

A Family-Centered Approach to Planning and Measuring the Outcome of Interventions for Children with Attention-Deficit/Hyperactivity Disorder

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This paper discusses a set of closely related parenting and family factors that should be considered when planning and measuring the outcome of interventions for children with attention-deficit/hyperactivity disorder (ADHD). These include parenting and parent-child relationships, parental cognitions, parental adjustment, marital interactions, general family relationships, and adaptive child functioning within the family.

The measurement of each construct is discussed, and comparative, longitudinal, and treatment outcome studies using these measures are reviewed. It is concluded that measures of treatment outcome for children with ADHD could be improved by utilizing multiple informants, developing tools with greater content and contextual validity, relying more on observational methods, and identifying those measures which are of greatest importance to families. Given the multiple pathways via which both psychosocial and pharmacological interventions exert their influence, composite measures combining multi-informant, multimethod constructs may represent more useful measures of treatment outcome than measures of primary ADHD symptoms.

Key words ADHD; family; outcome measurement

Problems in parent-child interactions, marital relationships, family functioning, and parental adjustment are common in some, though certainly not all, families of children with attention-deficit/hyperactivity disorder (ADHD).¹ These problems emerge in the preschool years,¹⁻⁴ persist through elementary school, and often intensify during adolescence.^{5,6} This review suggests that an interrelated family-centered series of constructs represents a more promising set of outcome measures for studies of the treatment of children with ADHD than do symptom counts. Problems in parent-child and family relationships are, themselves, a considerable source of stress that may prompt parents of children with ADHD to seek treatment. Indeed, most of the parenting and family outcomes included in this review represent important targets for assessment and treatment planning. Parenting, parental adjustment, and marital relationships may be affected differently by psychosocial and pharmacological treatments for children with ADHD. Assessing the

outcome of these interventions and understanding their potential impact on longer-term child and family adjustment require a more systemic approach to the measurement of constructs that are important to families.

The measures included in this review met several criteria. First, the review was narrowed to dimensions of parenting, marital relationships, family functioning, and parental adjustment that can be measured reliably. Second, measures were included that are associated with ADHD or closely related disruptive behavior disorders in correlational, cross-sectional, or longitudinal studies. Third, this review focused on parent-child or family measures that appear to be linked to longer-term outcome for children with ADHD and their families. For example, measures were included that may act as *moderators* by influencing the strength of the relationship between predictors and important child outcomes, or *mediators*—measures of the mechanisms via which other predictor variables influence the outcome of children

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with ADHD.⁷ Finally, the review was restricted to measures of parent-child and family relationships that are sensitive to the effects of evidence-based psychosocial or pharmacological treatments.

Given the space available and the vast literature in this area, this review is necessarily selective; it does not represent an exhaustive discussion of all potentially useful child and family outcomes. Moreover, it is recognized that many of the factors contributing to relational difficulties in the families of children with ADHD adversely affect the child's interactions with peers⁸⁻¹¹ and teachers.^{12,13} For a more definitive discussion of these issues, see reviews by Johnston and Mash¹ or Barkley.¹⁴

The Table summarizes the measurement framework used to organize this review. Although the Table does not represent the complex relationships among these measures, there are several assumptions underlying this framework. First, correlations between outcome measures at adjacent levels should be stronger than those between more distal measures. The correlation between ADHD symptoms and adaptive child functioning, for example, should be stronger than the relationship between ADHD symptoms and family functioning. It follows that studies composing groups based on measures at a given level should observe greater differences on immediately adjacent levels than on more distal levels. For example, if children are grouped on the presence or absence of ADHD symptoms, we should be more likely to observe associated differences in adaptive functioning,

child compliance, and parenting strategies and less likely to detect differences in more general measures of family functioning.

Second, to the extent that causal relationships between variables exist (see below for a caution), outcomes at adjacent levels are more likely to influence, or be influenced, by one another. Proximal factors are more likely to exert a direct effect, whereas distal factors may exert a moderating or mediating influence.⁷ Primary ADHD symptoms, for example, appear to exert a direct effect on adaptive child functioning. Effective parenting practices, however, may moderate the strength of the relationship between ADHD symptoms and adaptive functioning. Parenting may also represent a mediating mechanism via which marital relationships may contribute to poor outcome for children with ADHD. Conflict regarding discipline, for example, may result in inconsistent child management strategies, deteriorating parent-child relationships, and a resulting increase in noncompliance and oppositional behavior.

Third, to the extent that interventions targeting outcomes at a given level are effective, we might anticipate greater changes in immediately adjacent levels than in more distal variables. For example, if stimulant medications improve ADHD symptoms, they should have secondary effects on parenting. Influences on family functioning, in contrast, should be more difficult to detect.

