, composed of 18 items from the larger scale, was used. Examples of items include, “When I get bored, I look for new things to do,” “When I know I have learned something new, I feel good inside,” and “I do not enjoy learning” (reverse scored). The CAIMI shows good internal consistency (alphas for the general scale = .80&minus.83) and correlates positively with ratings on the Harter scales (e.g., r with Preference for Challenge scale = .62).

How I Feel About School (HIFAS; Schunk, 1996). This 18-item, child-completed scale yields four factors: Work Avoidant (desire to avoid or expend minimum effort on academic work), Task (desire for self-improvement and independent mastery of academic work), Affiliative (desire to share ideas and collaborate with peers on schoolwork), and Ego (desire to perform well to impress the teacher and be perceived as superior by others). Responses are based on a 10 (not at all) to 100 (very much) scale, with anchors at 10-point intervals. The scale shows good test-retest reliability (rs = .71−.82).

Intrinsic Versus Extrinsic Orientation in the Classroom (Harter, 1981). The child-rated version consists of 30 items in Five subscales: Preference for Challenge (versus preference for easy work assigned), Curiosity/Interest (versus pleasing the teacher, getting grades), Independent Mastery (versus dependence on the teacher), Independent Judgment (versus reliance on the teacher's judgment), and Internal Criteria for Success/Failure (versus external criteria). The widely-used Harter scale shows good internal consistency across factors (alphas = .68−.84) and has been shown to discriminate students with distinct learning styles. Teachers also completed the 10-item adult version of this scale, which contains 2 items from each subscale.

Procedure

Graduate students administered the diagnostic interview over the telephone (in person to the two children who were evaluated with the DISC) to parents of children with ADHD prior to the experimental session. Families were paid $20 for their participation, and teachers received $10 for completing study measures. For the ADHD participants being treated with stimulant medication, an 18-hour washout period preceded the experimental testing sessions.

During the single 2-hour experimental session, the child's parents provided informed consent for study participation and completed the parent rating measures. After children gave their written assent to participate, they completed an experimental computer-based task of attention (as part of a larger study) and motivational questionnaires. Graduate student research assistants read at least the initial sections of questionnaires aloud to children but allowed children to complete items independently if their reading ability and understanding of the task was adequate. For all questionnaires, prorated scale scores were calculated when individual items were missing. At the end of the session, the WISC-III and the WRAT-3 were individually administered.

RESULTS

Data were missing for some participants for some analyses; correct ns are indicated in tables. Three multivariate analyses of variance (MANOVAs) were conducted to separately examine overall effects for child, parent, and teacher measures. The child analysis, $F(20,90) = 2.44$, $p < .002$, parent analysis, $F(8,114) = 15.66$, $p < .0001$, and teacher analysis, $F(22,86) = 3.24$, $p < .0001$, all yielded effects that were significant at the .05 level using the Bonferroni correction (.05/3 = .02).

Follow-up analyses of variance (ANOVAs) were conducted to compare the three groups on each child, teacher, and parent scale. Because there was a significant group effect of IQ, analyses of covariance (ANCOVAs) were also conducted using IQ as a covariate. Covariance analyses were not completed for the parent TRAAM Cooperation scale because it yielded a significant group by IQ interaction, rendering covariance analyses meaningless (see Table 2). For variables on which either ANOVA or ANCOVA analyses yielded a significant main group effect, follow-up between-group t tests were conducted. To examine a potentially consistent

pattern between child and teacher ratings on the Harter, follow-up analyses were conducted for the child Harter Curiosity/Interest scale although the ANOVA yielded only a trend of $p = .06$. Results for ANOVA, ANCOVA, and follow-up analyses are shown in Table 2. The pattern of results was generally consistent for the two sets of analyses, although some significant pairwise comparisons became trends and vice versa.

Effect sizes were also calculated between groups for all measures to help assess the clinical significance of results. These effect sizes are reported in Table 3. Following Cohen (1992), effect sizes of .2 or greater, .5 or greater, and .8 or greater were considered small, medium, and large, respectively.

