Attention-Deficit/Hyperactivity Disorder and Methylphenidate: A dose-response analysis and parent-child comparison of somatic complaints

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Attention-Deficit/Hyperactivity Disorder and Methylphenidate: A dose-response analysis and parent-child comparison of somatic complaints

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The authors examined parent and child ratings of somatic complaints in 65 children with Attention-Deficit/Hyperactivity Disorder (ADHD) who received four doses (5 mg, 10 mg, 15 mg, 20 mg) of methylphenidate (MPH) in the context of a double-blind, placebo controlled, within-subject (crossover) experimental design.

Results indicated that parent and child ratings of somatic complaints decreased in a linear fashion from baseline levels as a function of increasing MPH dose and showed minimal variation across MPH conditions. Statistical comparisons of specific somatic complaints indicated minimal agreement between parents and children in contrast to the nearly identical parent-child dose-response curves. The paradoxical findings of fewer somatic complaints associated with MPH, importance of obtaining children's perceptions of MPH treatment, and implications for measuring somatic complaints are discussed.

The putative efficacy of psychostimulants as a first-line treatment for children with Attention-Deficit/Hyperactivity Disorder (ADHD) is well documented and deserved. Few treatments provide benefit to such a large percentage of individuals affected with a particular disorder and improve functioning in multiple domains. Positive effects are ascertained in an estimated 50% to 96% of children with ADHD, depending on the stringency with which positive response is defined and the particular outcome variable targeted. For example, positive treatment response is estimated to occur in 70% of children undergoing psychostimulant therapy (Barkley, 1977a), whereas an overall 96% improvement rate in behavior problems is demonstrated when response is defined as improvement on any one of several alternative psychostimulants (Elia, Borcherding, Rapoport, & Keysor, 1991). Conversely, others have shown response rates to vary between 53% and 94% for academic efficiency and teacher rated classroom behavior, respectively, when positive response is evaluated using psychometric indices such as statistically derived normative comparison scores (Rapport, Denny, DuPaul, & Gardner, 1994).

The breadth of domains shown to improve with psychostimulant treatment is equally impressive. These include direct observations of children's attention, behavior, and academic performance (Barkley, 1977b; Cunningham, Siegel, & Offord, 1985; DuPaul & Rapport, 1993; Douglas, Barr, O'Neill, & Britton 1985; Rapport et al. 1994), parent/teacher ratings of social deportment (DuPaul & Rapport, 1993; Fischer & Newby, 1991; Musten, Firestone, Pisterman, Bennett, & Mercer, 1997), performance on a wide range of clinic-based neuro-cognitive tests, tasks and paradigms (for reviews, see Denny & Rapport, 2001; Losier, McGrath, & Klein, 1996; and Rapport & Kelly, 1991), peer relationships and interpersonal behavior (Barkley, Karlsson, Pollard, & Murphy, 1985; Cunningham, Siegel, & Offord, 1985, 1991; Humphries, Kinsbourne, & Swanson, 1978; Smith et al., 1998; Whalen et al., 1989), and even participation in extracurricular activities, such as playing baseball (Pelham et al., 1990).

As with all medications and most other interventions, side effects can and do occur. Extant research has focused on three classes of dependent variables: height and weight effects, cardiovascular effects, and somatic complaints—the latter of which are assessed using questionnaire data derived from parent, teacher, and more recently, child self-ratings.

Existing literature concerning somatic complaints experienced by children receiving methylphenidate (MPH) has produced inconsistent findings. For example, 8 of 12 studies examining somatic complaints derived from questionnaire data report significantly more complaints

under MPH than placebo conditions. Common complaints associated with MPH therapy included appetite reduction (Ahman et al., 1993; Barkley, McMurray, Edelbrock, & Robbins, 1990; Fine & Johnston, 1993), sleep disturbance (Ahman et al., 1993; Barkley et al., 1990; Fine & Johnston, 1993; Garfinkel, Wender, Sloman, & O'Neill, 1983), headaches (Ahman et al., 1993; Barkley et al., 1990), dizziness (Ahman et al., 1993), and stomachache (Ahman et al., 1993; Barkley et al., 1990). Two studies failed to find significant differences in somatic complaints between MPH and placebo conditions (Buitelaar, van der Gaag, Swaab-Barneveld, & Kuiper, 1996; Manos, Short, & Findling, 1999), whereas four reported paradoxical findings—that is, a significantly greater number of somatic complaints under placebo compared to MPH conditions.