Table I. Family Centred Outcome Measures

ADHD Symptoms
Child Behavior
Adaptive Child Functioning
Child Compliance
Parenting
Child Management Strategies
Parental Monitoring
Parental Cognitions
Knowledge About ADHD
Attributions for Child Behavior
Parental Sense of Competence
Readiness for Change
Treatment Satisfaction
Parental Adjustment
Parenting Stress
Adult ADHD
Parental Depression
Family Functioning
Marital Relationships
Communication, Problem Solving, and Structural Family Relationships

Cautionary Note on Causal Mechanisms

Although this review discusses dimensions of parenting, marital relationships, and family functioning that constitute important treatment planning and outcome measurement considerations, a cautionary note regarding our understanding of the causal mechanisms linking ADHD with parent-child interactions and family relationships is warranted.¹ Much of the research reviewed here is based on cross-sectional designs comparing the family relationships of children with and without ADHD. A smaller number of studies describe the longitudinal course of these relationships. Though informative, these designs do not permit conclusions regarding the causal mechanisms regulating ADHD, parenting, and larger family relationships. Although ADHD appears to have a strong hereditary basis^{14,15} the extent to which correlations between ADHD symptoms and family interactions reflect the response of parents to the ADHD child's poorly regulated behavior, the influence of parenting

on the emergence or course of ADHD, or more complex gene-environment interactions,¹⁶ is not understood.

Child Behavior

Adaptive Child Functioning

While many studies have focused on the measurement of primary ADHD symptoms (e.g., inattention, impulsivity, and overactivity), fewer explore the links between ADHD and adaptive child behavior or the effects of treatment on functionally important adaptive behaviors. Adaptive measures may assess the completion of tasks of daily living, participation in social and recreational activities, or social relationships with siblings and parents. Adaptive functioning in children with ADHD can be measured via child, teacher, parent, or clinician ratings.^{17–20} The Home Situations Questionnaire, for example, measures how much difficulty parents have negotiating 16 functionally important family activities such as getting dressed, having meals, taking trips to public places, completing homework, or getting to bed.¹⁷ The parent form of the Impairment Rating Scale provides broader measurement of sibling, parent and peer relationships, family functioning, academic progress, self-esteem, and overall impairment.¹⁸

There are several rationales for measuring adaptive child functioning:

1. Cross-situational impairment in social, academic, or occupational functioning is a Diagnostic and Statistical Manual of Mental Disorders (Fourth Edition) (DSM-IV) diagnostic criterion.
2. Many of the most problematic interactions between children with ADHD and their families occur in the context of functionally important daily tasks.¹⁷
3. ADHD is associated with specific impairments in processes such as sleep that may complicate the difficulties parents experience during daily activities and transitions.^{21,22}
4. Measures of child functioning are more useful than ADHD symptom counts when planning psychosocial interventions.¹⁸ In parent training, for example, participants develop strategies to manage routine daily transitions (e.g., getting ready for school), essential tasks (e.g., completing homework), recreational activities, social relationships (e.g., interactions with siblings), or family meetings to plan leisure activities, solve problems, or resolve conflicts.²³ Because psychosocial interventions such as parent training often target

adaptive functioning rather than primary ADHD symptoms, adaptive child functioning may be a more appropriate measure of the outcome of these programs than symptom rating scales.

5. Although moderate correlations suggest considerable overlap between measures of ADHD symptoms and measures of child functioning, these remain relatively independent constructs.^{18,24} A reduction in symptom counts, therefore, may not result in a corresponding improvement in adaptive functioning.

Children with ADHD present more impairments in adaptive functioning than controls without ADHD.^{17,18,25} Moreover, adaptive functioning appears to be an important predictor of longer-term outcome. Children meeting full DSM-IV impairment criteria for ADHD at ages 4 to 6, for example, are more likely to evidence a full ADHD diagnosis at 3-year follow-ups.²⁵ Although measures of adaptive functioning generally improve in response to both psychosocial and pharmacological interventions,²⁶ medications that reduce ADHD symptoms may, via their effects on appetite,^{21,27} sleep,^{21,22} and growth,²⁸ increase problems during adaptively important activities such as meals or bedtimes. The observation that interventions might improve some aspects of adaptive functioning while increasing problems in others emphasizes the importance of measures that are sensitive to many different domains of adaptive functioning.

Child Compliance

Child compliance is often measured using direct observations of parents interacting with their child in standard laboratory tasks.^{29–31} Parents may also report on compliance during daily activities such as homework, chores, or bedtime.¹⁷ Children with ADHD are less likely to sustain their attention to play or to task-related activities with their parents,^{3,29,31–33} and are less cooperative and less likely to comply with parental commands.^{29,32,24,34}

The sensitivity of child compliance as an outcome is evident in randomized trials of parent training programs showing that improvements in the child management strategies of parents of preschoolers with ADHD increase observational measures of child compliance.³⁰ Similarly, in a systematic review of studies examining the link between parenting and child behavior, Rothbaum and Weisz³⁵ concluded that studies experimentally improving parenting had a “. . . strong and significant effect on child compliance.” With some exceptions,³⁶ doses of stimulant

medications that reduce overactivity, impulsivity, and inattention also improve compliance in children with ADHD.^{32,37}

Parenting Child Management Strategies

Parenting is a central outcome to measure for at least 3 reasons. First, the management strategies parents adopt exert a short-term influence on child behavior. Managing the daily tasks of family life (e.g., meals and bedtime), responding to noncompliance, dealing with sibling conflict, or solving the more complex problems encountered during adolescence requires effective parenting skills. Second, child management strategies may moderate the strength of the relationship between primary ADHD symptoms and adaptive outcomes.⁷ Third, the child management strategies parents use are important predictors of longer-term adjustment and a mechanism or mediator⁷ via which other factors such as treatment, parental depression, or marital conflict may influence child development.