On the CAIMI, controls rated themselves significantly higher than the ADHD/IA group. On the HIFAS scale, only the Ego factor yielded a significant effect, with the ADHD/C group scoring higher than the ADHD/IA group. Both of these effects were large.

On the child version of the Harter, both of the ADHD groups scored lower than comparison controls (large effects) on the Preference for Challenge and Internal Criteria for Success subscales. Teacher ratings on the Harter revealed a similar pattern for the Preference for Challenge, Independent Mastery, and Internal Criteria for Success subscales (large effects), although for the latter scale only the ADHD/C group scored lower than controls on the ANCOVA with IQ covaried. For both teacher and child ratings on the Harter Curiosity/Interest scale, children with ADHD/IA scored lower than controls; this effect was large for teacher and medium-sized for child ratings. There was also a trend ($p = .08$) with a medium effect size on the child Harter Curiosity/Interest scale for the ADHD/C group to score lower than controls; with IQ covaried, the differences between both ADHD groups and controls became nonsignificant.

On the TRAAM, teachers rated both ADHD groups lower than controls on all scales, and these effects were large with the exception of the Competition scale in the comparison with the ADHD/C group, which yielded a medium effect size. Moreover, on the Cooperation scale there was a trend ($p = .09$) with a medium effect size for the ADHD/IA group to receive higher scores than the ADHD/C group; this trend became nonsignificant when IQ was covaried. Parent ratings on the TRAAM revealed a similar pattern to teacher ratings; both ADHD groups were rated lower than controls on Amotivation and Mastery (large effects). The ADHD/IA group was rated as less Competitive (large effect) than both ADHD/C and control groups. Both ADHD groups were rated as less Cooperative than controls (this effect was large for the ADHD/C and medium for the ADHD/IA group), with the ADHD/C group also rated less Cooperative (medium effect) than the ADHD/IA group.

Although groups did not differ in gender ratio based on the overall chi-square analysis reported previously, the largest difference in gender composition was between the ADHD/C (80% boys) and ADHD/IA (54% boys) groups, and we wanted to assess whether this difference alone accounted for the results. To test this possibility, we conducted 3 × 2 (Group × Gender) analyses for variables on which the pattern of findings differed between the two ADHD groups (i.e., child CAIMI and HIFAS Ego, child and teacher Harter Curiosity/Interest, parent TRAAM Competition, and parent and teacher TRAAM Cooperation scales). For all of these variables, main and interaction effects of gender were nonsignificant (ps ranging between .20 and .84).

DISCUSSION

These findings extend previous work suggesting poor motivation and lack of persistence in children with ADHD/C by demonstrating deficits in self- and adult-rated motivation in both ADHD/C and ADHD/IA subtypes. On the Harter scale, teacher ratings and self-ratings indicated that relative to comparison controls, children in the ADHD/C and ADHD/IA groups preferred less challenging work and were more likely to gauge their level of performance based on external feedback than on their own internal standards (although in this latter respect, the difference between the ADHD/IA and the control group was reduced with IQ covaried). Similarly, teachers rated both ADHD groups as more dependent than controls on teacher involvement in their academic work. Teacher and parent ratings on the TRAAM indicated that the ADHD groups were less motivated and less mastery oriented than controls as reflected by their having lower self-expectations, being less persistent and more easily discouraged, showing a preference for easy work, and being less likely to enjoy learning. In addition to perceiving ADHD groups as less motivated and less likely to complete assignments independently, teachers rated the general cognitive skill level of both ADHD groups lower than that of comparison controls; this difference remained significant even with IQ covaried. The consistency of findings across measures and raters suggests that the motivational deficits in ADHD are implicated in performance both in the home and in school environments.