Three of the four studies reporting paradoxical findings were based on teacher reports of either more frequent (Barkley et al., 1990; DuPaul, Anastopoulos, Kwasnick, Barkley, & McMurray, 1996) or more severe (Barkley et al., 1990; DuPaul et al., 1996; Fisher & Newby, 1991) somatic complaints under placebo than MPH. The fourth study relied on parent ratings and reported significantly fewer somatic complaints such as staring, daydreaming, irritability, anxiety, and nail biting under MPH than placebo (Ahman et al., 1993).

Explanations offered to account for the paradoxical findings include the possibility that (a) adult raters (parents, teachers) confuse some symptoms of the disorder such as daydreaming and staring with drug-related side effects (Fine & Johnson, 1993), and (b) children with ADHD exhibit moderate rates of somatic complaints without treatment (i.e., normal base rates). In the latter case, both baseline-placebo and baseline-active drug statistical contrasts would be required to differentiate everyday complaints from those due to expectancy or drug effects. Despite the abundance of published MPH side effects studies, only one included both baseline-placebo and baseline-active drug statistical contrasts (Schachar, Tannock, Cunningham, & Corkum, 1997). This study, however, cannot address whether decreased side effects under MPH are associated with higher baseline rates of somatic complaints because of its design (between-group); use of a single, predetermined target dose; and titration procedure (designed to "minimize side effects," p. 756).

The purposes of the present study were to (a) determine whether somatic complaints are reduced (paradoxical effects) in children with ADHD as a function of MPH treatment by examining requisite baseline-drug and placebo-drug statistical contrasts, as well as the dose-response nature of these effects; and (b) evaluate whether findings concerning the occurrence and pattern of side effect endorsement differ as a function of rater (parent vs. child). Rater differences were examined based on recent evidence indicating that children can reliably report their own discomfort when prescribed a psychostimulant regimen and endorse more side effects per dose than do their parents (DuPaul et al., 1996).

Method

Participants

One hundred thirty-four children were screened for inclusion in the study after referrals from psychiatrists, pediatricians, and school personnel over a 5-year period. All children and their parents participated in a detailed, semi-structured clinical interview with the clinic's supervising psychologist (M.D.R.). The interview was adapted from the Schedule for Affective Disorders and Schizophrenia for School-Age Children (Orvaschel, Puig-Antich, Chambers, Tabrizi, & Johnson, 1982) and reviewed symptoms associated with disorders usually evident in childhood and adolescence as outlined in the DSM-III (American Psychiatric Association, 1980). Children were required to meet the following inclusion criteria: (1) an independent diagnosis by the child's referring physician and the Children's Learning Clinic (CLC) clinical psychologist (M.D.R.) using DSM-III criteria for ADDH; (2) a maternal report of a developmental history consistent with ADDH and problems in at least 50% of the situations on Barkley's (1990) Home Situations Questionnaire; (3) a maternal rating of at least 2 standard deviations above the mean for the child's age on the Werry-Weiss-Peters Activity Scale (Routh, Schroeder, & O'Tauma, 1974); (4) a teacher rating of at least 2 standard deviations above the mean on the Abbreviated Conners Teacher Rating Scale (Werry, Sprague, & Cohen, 1975); and (b) absence of any gross neurological, sensory, or motor impairment as determined by pediatric examination.

Sixty-five children (58 boys, 7 girls) met criteria and participated in the study after written informed consent was obtained from their parent. Selected children were from 6 to 11 years of age (mean = 8.56) and fell within the average range of intelligence (mean = 102.8; SD = 10) based on the Peabody Picture Vocabulary Test–Revised, Form L (Dunn & Dunn, 1981). All participants were Caucasian and from families of low to middle socioeconomic status (Hollingshead, 1975). Eight had experienced brief trials of psychostimulant within the past four years.