Child management strategies are often measured by coding live or videotaped parent-child interactions in standard laboratory^{37,38} or home settings.² Child management strategies may also be assessed by observing and rating key dimensions of parent-child interactions in a standard setting (e.g., completing chores or academic tasks). Keown and Woodward,⁴ for example, observed parents interacting with their child in a 10-minute free-play period. Observers rated “interactional synchrony” and “directiveness” on a 5-point Likert scale in 30-second intervals. Mothers of preschoolers with ADHD evidenced more asynchronous interactions than those of children without ADHD,⁴ a measure other investigators have linked to children’s social competence.³⁹

Other investigators have employed structured interviews presenting parents with standard descriptions of childhood behavior problems and asking them to discuss how they would manage the problem.² When presented with written descriptions of oppositional behavior or conduct problems, for example, parents of preschoolers at risk for ADHD proposed the more controlling, less positive strategies typically reported in observational studies of interactions between children with ADHD and their parents.²

In other studies, parents complete standardized parenting questionnaires.^{40,41} Keown and Woodward,⁴ for example, asked parents to complete the 30-item Parenting Scale.⁴⁰ Parents of preschoolers with ADHD

used more lax and overreactive parenting strategies than those of children without ADHD.^{4,41}

Studies using different diagnostic strategies and approaches to measurement have yielded a similar pattern of findings; parents of children with ADHD interact in a more controlling, less positive way with their child.^{2–4,29,31,41–43} This continues into adolescence where the interactions of ADHD youth and their parents are marked by conflict over a wider range of issues.^{5,6,44}

Many studies in this area have included mixed samples of children with ADHD and comorbid oppositional or conduct disorders, which makes it difficult to determine whether the more controlling approach used by parents of children with ADHD is associated with ADHD symptoms or conduct problems. A growing number of studies, however, suggest that less responsive parenting,⁴⁵ coercive parenting^{41,45} and parent-adolescent conflict⁴⁴ are more closely linked to comorbid oppositional and conduct disorders than to ADHD symptoms.

As noted above, it has also been difficult to determine the extent to which correlations between parenting and child behavior reflect the influence of parenting on child behavior, the influence of child behavior on parenting, the bidirectional influences of parents and children, or the shared genetic makeup of parent and child. Although some reviews have questioned the influence of parents on child development,⁴⁶ evidence regarding the importance of parenting is emerging from a more recent series of studies using the monozygotic differences method.^{47,48} This approach examines the extent to which differences in identical twins are associated with nonshared environmental factors such as differential parenting.⁴⁸ Because monozygotic twins are genetically identical, differences in their behavior must be due to nonshared environmental factors.^{47,48,49} Interestingly, parents often report differences in the behavior of individual twins in monozygotic pairs. Asbury and colleagues⁴⁸ found that parents reported using harsher discipline and feeling more negative toward the twin they rated as more hyperactive or conduct disordered. The relationship between parenting and child behavior was stronger in chaotic family environments.⁴⁸ In another study, the emotional tone of mothers’ descriptions of individual 5-year-old twins, a measure that is correlated with more authoritarian parenting of children with ADHD,⁵⁰ predicted differences in teacher ratings 2 years later: The twin that mothers described with more negativity and less warmth at age 5 was judged by their teachers to be more antisocial at age 7.⁵⁰

Parents suggest different strategies in response to written vignettes describing children with ADHD symptoms, oppositional behaviors, or conduct problems.² Parents also propose different strategies when presented with videotaped examples of different child behavior problems,⁵¹ and indeed, adopt different strategies when confronted with children with or without conduct problems.⁵² In crossover trials, parents of children with ADHD showed a reduction in controlling strategies and an increase in positive responses when their children shift from placebo to methylphenidate.^{32,37} Together, these studies suggest that the more controlling, less positive approach to child management evident in observations of parental interactions with children with ADHD^{29,31,32} is, to some extent, elicited by active, poorly regulated child behavior. Although a more controlling approach to tasks may represent a parents attempt to compensate for the ADHD child's self-regulatory deficits,^{53,54} it is often accompanied by a reduction in the more supportive interactions that are critical to positive parent-child relationships.^{2,29,32} The quality of the relationship between children with ADHD and their mothers, when combined with paternal psychopathology (e.g., antisocial personality disorder), results in a specific increase in the risk for conduct problems.⁵⁵