In this and previous research (see Barkley, 1998, for a review), ADHD has been associated with deficits in general cognitive ability, and disentangling the contributions to low academic performance of general ability from those of motivational factors is difficult. However, most of the significant findings in the current study remained so with IQ covaried, supporting a unique contribution of motivational factors to the typically poor academic performance of children with ADHD above and beyond the role of general intellectual ability. A rich literature exists linking deficits in motivation to compromised learning and academic functioning in populations with and without disabilities (e.g., Deci, Hodges, Pierson, & Tomassone, 1992; Dweck, 1986; Harter & Connell, 1984; Ryan, Deci, & Grolnick, 1995; Sansone & Harackiewicz, 1996; Wigfieid, 1994), further supporting the position that directly addressing motivational style may benefit performance.

One strategy for improving academic task performance involves the use of contingent rewards and punishments (i.e., response cost). Although the use of such methods has been called into question due to their presumed negative effect on motivation (an issue that remains a subject of debate; see Deci, Koestner, & Ryan, 1999, and Eisenberger & Cameron, 1996), it is generally acknowledged that any potentially undermining effects of contingencies on motivation are most likely when children show high levels of initial intrinsic motivation. Our current results provide strong evidence that both ADHD subtypes are characterized by generally low intrinsic motivation. Given this result and our demonstration in our experimental paradigm (Carlson et al., 2000; Carlson & Tatum, 2000) that contingencies positively affect the cognitive performance of children with ADHD without decreasing their self-rated task interest or motivation, we continue to advocate the use of such extrinsic motivation techniques for these children, at least for academic tasks for which they show low levels of intrinsic motivation.

Our findings also suggested divergent patterns of motivational deficits between different ADHD subtypes. Children with ADHD/C rated themselves as more motivated by Ego factors than children with ADHD/IA, indicating a stronger desire to be perceived by others as high performing. TRAAM results revealed a similar pattern, with parents rating their ADHD/IA children as less competitive than parents of ADHD/C or NC children, and this pattern of scores was identical in teacher ratings, although the significance levels changed. Controls were rated higher by teachers than both ADHD groups, which did not differ from each other. There was also a tendency for children with ADHD/C to be perceived by adults as less cooperative with peers than children with ADHD/IA. For teachers, this pattern was only a trend and was no longer apparent when IQ was covaried. Finally, both self-and teacher ratings on the Harter scale indicated that relative to controls, children with ADHD/IA were motivated to perform well more to please the teacher and make good grades than for their own curiosity and interest. In summary, children with ADHD/C can be characterized as more competitive and motivated by wanting to be perceived as superior to others, whereas the children in the ADHD/IA group are less uncooperative and possibly more passive in their approach to academic work, as reflected by their greater reliance on external validation than on internal drive. This pattern mirrors the previously demonstrated differences between subtypes in behavior and cognitive—attentional style suggesting that children with ADHD/C are characterized by externalizing problems and impulsivity and children with ADHD/IA are more lethargic and sluggish in their cognitive tempo.

One intriguing implication of these results is that different academic interventions might be tailored to the discrepant motivational styles of the two ADHD groups. There is some precedent for advocating that treatments be matched to child characteristics. Bugental, Whalen, and Henker (1977) suggested that optimal behavior change occurred when the attributional style of children with ADHD matched the implicit attributional emphasis of interventions (e.g., self-control versus social reinforcement). Our results suggest that the more competitive style of children with ADHD/C might be capitalized on in a positive way, possibly by the use of game-like learning approaches and public recognition of their performance. For children with ADHD/IA, cooperative learning strategies and the use of enhanced mechanisms for external feedback may particularly appeal to their more cooperative style and tendency to be particularly unmotivated by their own intrinsic curiosity. These results hold implications for teacher inservice training, which might include consideration of the motivational deficits shown by both ADHD subtypes as well as the potential subtype differences in specific motivational patterns in designing classroom interventions. These suggestions are clearly speculative, as the current study was correlational and, therefore, cannot be used to draw conclusions about whether these motivational deficits are causally related to academic performance. Nonetheless, our results provide the basis for future work in this area.