All children were considered pervasively hyperactive as judged by clinical interview and rating scale scores. A systematic review using current diagnostic nomenclature indicated that each of the 65 children would currently be classified as meeting criteria defining ADHD combined type, as detailed in the DSM-IV (American Psychiatric Association, 1994). The clinical outcome of these children has been reported elsewhere (see Rapport et al., 1994).

Many of the children showed symptoms of but did not meet formal criteria for mood and anxiety disorders. As a result, findings of this study may not generalize to children comorbid for ADHD and anxiety or affective disorders. Comorbidity for oppositional defiant disorder was not assessed because of the controversial nature of the disorder at the time the study was initiated. All selected children were attending regular elementary school classrooms, although several received concurrent special education services. Learning disabilities were not specifically assessed.

Thirty-one of the 69 nonparticipating children met criteria and were enrolled in an abbreviated placebo-controlled medication trial (5 to 15 mg of MPH) during the first year of the clinic's operation and are not reported on here. Insufficient data were available for 2 children because of school conflicts, and 1 child moved out of state before completing the study. Side effect ratings were not obtained for the first 11 children participating in the 5–20 mg medication trials because the procedure was implemented late in the second year of the clinic's operation. The remaining 24 children scored within the established range for inclusion on the various rating scales, but their developmental histories were inconsistent with DSM-III criteria (i.e., onset of symptoms later than age 7 and/or duration less than 6 months). Fourteen of these children met criteria for conduct disorder, 7 showed symptoms of anxiety disorder (1 social phobia, 6 separation anxiety disorder), 1 had an eating disorder, and 2 were referred for neurological evaluation because there was evidence of a seizure disorder.

Experimental Design and Procedures

Drug administration. A double-blind, placebo-controlled, within-subject (crossover) experimental design was used in which ADDH children received a placebo and each of four active MPH doses after baseline assessment. Order of dose administration was counterbalanced and determined by random assignment such that an equal number of children received each dose during a given week of the study. MPH was prescribed by each child's physician in the following doses: placebo, 5 mg (range = .10 to 0.26 mg/kg), 10 mg (range = 0.20 to 0.52 mg/kg), 15 mg (range = 0.29 to 0.79 mg/kg) and 20 mg (range = 0.39 to 1.1 mg/kg). Fixed doses were used to reflect typical pediatric practice and because response to MPH is independent of body mass (Rapport & Denney, 1997; Swanson, Cantwell, Lerner, McBurnett, & Hanna, 1991). MPH and placebo doses were packaged in colored gelatin capsules by the clinic's pharmacist to avoid detection of dose and taste. Capsules were sealed in individual, daily envelopes to help control for accurate administration.

After baseline data collection (first and second week), parents were given 1 week's medication in predated envelopes at a single dose level (i.e., placebo, 5 mg, 10 mg, 15 mg, or 20 mg). Single morning doses (as opposed to twice per day) were administered to maintain experimental control, as it was not possible to ensure that medication would be appropriately administered at school at an established time during the day. This procedure continued until each child received every dose for 6 consecutive days. All weekly dose changes occurred on Sundays. No capsules were administered on Saturdays to allow for "washout" and to control for possible rebound effects. Parents were instructed to give their children one capsule each morning, one half hour before breakfast. Both used and unused envelopes were returned on a weekly basis to control for medication compliance. Medication was properly administered nearly 100% of the time. "Makeup" observation days were scheduled in 4 cases when compliance was not obtained.

Assessment of somatic complaints. Children and their parents completed the Subjective Treatment Emergent Symptoms Scale (STESS; Guy, 1976) during baseline, placebo, and each of the MPH conditions. The STESS was devised for adult raters and consists of questions concerning the occurrence and severity of a broad range of possible somatic complaints and emergent symptoms associated with drug therapy. A 4-point, Likert-type response format ("not at all," "just a little," "pretty much," and "very much") was used in response to a general question ("Have you had any trouble with...?"). The general question was revised for purposes of the present study to read, "During the past several days did you observe (in your child) or did your child complain of any of the following?" The original format of the STESS included several potential somatic complaints that would be difficult to interpret in terms of directionality, such as whether a child experienced problems with eating, drinking, or bowel movements (i.e., it would be unclear whether the child was eating more or less, drinking more or less, or having more or fewer bowel movements). To reduce ambiguity,

questions of this type were reworded to reflect a directional concern (e.g., "Did you observe your child eating more during the past several days?" followed by a separate question, "Did you observe your child eating less during the past several days?"). The revised parent version included a total of 69 questions.

