ABSTRACT: The likelihood that patients with attention-deficit hyperactivity disorder (ADHD) will start stimulant medication can generally be identified at the initial diagnostic assessment. There are 4 empirically supported theoretical models of behavior that can be applied to medication adherence in children and adolescents who take stimulants for ADHD. These health behavior models help explain the impact of parents’ and children’s beliefs on medication use decision making. A trial of psychostimulants can assist families who continue to have doubts about their use. Use of standardized symptom and adverse effect checklists during the trial is helpful when comparing efficacy and safety of different preparations. Proper monitoring and communication can address problems and questions early on, thereby increasing adherence.

Medication adherence is a complex problem that is poorly understood and under-researched, especially in children and adolescents. It is a clear barrier to effective treatment that is frequently encountered in everyday clinical practice. The relationship between the prescribed treatment and its implementation is made more complicated by parents, the usual decision makers for the young patient.

While it is often possible to identify children and families at risk for poor medication adherence, it is not always clear to medical professionals how best to use this information. In this article, I review 4 empirically-supported theoretical models of health behavior and apply them to the treatment adherence literature on children and adolescents who take psychostimulants for attention-deficit/hyperactivity disorder (ADHD). To illustrate how these models can be used to improve adherence to stimulant medication treatment, I provide clinical examples involving a child and a teen with ADHD.

THE PROBLEM OF POOR ADHERENCE

The dilemmas inherent in medication adherence are particularly stark in the use of psychostimulants for children and teens who have ADHD. Research has shown that psychostimulants (ie, methylphenidate, dextroamphetamine, and related compounds) are clearly beneficial for reducing symptoms characteristic of ADHD—inattention, overactivity, and impulsivity.1 Extended use is associated with improved school attendance and high school completion; reduced onset of mood, anxiety, and substance disorders; and improved functioning in adulthood.2-4

In community samples, approximately half of patients discontinue prescribed stimulants after 3 months.5 One-third of patients receive 2 or fewer prescriptions while only one-fifth fill prescriptions continuously.6 Among children, stimulant adherence also declines with onset of adolescence, with adherence rates decreasing from 72% at age 11 years to 32% at age 15 years.7 Clinical
treatment guidelines recommend that physicians pay close attention to medication adherence, noting that poor treatment adherence contributes to poor response.8-10

The Table summarizes factors associated with decreased adherence to psychostimulants. The likelihood that patients will start stimulant medication generally can be identified at the initial diagnostic assessment. Parents who understand that ADHD is a biological disorder and believe that the medications are safe and effective are likely to support their use in their children’s treatment regimen, especially for children whose symptoms are more severe. Parent beliefs about their child’s behavior problems are associated with specific attitudes regarding medication use and subsequent likelihood to use prescribed medications.11 Those who are most likely to continue using medications for up to 1 year, initially believe that ADHD is a problem to be fixed and see medication as something that will help the child succeed.11

Poor adherence may stem from parents’ initial hesitancy to have their child with ADHD treated with psychostimulants.12 Once the child has tried the medication, clear symptom benefit with few adverse effects and a simplified dosing schedule encourages families to continue its use (see Charach and Gajaria13 for a more thorough discussion of predictors of stimulant adherence). However, many families do not find the use of stimulant medication by their child to be straightforward. Two cognitive-behavioral models, the Health Beliefs Model (HBM) and the Theory of Reasoned Action and Planned Behavior (TRAPB), address the beliefs and behavior of the parents and the child at a given point.14,15

HEALTH BELIEFS MODEL

The essential focus of the HBM is the preference to use or not to use stimulant medication based on the family’s perception of risks and benefits. Consistent with this model, severe ADHD symptoms along with moodiness, defiance and low frustration tolerance would increase parents’ openness to the benefits medication might offer. On the other side, parents balance concerns about adverse effects, which can include over-riding a child’s preference, a step more difficult for parents of teens. Clinicians naturally apply the HBM when they educate parents and children about key points:

**Key Points: Health Beliefs Model**

The likelihood to begin medication increases when clinicians:

- Provide information about attention-deficit/hyperactivity disorder to the parent and child.
- Obtain a cognitive and learning assessment if the child is having academic difficulties.
- Discuss treatment options for learning and behavior problems.
- Clarify the parents’ beliefs about what would be most helpful for their child.
- Follow the family’s preferences for non-medication options first if they have not been tried.
- Do not give a prescription after a brief assessment “to see if it works.”