Although dysfunctional parenting is associated with a less favorable response to treatment^{56,57} and poorer long-term adjustment,⁵⁸⁻⁶² parenting often improves in response to behavioral, pharmacological, and combined treatments.⁶³ The influence of parenting and the sensitivity of parenting as an outcome measure, for example, is evident in many randomized trials of parenting programs for children with ADHD.^{30,64-66} These studies show that improvements in parenting skills are often accompanied by a reduction in inattention, overactivity, and impulsivity,^{64,66-68} noncompliance,^{30,69} aggression,^{64,68} and general management problems.⁶⁵ Indeed, some studies suggest that treatment-related reductions in negative/ineffective discipline may mediate the effects of combined behavioral and pharmacological treatments on the social behavior of children at school.⁷⁰

The effects of parenting are also evident in trials of parent training programs for children with the oppositional disorders and conduct problems that often accompany ADHD.⁷¹⁻⁷⁴ Within parent training studies of children with Oppositional Defiant Disorder (ODD), those with attentional problems evidence improvements that are equal to or greater than those of children without attentional problems.⁷⁵

Parental Monitoring

Children with ADHD are at substantially higher risk for accidents in both early childhood and adolescence.^{76,77} In adolescence, children with ADHD, particularly those with conduct problems, are at risk for substance abuse, risky sexual behavior, and automobile accidents.^{77,78} To the extent that accidents reflect the child's difficulty with vigilance⁷⁹ and self-regulation,^{53,54} parents must compensate by monitoring⁸⁰ the child's participation in potentially dangerous activities, influencing the peers children associate with,^{81,82} and limiting access to high-risk activities such as driving.⁸³ Parental monitoring, accordingly, may act as a moderator of the relationship between ADHD symptoms and high-risk behavior.⁷

The measurement of parental monitoring requires parent and adolescent reports of 3 closely related factors: (1) the efforts parents make to monitor the adolescent's activities, (2) the actual knowledge of parents regarding their adolescent's activities, and (3) the extent to which parents attempt to control high-risk behavior.^{80,84} Parents, for example, may be asked to report how difficult it is to determine where their adolescent is, what their adolescent is doing, or how often other adults are present when their adolescent is at the home of friends.⁸⁵ Adolescents may be asked to report the extent to which parents are aware of (knowledge) or try to determine (parental monitoring) who their friends are, or where they spend time after school.^{80,85} Control can be determined by asking parents or adolescents to rate the extent to which decisions regarding curfews, friends, spending, alcohol use, or dating are made by parents or adolescents.⁸⁰ Because positive parent-adolescent relationships are associated with more effective parental monitoring, parental warmth is often measured by asking adolescents to rate the extent to which their parents show interest in the adolescent's activities, praise positive behavior, provide assistance, explain commands, and encourage their adolescent in the face of failures.⁸⁰

Failures of parental monitoring and control are associated both directly and indirectly with a significant increase in high-risk antisocial behavior.⁸⁰⁻⁸⁵ Although randomized trials suggest psychosocial interventions designed to improve parental monitoring reduce high-risk adolescent behavior,⁸⁶ the effects of pharmacological interventions on the relationships that support effective monitoring, the willingness of adolescents to divulge their activities, and the success of parental monitoring deserve study.

Parental Cognitions Knowledge About ADHD

To make informed decisions about treatment, families require information regarding the etiology of ADHD, factors such as parenting that may influence the course of the disorder, and the relative risks and benefits of alternative interventions. Parental knowledge regarding ADHD is typically assessed using standardized questionnaires such as the ADHD Knowledge and Opinion Scale.^{87,88} Parents who are knowledgeable about ADHD are more likely to pursue pharmacological and psychosocial treatments.^{87,89,90} Parents are also influenced by inaccurate information regarding ADHD.⁹¹ For example, while misinformation encountered in the popular media leaves many parents hesitant to pursue evidence-based pharmacological treatments, others overestimate the long-term benefits of the stimulant medications their child is receiving.⁹² Other studies suggest that general knowledge about ADHD is linked to parental explanations or attributions regarding the child's behavior (see below). Parents with more knowledge about ADHD, for example, report a greater sense of control over their ADHD child's behavior.⁹³

Several studies suggest that measures of parental knowledge regarding ADHD are sensitive to intervention.^{94,95} Andrews and colleagues,⁹⁴ for example, randomly assigned parents of children with ADHD to an information or control condition. In the information condition, parents watched 2 commercially available videotapes regarding ADHD.^{96,97} Those in the information condition showed an increase in knowledge regarding ADHD and improved service utilization. Teachers of children whose parents were in the information condition reported greater improvements in the child's behavior at school. Odom⁹⁵ reported that a 5-week educational intervention for parents of children with ADHD also improved parenting sense of competence and satisfaction. The results of these studies are consistent with a larger body of evidence regarding the effectiveness of media-based interventions for child mental health problems.⁹⁸