An equivalent child version was created such that items on the adult version were reworded asking children directly whether they had experienced a particular problem, and if so, the degree of severity (e.g., "During the past few days did you feel more thirsty?" Response options were "not at all," "just a little," "pretty much," "very much"). The revised child version included a total of 63 questions.

Parents completed the side effect questionnaire during each weekly visit to the clinic. Children were administered the scale during each weekly visit by trained graduate research assistants who read each item aloud to the children and recorded their verbal responses. Graduate assistants were blind concerning children's medication status. Completed questionnaires reflected somatic complaints noticed by parents or experienced by children within the past three days and associated with a single experimental condition (baseline, placebo, or one of the four MPH conditions).

Results

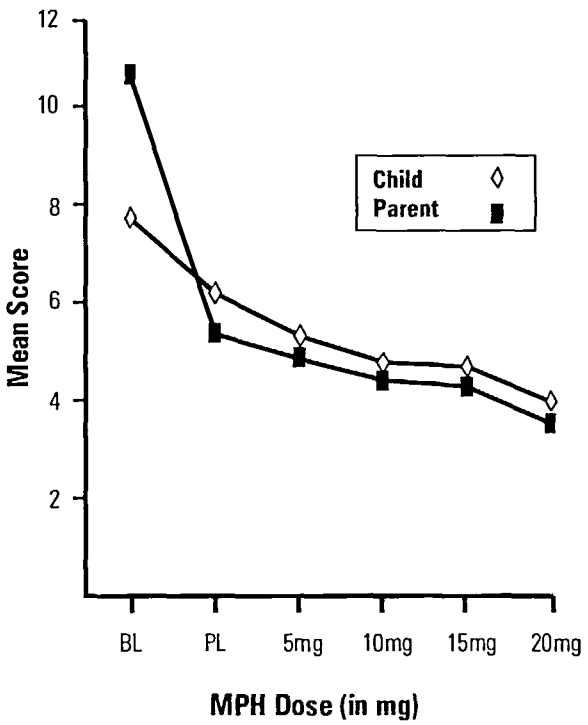
A three-tier data analytic approach was incorporated to address the primary purposes of the study. Parent and child ratings of somatic complaints were analyzed in the first tier to examine differences in ratings and between raters under baseline, placebo, and active drug (MPH) conditions. Complementary analyses of trend were used to elucidate the shape of obtained dose-response curves for parent and child ratings across experimental conditions. The ensuing two sets of analyses examined whether parent-child dyad endorsements of somatic complaints differed significantly under each of the experimental conditions, and the relative strength of these associations.

Series I Analysis: Differences in Somatic Complaints as a Function of Rater and MPH Dose

Parent and child endorsements of somatic complaints were analyzed using a 2 (between subjects: parent, child raters) x 6 (conditions: baseline, placebo, 5 mg, 10 mg, 15 mg, 20 mg MPH) mixed-subjects, repeated-measures analysis of variance (ANOVA). The 2-way interaction involving drug condition and rater was significant [$F(5, 290) = 3.34$, $p < .01$], as was the main effect for drug condition [$F(5, 290) = 19.07$, $p < .0001$]. No significant main effect emerged for raters [$F(1, 58) = .02$, *ns*], indicating that parents and children did not differ in their endorsements of somatic complaints across experimental conditions. Post-hoc analyses using Tukey's HSD revealed that children's complaints under baseline were significantly higher compared to placebo and all active drug conditions ($p < .01$), whereas no other differences among drug conditions by rater or between raters for drug conditions were significant. Thus, the significant interaction effect was due solely to the fact that children rated somatic complaints somewhat (albeit not significantly) higher during baseline but lower under drug conditions than did parents. Mean endorsement of somatic complaints by parents and children under baseline, placebo and the four MPH conditions is depicted in Figure 1.