Although we believe these results to be important in suggesting potential educationally relevant differences in motivational style between the ADHD subtypes, several limitations of the study must be acknowledged and considered in interpreting our findings. The small sample size, particularly for the ADHD/IA group, is problematic, especially in light of the relatively large number of statistical comparisons. Therefore, effect sizes were calculated to help assess the magnitude of results. All statistically significant effects and many of the nonsignificant trends achieved medium to large effect sizes, suggesting that despite the liberal statistical approach,

the reported effects were clinically robust. This approach was considered justified given the exploratory nature of the work and the relative lack of research on this topic, but clearly replication of these results in future research is necessary.

Another factor of potential relevance in interpreting our results is medication status. Most of the ADHD participants in the current study were receiving medication, which could affect their motivational style; thus, our results may not generalize to nonmedicated children. Furthermore, future research using larger sample sizes should consider the potential influence of subtype differences in comorbid conditions (e.g., externalizing and learning disorders) and incorporate experimental or longitudinal designs to better evaluate the nature of the relationship between motivational style and academic deficits in children with ADHD. Despite these caveats, we believe that our results support the need for further examination of the specific pattern of motivational deficits exhibited by different ADHD subtypes as a potentially fruitful avenue for designing effective treatments for their academic performance deficits.

NOTES

1. For one participant in the ADHD/IA group, the IQ estimate was based on the WISC-III Vocabulary score only, because the child's excessively slow motor speed was considered to invalidate the Block Design score.

2. Two children in the ADHD/C group did not meet HI symptom cutoffs on the parent interview but were included because diagnostic criteria were met on the DSM-IV symptom checklist.

TABLE 1
Demographic and Descriptive Characteristics of Participants

Variable	ADHD/C[a]		ADHD/IA[b]		Control[a]			
	n	%	*n*	%	*n*	%	χ^2	*p*
Gender (*n* boys)	20	80	7	54	17	68	1.77	.41
Ethnicity							3.00	.61
European American	16	64	11	85	17	68		
African American	3	12	0		2	8		
Hispanic	4	16	2	15	4	16		
Asian American	1	4	0		2	8		
Other	1	4	0		0			
Learning disability							.08	.96
Arthmetic	2	10[c]	1	8	1	5[d]	.62	.74
Reading	2	10[c]	2	15	0		3.35	.07
Conduct disorder	5	23[d]	0					

Variable	ADHD/C[a]		ADHD/IA[b]		Control[a]			
	M	*SD*	*M*	*SD*	*M*	*SD*	*F*	*p*
Age (months)	131.2	13.6[d]	137.0	13.0	13.5	11.5[d]	1.50	.23
Socioeconomic index	48.2	22.3[d]	50.8	17.2	54.6	21.8[d]	.46	.63
WISC-III prorated IQ	105.4	14.8[d]	97.8	13.1	111.5	9.1	5.27	.01
WRAT-3								
Arithmetic	93.4	11.4[c]	95.9	15.1	103.6	13.7[d]	2.85	.07
Reading	98.1	13.0[c]	97.8	13.1	108.1	13.1[d]	3.42	.04
Parent RBPC								
Conduct disorder	20.6	6.7[e]	9.1	7.3	3.0	2.9	58.86	.00
Socialized aggression	2.4	2.1[e]	0.7	0.9	0.3	0.8	13.98	.00
Attention problems	18.0	5.8[e]	12.0	5.0	1.9	2.2	78.11	.00
Anxious/Withdrawn	8.9	4.0[e]	6.4	3.8	2.5	2.8	20.51	.00
Psychotic behavior	2.4	1.9[e]	0.9	1.6	0.3	0.5	14.59	.00
Motor excess	5.5	2.3[e]	1.9	1.1	0.5	1.0	58.52	.00
Parent *DSM-IV* rating								
Inattention	8.5	0.9	7.9	1.2			3.44	.07
Hyperactivity/Impulsivity	7.3	1.3	2.2	1.4			129.15	.00
Teacher CAP								
Inattention	10.3	2.8[d]	7.8	4.0[f]			4.46	.04
Overactivity	8.1	2.3[d]	2.6	2.6[f]			37.85	.00

Note. ADHD/C = attention-deficit/hyperactivity disorder, combined type; ADHD/IA = attention-deficit/hyperactivity disorder, predominantly inattentive type; WISC-III = *Wechsler Intelligence Scale for Children–Third Edition*; WRAT-3 = *Wide Range Achievement Test–Third Edition*; RBPC = *Revised Behavior Problem Checklist*; *DSM-IV* = *Diagnostic and Statistical Manual of Mental Disorders, 4th edition*; CAP = *Child Attention Profile.*
[a]*n* = 25 unless otherwise noted. [b]*n* = 13 unless otherwise noted. [c]*n* = 21. [d]*n* = 22. [e]*n* = 23. [f]*n* = 11.