Attributions for Child Behavior

Parents develop explanations or attributions regarding the causes of their child's behavior.^{99,100} Attributions have been measured by prompting parents to recall instances of compliant or noncompliant child behavior,⁹⁹ presenting parents with standard written descriptions of child behavior and asking them to imagine that their child behaved in this way,^{99,101} or showing parents

videos of different child behaviors.¹⁰² Parents rate the causes of these behaviors on dimensions such as locus of control, controllability, globality, stability, and degree of parental responsibility.^{99,100} Parental explanations regarding the causes of children's behavior (e.g., "he's doing this intentionally") exert an important impact on their emotional response to the child,⁹³ the disciplinary responses parents choose,^{103–105} and possibly the treatment options they prefer.¹⁰⁰

Parents of children with ADHD report a limited sense of control over their child's difficulties,¹⁰⁶ attribute inattentive-overactive and oppositional behavior to internal child characteristics that are less controllable by the child and more stable, and react more negatively to these behaviors than parents of children without ADHD.¹⁰⁴ Parents who interpret their child's behavior as intentionally disobedient may respond more negatively than those who attribute their child's behavior to symptoms of a disorder that the child is unable to control.¹⁰⁵ Similarly, parents who perceive that they have limited control over their child's behavior respond more coercively to their child.^{100,104}

Studies using qualitative interviews suggest that parental attributions regarding differences in monozygotic twins are associated with a different pattern of interaction with each child.⁴⁹ For example, some mothers believed that one twin was more likely to be dominant, to share positive attributes with the mother, or to possess negative attributes of an ex-partner.⁴⁹ Within monozygotic twin pairs, the twin that mothers described with more negativity and less warmth at age 5 were rated as more antisocial by their teachers at age 7 than the twin who mothers described with less negativity and more warmth.⁴⁹

Although some counter-productive attributions may increase parental stress, alternative attributions may constitute effective coping strategies. Harrison and Sofronoff,⁹³ for example, reported that parents of children with ADHD who felt they had more control over their child's behavior reported lower scores on the parenting stress index. Podolski and Nigg¹⁰⁶ found that fathers and mothers who positively reframed their child's behavior, for example, redefining their child's behavior as just a fact of life, reported lower stress than parents who used these strategies less frequently.

Hoza and colleagues⁵⁶ reported that a tendency of fathers of children with ADHD to attribute child noncompliance to poor child effort and bad mood predicted poorer treatment outcome. Parents who assume some responsibility for their child's problems,

in contrast, were more likely to complete a parent training program.¹⁰⁷ The attributions of both parent and child may also shift in response to treatment.¹⁰⁸ Parents, for example, rate compliance and prosocial behavior as more global, stable, and under the child's control when children with ADHD are taking stimulant medication.¹⁰⁸ Both parents and children rate noncompliance as more controllable when the child is receiving stimulant medication.¹⁰⁸

Parenting Sense of Competence

Parental confidence and sense of competence in families of children with ADHD has been most frequently measured using the Parenting Sense of Competence Scale.¹⁰⁹ The Parenting Sense of Competence Scale yields 3 scores: a parenting satisfaction scale, a parenting competence scale, and a composite total score. In comparison to parents of children without ADHD, parents of children with ADHD lack confidence in their parenting skills^{2,34,38,42,66} and are less satisfied with their performance as parents.¹⁰⁷ Even mothers of normal preschoolers report a negative emotional response and limited confidence in their ability to manage ADHD behaviors.¹⁰¹ Although low maternal self-esteem and low paternal parenting sense of competence predict poor treatment outcome,⁵⁶ parent training improves sense of competence for parents of children with both ADHD^{64,110} and oppositional disorders.^{65,72}

Readiness for Change

Readiness for change may influence the outcome of treatment for children with ADHD by affecting the decision of parents to pursue different evidence-based pharmacological or psychosocial interventions.^{111,112} Accordingly, families proceed through a series of readiness for change stages. Some may be at a "precontemplative stage," having never considered a particular psychosocial or pharmacological treatment. Others may be at a "contemplative stage"; willing to consider the possibility of, though not ready to initiate, a change. Barkley and colleagues,¹¹³ for example, found that many parents of kindergartners with ADHD and aggressive behavior chose not to enroll in a demonstrably effective^{30,110} parent training program. Those at a "preparatory" or "action stage" are ready to initiate, or in the process of making, changes (e.g., improving their child management skills or beginning a course of pharmacological treatment). At the "maintenance stage," parents who have successfully initiated a change or treatment program must work to sustain it. Longitudinal studies,

for example, suggest that parents of children with ADHD often discontinue apparently effective pharmacological treatments.²⁴

Much of the research in this area is based on a series of questionnaires developed by Prochaska and colleagues.¹¹⁴ A number of studies suggest that a shift to the preparatory or action stage is a function of decisional balance—the point at which the anticipated benefits of change outweigh the risks or logistical costs of change. For example, although parents may believe that a change in child management skills would contribute to an improvement in their child's behavior, work schedules, extracurricular child activities, transportation difficulties, time, or costs may constitute barriers to participation in parent training programs.^{115–118} These factors may pose particular difficulties to younger, economically disadvantaged parents with limited education who are more socially isolated or depressed.^{115,119–122} Consumer preference modeling studies confirm that parents are most likely to choose evidence-based programs that reduce barriers by offering convenient times, locations, and child-care options.¹²³