Trend Analysis. Analyses of trend were performed to examine the shape of the relationship between parent and child ratings of somatic complaints and MPH dose. In the first set of analyses, parent and child endorsements of somatic complaints under baseline and active medication conditions were examined (i.e., the placebo condition was excluded). The ensuing analyses were conducted using placebo and active drug conditions, while excluding baseline. (Note: a basic assumption of trend analysis is that "levels" of experimental conditions be of similar magnitude, which precludes simultaneous use of both baseline and placebo in the same analysis). The proportion

Figure 1. Mean Somatic Complaint Scores



Note. Lower scores indicate fewer somatic complaints.
B = Baseline; PL = Placebo; MPH = Methylphenidate

of treatment variance (R^2_{Trend}) was computed for each significant trend component to elucidate the properties of the curves. This analysis allows one to determine the relative contribution of each trend component (e.g., linear, quadratic) when more than one component reaches statistical significance (Keppel, 1991).

Trend analysis of **parent** endorsements of somatic complaints excluding the placebo conditions (i.e., baseline, 5 mg, 10 mg, 15 mg, 20 mg) revealed a significant linear trend [F (1, 232) = 15.38, $p < .0001$]. Higher order trends (quadratic, cubic) were not significant. In contrast, analysis of **child** endorsed somatic complaints revealed significant linear [F (1, 290) = 55.37, $p < .0001$], quadratic [F (1, 290) = 19.80, $p < .0001$], and cubic [F (1, 290) = 15.02, $p < .0001$] trend components. As shown in Table 1, the proportion of treatment variance accounted for by the significant trends was minimal (i.e., < 10%). This indicates that somatic complaint endorsements by both parents and children show a fairly robust (children) or small (parents) decline from baseline and are largely characterized by minimum variation across MPH conditions. Trend analysis of parent and child endorsements of somatic complaints excluding the baseline condition (i.e., placebo, 5 mg, 10 mg, 15 mg, 20 mg) revealed no significant trends for parents or children.

Collectively, the preceding analyses indicate a slight reduction in child and parent endorsement of somatic complaints from baseline to active MPH conditions and no significant variation among placebo and active drug conditions.

Qualitative Analysis. Mean levels of somatic complaints were examined qualitatively to examine the possibility that higher levels of specific somatic complaints may be reported but obscured by traditional quantitative analysis. Mean somatic complaint total scores for parents and children ranged from 3.59 to 10.78, with 90 representing the highest total score possible. The five most frequent somatic complaints with highest mean ratings (means shown in parentheses) across active drug conditions endorsed by parents included increased talkativeness (.46), difficulty sitting still (.35), insomnia (.34), reduced appetite (.32), and increased tearfulness (.30). Two of these (increased talkativeness, insomnia) corresponded with the five most frequent complaints endorsed by children: increased talkativeness (.36), having a cold or sniffles (.36), increased tiredness (.31), insomnia (.27), and increased thirst (.26). Collectively, the results indicate that both parents and children report low levels of somatic complaints associated with MPH therapy (i.e., 3.0 represents the highest rating possible for a single item) up through and including the highest 20 mg dose.

Table 1. Trend Analysis Summary for Parent and Child Somatic Complaint Ratings

Task	F_{Lin}	R^2_{Lin}	F_{Quad}	R^2_{Quad}	F_{Cubic}	R^2_{Cubic}
Parent						
Excluding placebo	15.38*	.038	3.83	.009	5.98	.015
Excluding baseline	5.35	.014	.30	.076	2.76	.007
Child						
Excluding placebo	55.37*	.058	19.80*	.021	15.02*	.016
Excluding baseline	5.35	.014	.30	.001	.09	.007