TABLE 2

Group Comparisons on Motivational Measures: Follow-Up Analyses

Measure	Control		ADHD/C		ADHD/IA		ANOVA		ANCOVA	
	M	*SD*	*M*	*SD*	*M*	*SD*	*F*	significant *t* tests[a]	*F*	significant *t* tests[a]
CAIMI	68.7	6.9[b]	64.8	8.7[b]	61.5	7.3[c]	3.7*	N > I	2.6[d]	N > I[e]
Harter (child)										
Preference for challenge	18.2	4.7[f]	14.0	4.1[g]	13.1	4.1[c]	7.6**	N > C & I	6.3**	N > C & I
Curiosity/Interest	18.2	3.9[f]	16.2	3.3[g]	15.5	3.2[c]	3.0[h]	N > I, N > C[i]	1.3	
Independent mastery	17.0	4.1[f]	15.7	3.9[g]	14.4	3.0[c]	1.9		1.6	
Independent judgment	14.9	3.7[f]	12.8	4.0[g]	15.3	3.7[c]	2.5[e]		2.5[d]	
Internal criteria	16.7	4.0[f]	13.1	3.7[g]	12.4	3.6[c]	7.1**	N > C & I	3.5*	N > C, N > I[i]
HIFAS										
Work avoidant	195.2	139.4[f]	242.7	121.0[b]	243.1	126.5[c]	0.9		1.4	
Task	404.3	85.9[f]	423.6	66.4[b]	377.7	83.4[c]	1.4		1.4	
Affiliative	287.8	73.5[f]	274.5	71.4[b]	240.0	78.8[c]	1.8		1.6	
Ego	344.8	53.2[f]	364.5	39.7[b]	312.3	65.2[c]	4.2*	C > I	3.9*	C > I
PTRAAM										
Amotivation	46.8	6.9[j]	26.1	7.0[k]	29.2	5.5[c]	65.1**	N > C & I	61.5**	N > C & I
Mastery	60.9	7.3[j]	48.1	7.4[k]	45.1	7.5[c]	27.3**	N > C & I	23.8**	N > C & I
Competition	14.8	3.5[j]	13.4	3.5[k]	9.2	2.7[c]	12.0**	N & C > I	9.2**	N & C > I
Cooperation	9.2	1.2[j]	7.2	1.6[k]	8.2	1.3[c]	12.5**	N > I, I > C	—	
TRAAM										
Amotivation	47.8	11.4[b]	32.0	9.2[b]	34.2	11.2[l]	13.6**	N > C & I	11.6**	N > C & I
Mastery	61.6	8.0[b]	43.7	7.6[b]	45.9	10.6[l]	27.8**	N > C & I	22.9**	N > C & I
Academic–cognitive skills	26.4	4.3[b]	22.5	5.4[b]	21.0	5.2[l]	5.4**	N > C & I	3.4*	N > C & I
Academic work completion	21.2	2.5[b]	14.7	5.1[b]	13.6	6.2[l]	15.5**	N > C & I	11.1**	N > C & I
Competition	13.0	3.4[b]	10.5	3.2[b]	9.5	2.2[l]	5.5**	N > C & I	4.5*	N > C & I
Cooperation	9.0	1.4[b]	5.1	2.4[b]	6.5	2.0[l]	21.9**	N > C & I, I > C[d]	23.7**	N > C & I
Harter (teacher)										
Preference for challenge	6.4	1.4[b]	3.4	1.6[b]	3.7	1.8[l]	23.0**	N > C & I	19.0**	N > C & I
Curiosity/Interest	4.9	1.2[b]	4.4	1.1[b]	3.7	1.2[l]	3.7*	N > I	2.6[d]	N > I[h]
Independent mastery	6.3	1.7[b]	4.3	1.9[b]	4.5	1.4[l]	7.6**	N > C & I	5.3**	N > C, N > I[h]
Independent judgment	4.0	1.6[b]	5.0	1.7[b]	4.2	1.8[l]	1.8		2.1	
Internal criteria	6.0	1.6[b]	4.4	1.5[b]	4.6	0.8[l]	8.0**	N > C & I	5.6**	N > C