Treatment Satisfaction

Although readiness for change may influence the acceptability and decision to adopt alternative treatment options for families of children with ADHD,¹²⁴ satisfaction influences whether they continue or discontinue treatment. Measures of treatment preference, acceptability, and satisfaction, therefore, may be important moderators of the long-term effects of different treatments.¹²⁴

Service satisfaction scales ask parents, teachers, and children to evaluate the effectiveness of an intervention more broadly than symptom or side-effect rating scales.²⁸ The Multimodal Treatment Study of Children with ADHD (MTA) Cooperative Group, for example, reported that, although medication management initially resulted in a greater reduction in ADHD symptoms than psychosocial interventions, parent and teacher consumer satisfaction scores favored psychosocial interventions.²⁸ Because a significant number of families in the medication management condition discontinued pharmacological treatment by the 24-month follow-up, the effectiveness of that treatment declined. This reduction in treatment efficacy was not observed in the psychosocial conditions. The authors concluded that "... the full extent of effectiveness of the treatments for ADHD, as well as their limitations, may not be captured by the ratings of symptoms."²⁸

Children's attitudes may also play an important role in adherence to and the ultimate effectiveness of different psychosocial and pharmacological treatments for ADHD. Many children with ADHD, for example, dislike and resist taking medication and may perceive medication to be less helpful than do their parents.^{125,126}

Parental Adjustment

Parenting Stress

Chronically stressful family environments place children and adults at risk for both health and mental health problems. Parenting stress is often measured with standardized parent-completed rating scales such as the Parenting Stress Index.¹²⁷ Parents of children with ADHD report more stress^{3,107,128} and poorer coping⁴ than parents of children without ADHD. Parent training reduces parenting stress in families of children with ADHD,^{64,110} closely related disruptive behavior disorders, and a much broader range of child problems.¹²⁹ Interestingly, medication management, behavior management, nor combined treatments reduced the high levels of stress reported by parents participating in the NIMH multimodal treatment of ADHD study (MTA).⁶³

Adult ADHD

Parents of children with ADHD are more likely to evidence symptoms of adult ADHD.^{130,131} Adult ADHD symptoms are typically assessed via a combination of self-report, parent report, and records of childhood assessments.¹⁴ Recent evidence suggests that adult ADHD symptoms influence family relationships that may, via mediating variables such as parenting, influence child outcomes. For example, parents who evidence ADHD symptoms, though not their partners, report poorer marital adjustment and greater family dysfunction than controls.¹³² Adult ADHD symptoms may also moderate the effects of psychosocial treatments for children with ADHD. Children with ADHD whose parents evidence symptoms of adult ADHD, for example, show more limited improvement in parent training programs than those of parents who do not evidence symptoms of adult ADHD.¹³¹

Parental Depression

Depression is most typically measured by asking parents to rate the extent to which symptoms of the disorder are present. Examples include the Beck Depression Inventory¹³³ or the 20-item Center for Epidemiological Studies Depression Scale (CES-D).¹³⁴ Although parents of children with ADHD often report higher depression

scores than those of children without ADHD,^{2,42,135–139} other studies find elevated depression scores only in families of children with ADHD and oppositional disorders.^{44,140}

Parental depression, like other parental psychiatric disorders¹⁰⁹ is linked to poor child outcomes.¹⁴¹ While genetic factors play an important role, the link between parental psychiatric disorders and childhood adjustment appears, in part, to be mediated by poor parenting.¹⁰⁹ Parents with psychiatric disorders, for example, spend less time with and show less affection to their children, provide poorer supervision, use harsher punishment, inconsistently reinforce rules, and argue with partners about child management issues.^{109,142,143} Although depression may also influence child outcomes via its adverse influence on participation in potentially useful psychosocial interventions, parent training programs that reduce ADHD symptoms reduce parental depression scores.⁶⁵

Family Functioning

Marital Relationships

Marital relationships can be assessed using structured interviews, parental reports,^{144,145} child reports,¹⁴⁶ or direct observation of couples interacting in standardized laboratory tasks.¹⁴⁷ Marital conflict and poor marital adjustment are common in families of children^{135,148} and adults¹⁴⁹ with ADHD, particularly those of children with both ADHD and oppositional disorders.⁴⁴ Marital conflict has been consistently linked to adverse health and mental health outcomes for both children^{150–152} and their parents.¹⁵¹ Although the causal mechanisms responsible for the association between marital conflict and child adjustment are not fully understood, marital conflict may reduce the sense of safety and security children derive from home environments with less conflict, disrupt parent-child relationships, contribute to inconsistent discipline practices, decrease parental monitoring of potentially risky child and adolescent behavior, or more directly model aggressive social interactions.