Series II Analysis: Differences in Parent-Child Endorsements

The preceding analyses are useful for evaluating overall mean differences and trends associated with parent and child ratings of somatic complaints across experimental conditions, but fail to address whether ratings of *specific* somatic complaints differ significantly between raters. The ensuing analysis thus addresses a complementary and perhaps more pertinent clinical question with respect to the degree to which parents and children agree concerning the occurrence and severity of specific somatic complaints associated with MPH therapy. Difference scores were calculated for each parent-child dyad based on individual rating scale items (i.e., only identical items appearing on the child and parent versions were included; total identical items = 48). These scores were subsequently averaged across all parent-child dyads to form an overall group mean for each dose condition. The authors conducted t tests to determine whether the group mean difference score for any experimental condition was significantly different from zero using a Bonferroni correction to control for Type I error rate. Group mean difference scores differed significantly from zero at each dose condition: baseline [t (64) = 13.36, $p < .001$], placebo [t (62) = 8.40, $p < .001$], 5 mg [t (64) = 9.80, $p < .001$], 10 mg [t (62) = 8.19, $p < .001$], 15 mg [t (63) = 9.51, $p < .001$], and 20 mg [t (62) = 10.60, $p < .001$]. This finding indicates that parents and children rate individual somatic complaints differently from one another under all experimental conditions including baseline, placebo, and active drug. (Note: differences in sample size in the preceding analysis represent occasional unendorsed items by parents and children).

Series III Analysis: Agreement in Parent-Child Endorsements

The preceding analysis indicates that parents and children differ in their endorsements of specific somatic complaints across all experimental conditions, but provides no information concerning the degree to which endorsements may be correlated across experimental conditions despite their mean differences. That is, parent-child endorsements for specific somatic complaints could be significantly different yet perfectly correlated if parents and children use different baseline anchors for their initial ratings, but indicate a similar degree of change in somatic complaint ratings as a function of increasing dose or for a particular dose.

Correlation coefficients were calculated using parent and child endorsements for each scale item in each experimental condition (baseline, placebo, 5 mg, 10 mg, 15 mg, 20 mg). An average correlation coefficient was subsequently calculated to reflect parent-child agreement concerning the occurrence of somatic complaints for each experimental condition. Obtained correlations for parent-child endorsements of somatic complaints under baseline ($r = .09$), placebo ($r = .08$), 5 mg ($r = .14$), 10 mg ($r = .08$), 15 mg ($r = .08$), and 20 mg ($r = .13$) MPH were remarkably low and indicate minimal agreement between raters for specific somatic complaints items across all experimental conditions.

Discussion

Parent- and child-reported somatic complaints assessed by weekly questionnaires were analyzed for children undergoing an acute controlled trial of MPH to examine the dose-response nature of these effects and similarities between raters. Results indicate that parents and children rate somatic complaints similarly under both nondrug (baseline, placebo) and active drug (5 mg, 10 mg, 15 mg, 20 mg MPH) conditions based on mean total rating scale scores. Between-dose effects were found for child but not parent ratings and were specific to baseline rating differences. That is, children endorsed significantly more somatic complaints under baseline compared to placebo and all active MPH conditions, whereas no significant between-dose effects were found for parents.

The findings corroborate those reported in previous investigations using both parent and child report of side effects (DuPaul et al., 1996), and support their proposition that children can reliably report their own discomfort while undergoing a prescribed trial of psychostimulants. They are also consistent with recent reviews suggesting that insomnia and reduced appetite are among the most common side effects and occur at a relatively low rate during acute MPH trials (Barkley et al., 1990). The findings differ, however, from the only other published study (Schachar et al., 1997) to contrast both baseline and placebo with active drug conditions to differentiate everyday (nondrug related) complaints from those due to expectancy or drug effects. Schachar et al. (1997) examined parent and teacher side effect ratings in 91 children with ADHD who were randomly assigned to receive either MPH (titrated to a target dose of 0.7 mg/kg daily) or a placebo. Teachers did not report any significant increase in side effects in MPH- and placebo-treated children, whereas parents reported statistically significant increases in two domains (physiological, affective) under active drug contrasted with baseline. Anorexia and stomach aches were the most common physiological side effects, and withdrawal, sadness, and crying the most common affective side effects associated with MPH. Increases in both domains were of small magnitude (i.e., mean ratings of 1.2 or less based on a 10-point Likert scale). Differences in design (between group), experimental methods (single dose gradually titrated upwards with different children receiving different end doses of MPH), and statistical procedures (children receiving active drug were not administered a placebo, and those receiving a placebo did not receive MPH) preclude direct comparisons of the two studies.