Note. ADHD/C = attention-deficit/hyperactivity disorder, combined type; ADHD/IA = attention-deficit/hyperactivity disorder, predominantly inattentive type; ANOVA = analysis of variance, no covariate; ANCOVA = analysis of variance with IQ as covariate; CAIMI = *Children's Academic Intrinsic Motivation Inventory*; Harter = *Intrinsic Versus Extrinsic Orientation in the Classroom*, child and teacher versions; HIFAS = *How I Feel About School* scale; TRAAM = *Teacher Rating of Academic Achievement Motivation*; PTRAAM = parent version of TRAAM.

[a]N = control; C = ADHD/C; I = ADHD/ IA. [b]n = 22. [c]n = 13. [d]p = .09. [e]p = .10. [f]n = 23. [g]n = 21. [h]p = .06, [i]p = .08. [j]n = 25. [k]n = 24. [l]n = 11.

*p < .05. ** p < .01.

TABLE 3
Group Comparisons on Motivational Measures: Effect Sizes

Measure	*d*		
	N vs. C	N vs. I	C vs. I
CAIMI	0.50[b]	0.95[a]	0.40[c]
Harter (child)			
Preference for challenge	0.95[a]	1.13[a]	0.22[c]
Curiosity/Interest	0.55[b]	0.73[b]	0.21[c]
Independent mastery	0.32[c]	0.65[b]	0.36[c]
Independent judgment	0.55[b]	–0.11	–0.64[b]
Internal criteria	0.93[a]	1.10[a]	0.19
HIFAS			
Work avoidant	–0.36[c]	–0.36[c]	0.00
Task	–0.25[c]	0.33[c]	0.63[b]
Affiliative	0.18	0.66[b]	0.47[b]
Ego	–0.42[c]	0.67[b]	1.03[a]
PTRAAM			
Amotivation	2.98[a]	2.54[a]	–0.48[c]
Mastery	1.74[a]	2.15[a]	0.40[c]
Competition	0.40[c]	1.60[a]	1.29[a]
Cooperation	1.42[a]	0.74[b]	–0.66[b]
TRAAM			
Amotivation	1.53[a]	1.27[a]	–0.22[c]
Mastery	2.29[a]	1.99[a]	–0.25[c]
Academic–cognitive skills	0.80[a]	1.15[a]	0.28[c]
Academic work completion	1.62[a]	2.14[a]	0.20[c]
Competition	0.76[b]	1.05[a]	0.34[c]
Cooperation	1.99[a]	1.40[a]	–0.61[b]
Harter (teacher)			
Preference for challenge	2.00[a]	1.84[a]	–0.18
Curiosity/Interest	–0.61[b]	–0.12	0.46[b]
Independent mastery	0.43[c]	1.03[a]	0.62[b]
Independent judgment	1.11[a]	1.02[a]	–0.11
Internal criteria	1.03[a]	0.89[a]	–0.15

Note. N = control group; C = ADHD, combined type group; I = ADHD, predominantly inattentive type group; CAIMI = *Children's Academic Intrinsic Motivation Inventory*; Harter = *Intrinsic Versus Extrinsic Orientation in the Classroom*, child and teacher versions; HIFAS = *How I Feel About School* scale; TRAAM = *Teacher Rating of Academic Achievement Motivation*; PTRAAM = parent version of TRAAM.
[a]Large effect size. [b]Medium effect size. [c]Small effect size.

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