Systematic reviews report a consistent link (average effect size = 0.46) between marital relationships and parenting.¹⁵³ Parental conflict and the disruption of parenting practices may increase the risk of internalizing problems such as anxiety or depression, alter the child's cognitions, and contribute to the emergence of antisocial behavior. These factors may increase the child's vulnerability to other environmental stressors (e.g., bullying and antisocial peers) and add an additional burden to parenting and family relationships.

Communication, Problem Solving, and Structural Family Relationships

Families of children with ADHD must contend with a larger number of behavioral, developmental, and educational problems than those of children without ADHD. The time, logistical demands, and energy required to cope with these difficulties is associated with an increase in stress on marital and family functioning.^{3,4,107,128} Many families must also manage the costs of treating ADHD and associated psychiatric difficulties, the additional health care costs incurred by parents caring for a child with ADHD, and the impact of the stresses of managing a child with ADHD on parental absenteeism, productivity, and household income.¹⁵⁴

Family dysfunction can be measured with parental rating scales^{155,156} or observations of families interacting in standard tasks.¹⁵⁷ The Family Assessment Device,¹⁵⁶ for example, provides a brief, easily scored estimate of family relationships (e.g., “we don’t get along well together”), communication (e.g., “we avoid discussing our fears and concerns”), and problem solving (e.g., “we are able to make decisions about how to solve problems”).

With some exceptions,¹³⁸ parents of children with ADHD report more family dysfunction^{2,3} than those of children without ADD. The discrepancy in these studies may reflect epidemiological evidence suggesting a stronger association between conduct problems, marital conflict, and family dysfunction.^{2,145,158,159} In 4-year longitudinal follow-up of the Ontario Child Health Study, a large epidemiological study of children’s mental health, a measure of family dysfunction (e.g., the Family Assessment Device noted above), predicted the persistence of psychiatric disorders.¹⁶⁰ Children with ADHD and oppositional or conduct disorders confront families with more management difficulties^{2,161} and are at greater long-term risk than children with either disorder alone.¹⁶²

Parent training programs have been shown to improve relationships in families of children with ADHD.^{63,65} With the exception of a study finding improved family functioning when children responded favorably to stimulant medication,¹⁶³ few studies have examined the effects of pharmacological treatment for children with ADHD on broader relationships within the family.

General Issues in Outcome Measurement Observational Measures Versus Self-Reports

In conclusion, we consider several general issues in the design and analysis of family-centered outcome measures.

Although structured interviews and rating scales represent a logistically feasible approach to the measurement of parent-child and family relationships, they are prone to strong social desirability biases and may not reflect the actual interactions of ADHD children and their families. Systematic reviews show that the strength of the association between externalizing child behavior and parenting measured by parental rating scales is weaker than that for observational measures.³⁵ Moreover, a number of studies of the effects of stimulant medications suggest that direct observations by carefully trained observers often detect maximum effects at significantly lower doses than studies based on more subjective parent and teacher reports.^{10,27}

Multiple Informants

Different informants (e.g., father vs mother, parent vs teachers, and youth vs parent) often provide a very different perspective on child and family problems.¹⁶⁴ The way in which these discrepancies are integrated may have a significant impact on both the diagnostic and outcome measurement process.¹⁶⁴ Simply combining the reports of parents and teachers, for example, may mask the different pattern of associated features of problems linked to the reports of specific informants.¹⁶⁵ Research studying ways of analyzing and interpreting data from multiple informants is important.

Composite Versus Individual Outcome Measures

Most studies reviewed here analyze measures of parent-child and family outcome individually. For example, studies comparing the interactions of mothers with their ADHD children to those of mothers with their normal children typically compute comparisons of the scores of each group on individual measures such as parental depression or controlling maternal behavior. An increasing number of pharmacological and psychosocial treatment studies, however, are employing more complex composite outcome measures.^{166,167} Composite measures may provide a better assessment of complex constructs, capture the effects of treatments that may affect individual children and families differently, increase the statistical power needed to detect incremental effects in clinical trials with multiple treatment arms, or provide measures that are easier to interpret.¹⁶⁶ Rothbaum and Weisz,³⁵ for example, showed that the association between combinations of parenting measures and child externalizing problems is substantially stronger than the associations observed in studies examining the relationship between individual parenting measures and

externalizing problems. Thus, composite measures of approval, guidance, positive motivational strategies, synchronous interactions, and the absence of coercive control are more closely linked to childhood externalizing problems than single measures of these constructs.³⁴

Perhaps the simplest approach to composite measurement is illustrated in the work of Michael Rutter and colleagues. These investigators demonstrated that an aggregate adversity index composed of the types of measures reviewed here was a better predictor of developmental impairments than any single factor. Biederman and colleagues reported that the odds of an ADHD diagnosis increased linearly as a function of the number of Rutter's adversity factors present in families of 6 to 17-year-olds.¹⁶⁸

Other investigators have proposed that theoretically derived configurations of dependent measures better capture complex constructs such as parenting.¹⁶⁹ Johnston and colleagues,¹⁷⁰ for example, observed the interactions of mothers with their sons with ADHD. Observers rated complex theoretically derived interactional constructs such as authoritative control, sensitivity of control, responsiveness, or positive affect. Responsiveness, for example, reflected the overall ability of the mother to adjust her behavior to her child's behavior, capabilities, needs, requests, and interests. Mothers who were rated less responsive reported higher personal depression and child conduct problem scores.¹⁷⁰

In another study, Johnston and colleagues⁹⁹ suggested that, although treatment with stimulant medication resulted in a complex shift in many individual parental attributions regarding the behavior of children with ADHD, in combination this pattern of changes represented a shift to a healthier attributional set. A composite attributional measure composed of individual attributions regarding locus, controllability, etc might represent a better outcome measure than a series of individual attributions.