Additional research involving careful replication and inclusion of necessary contrast conditions (i.e., baseline assessment) is warranted to clarify whether emergent symptoms occur over and above those observed under baseline conditions in both acute and extended trials with psychostimulants across a broad range of doses. Past studies, for example, reveal that somatic complaints such as headaches, stomach aches, musculoskeletal pain, back pain, dizziness, and fatigue are common in children (Campo & Fritsch, 1994; Garber, Walker, & Zeman, 1991), with 10% to 30% of children reporting weekly or frequent headaches (Egger, Angold, & Costello, 1998), 10% to 25% reporting recurrent abdominal pain (Alfven, 1993; Garber et al., 1991), and 5% to 20% complaining of musculoskeletal pain (Abu-Arafeh & Russell, 1996; Kristjansdottir, 1997). Psychiatric disability appears to accentuate the incidence of somatic complaints in children with internalizing (depression, anxiety disorder) and externalizing disorders (oppositional defiant disorder, conduct disorder, ADHD), and stomach aches in particular in children with ADHD (odds ratio = 3.5) compared to those without the disorder (Egger, Costello, Erkanli, & Angold, 1999). These findings coupled with the current results suggest that the "paradoxical" findings of fewer side effects associated with

MPH contrasted with placebo reported previously may be a function of normally occurring base rates and associated emotional-behavioral problems. For example, children with ADHD are known to experience significant problems and associated distress at home and in school owing to inherent difficulties associated with the disorder, and may internalize these difficulties as physical complaints. In such cases, improved behavior and school performance associated with MPH therapy may correspond with reductions in somatic complaints consistent with our findings and others reporting reductions in side effects ratings as a function of MPH therapy (Ahman et al., 1993; Barkley et al., 1990; DuPaul et al., 1996; Fisher & Newby, 1991). Further research can help elucidate this issue by establishing whether the breadth and severity of general physical complaints reported by children with ADHD vary as a function of school and/or home difficulties over time.

Complementary analyses were undertaken to examine parent-child agreement concerning the occurrence and severity of specific somatic complaints. Item-by-item agreement for parent-child dyads was examined by means of conventional between-rater correlation coefficients and difference scores. Obtained correlations indicated marginal agreement between parents and children on specific item endorsements (i.e., average correlation coefficients never exceeded .14 under the 6 experimental conditions, accounting for less than 2% of shared variance), and complementary analysis of difference scores suggest that parent and child ratings of specific somatic complaints differed significantly under all experimental conditions (baseline, placebo, and active drug).

Collectively, the findings have implications for measuring somatic complaints in children and for the broader field of child psychopathology. For example, the lack of agreement between parents and children may be due to several factors. Most but not all rating scale items on the STESS and other commonly used side effect questionnaires inquire about internal states (e.g., stomach discomfort, headache, mood, anxiety) that are not readily observed by others in the child's environment. In these cases children, as opposed to external observers, must be relied upon to accurately report occurrence, severity, and possible changes over time. Additional study is needed, however, to assess the temporal stability of these ratings (e.g., by assessing within- or between-day complaints) and to cross validate their occurrence with observational data whenever possible. The results also imply that the growing body of research in child psychopathology based on parent-child report data may require closer scrutiny. Theory, developmental trajectories, and treatment outcome are frequently based on parent and child total score behavior ratings which may provide unstable or biased estimates concerning item level agreement. To address this possibility, analysis of total scores may need to be complemented by item level analysis to elucidate potential discrepancies between raters and the effect such findings may have on understanding child psychopathology.

Extant literature indicates that side effects associated with MPH may include transient weight loss, initial reductions in height velocity, elevated heart rate, increased blood pressure, and somatic complaints (i.e., reduced appetite, sleep disturbance, headaches, dizziness, and stomach aches). The more easily quantifiable side effects (e.g., blood pressure, heart rate, weight) are mostly transient, dose-dependent, easily rectified with dosage adjustments, and considered minor from a clinical perspective considering the breadth and level of improvement in behavior and cognitive functioning observed in most children. Previously reported somatic complaints associated with psychostimulant therapy may reflect symptoms occurring prior to the initiation of treatment (at least to some degree) and require additional study. Careful monitoring of emergent symptoms in children undergoing MPH therapy remains the *sine qua non* of professional care and should be supplemented with prudent baseline assessment to disentangle normally occurring somatic complaints from changes associated with active treatment.

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