A variety of theoretical and empirical approaches has been employed to analyze the complex constellation of behaviors that characterize marital and family relationships. In an effort to capture the complex interactions between marital relationships and parenting,¹⁵³ for example, Belsky and Fearon¹⁷¹ derived 5 parenting-marriage typologies via latent class analysis. This analysis yielded 3 groups in which marital relationships and parenting were consistent (e.g., consistent supportive marital relations and parenting or consistently risky marital relations and parenting). In addition, 2 groups evidenced inconsistent relationships between marriage

and parenting (poor parenting but good marriages vs good marriages but poor parenting). The added value of good marital relationships was reflected in the observation that children from consistently supportive families (good parenting plus good marriage) evidenced fewer conduct problems and better social skills than those from the good parenting but poor marriage group.¹⁷¹ The hypothesis that good parenting may moderate the influences of a poor marriage was reflected in the observation that children in the consistently risky group (poor parenting and poor marriage) evidenced more conduct problems than those in the good parenting but poor marriage group.¹⁷¹

Finally, in considering the outcome of the NIMH multimodal ADHD treatment study, Conners and the MTA Study Group¹⁶⁶ argued that a complex composite measure might better reflect inconsistency in the behavior of children with ADHD, the different perspectives of multiple informants, and the multidimensional goals of multimodal therapy than the analysis of individual measures. As predicted, a composite outcome measure of parent and teacher ratings of primary ADHD symptoms, comorbid problems, social competence, and parenting, composed via factor analytic methods, yielded a different pattern of results than the analysis of individual scores.¹⁶⁶ Although the use of individual outcome measures suggested that medication management was superior to behavior therapy, this composite measure revealed that a combination of medication management and behavior therapy outperformed medication management, behavior therapy, and control conditions.¹⁶⁶

Content and Contextual Validity

Although the content of questions on measures such as the Parenting Stress Index and the Parenting Sense of Competence Scale are closely linked to parenting and child behavior, other measures included in this review deal more broadly with parental adjustment and family relationships. Some evidence suggests that outcome assessments might be improved by adopting measures of parental depression, marital conflict, and family functioning that relate more directly to parenting and child behavior. Jouriles and colleagues,¹⁷² for example, reported that interparental disagreements about child rearing were more closely linked to child behavior problems than nonchild disagreements or measures of global marital adjustment.

The importance of contextually sensitive outcome measurement is also evident in a study by Schachar and colleagues.¹⁷³ These investigators used repeated daily

probe phone calls asking parents to report on ADHD symptoms and oppositional problems during the immediately preceding time period (e.g., morning or evening). This contextually sensitive measure detected medication time courses that were not evident on more global symptom ratings.¹⁷³

Parental Preferences

Finally, a family-centered approach to outcome measurement suggests that the selection of measures for studies of children with ADHD should be informed by family preferences. As noted earlier, although the MTA found that medication management yielded greater reductions in parent and teacher-reported ADHD symptoms, parent and teacher satisfaction measures favored psychosocial treatment.^{27,28} The possibility that primary symptom reports may not capture outcomes of greatest importance to parents may be reflected in the observation that parents often discontinued pharmacological interventions that appeared to yield a significant reduction in primary ADHD symptoms.²⁸ These findings suggest the need for clinical trials utilizing measures reflecting those outcomes that are most important to the parents, teachers, and children using these interventions.

In a trial of atomoxetine for children with ADHD, for example, Saylor and colleagues¹⁷⁴ interviewed parents regarding treatment outcomes that were meaningful to the child's social, emotional, and self-regulatory development. Parents reported improvements in relationships with siblings and peers, emotional stability, "availability," planning skills, and insight. Using themes from these qualitative interviews, these investigators developed a brief 24-item Life Participation Scale. Although the consumer preference modeling methods market researchers use to identify the attributes of complex products and services that are most important to consumers are informing health service research,¹⁷⁵ they are only now being applied to identify the mental health service outcomes that are most important to parents.^{123,176}

Conclusion

In summary, parent-child and family relationships constitute important measures in studies of the correlates, developmental course, and treatment of children with ADHD. Complex, composite, contextually sensitive, functionally important observational measures of constructs that are important to parents, children, and related stakeholders may provide a more useful

measure of treatment outcome and long-term adjustment than more traditional primary symptom counts.

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