---

<table>
<thead>
<tr>
<th>Table – Factors that decrease stimulant use</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Parent/family</strong></td>
</tr>
<tr>
<td>• Older parent23</td>
</tr>
<tr>
<td>• More parent-child problems23</td>
</tr>
<tr>
<td>• Parent belief that symptoms are temperamental29</td>
</tr>
<tr>
<td>• Parent belief that symptoms are stress-related27</td>
</tr>
<tr>
<td>• Distrust of medical system30</td>
</tr>
<tr>
<td><strong>Child</strong></td>
</tr>
<tr>
<td>• Older child23</td>
</tr>
<tr>
<td>• No previous history of stimulant use31</td>
</tr>
<tr>
<td>• Non-white31,33</td>
</tr>
<tr>
<td>• Fewer ADHD symptoms31,34</td>
</tr>
<tr>
<td>• Lack of comorbid conditions31,34</td>
</tr>
<tr>
<td>• Child unwilling12,19,22</td>
</tr>
<tr>
<td><strong>Health care professional</strong></td>
</tr>
<tr>
<td>• Lack of providers in community30</td>
</tr>
<tr>
<td>• Difficult/lack of access30</td>
</tr>
<tr>
<td>• Lack of insurance coverage23</td>
</tr>
<tr>
<td>• Nonacademic health center19</td>
</tr>
<tr>
<td><strong>Medication</strong></td>
</tr>
<tr>
<td>• Ineffectiveness7,19,29</td>
</tr>
<tr>
<td>• Adverse effects7,19,29</td>
</tr>
<tr>
<td>• Multiple daily doses23</td>
</tr>
<tr>
<td>• Dose given in school23</td>
</tr>
<tr>
<td>• Cost30</td>
</tr>
</tbody>
</table>

ADHD, attention-deficit/hyperactivity disorder.
ADHD symptoms and discuss potential benefits and risks of treatment.

Parents often express concerns about adverse effects, especially physiological effects. When the family is willing to initiate medication, the physician can address these concerns by discussing adjustments to the dose or dosage or by changing to a different agent.

**CASE VIGNETTE 1**

**SUSIE AT DIAGNOSIS**

Susie is an 8-year-old third grader who lives with her parents and a younger brother. Her second-grade teacher had reported that Susie often had trouble focusing on her work and completing assignments. The teacher thought that Susie could do better and suggested a psychoeducational evaluation. Organizational and working memory difficulties were noted but no learning disability, which is consistent with primarily inattentive-type ADHD.

Susie’s parents were hesitant about having their daughter take a stimulant medication. They found the teacher to be young and inexperienced and felt that better teaching methods and extra tutoring were preferable for Susie’s learning problems. In addition, her mother was concerned that Susie, who had always been a picky eater, would have even more trouble eating if she were to use stimulant medication.

After a thorough discussion of the pros and cons of an educational versus a pharmacological approach that would include stimulant medication, the physician and family agreed to educational supports.

**THEORY OF REASONED ACTION AND PLANNED BEHAVIOR**

The second cognitive-behavioral model, TRAPB, includes aspects of the HBM but uniquely focuses on the gap between the patient’s intention to follow the treatment plan and actual pill-taking behavior. More recently, habitual routines have been identified as an important component of this model. Activities that assist young people to integrate taking medication into their daily routine can help. For example, the match between pills prescribed and pills taken improves when long-acting stimulants are used because they simplify the dose schedule.

Parental supervision, daily routines such as placing pills next to the breakfast plate, and memory aids for children and parents with poor organization skills also are helpful. In the following case vignette, Robert’s mother had assisted him by reminding him to take his medication; now that he is older, her reminders are of little use unless they match his intentions.

**CASE VIGNETTE 2**

**ROBERT AT FOLLOW-UP**

Robert is a 13-year-old eighth grader who lives with his mother and 17-year-old brother. Robert had been identified with ADHD combined type, generalized anxiety disorder, and oppositional defiant disorder (ODD) 4 years ago. Because of a reading disability, he has received special education assistance for 3 years and now reads at grade level.

Over the past 3 years, he has been taking 54 mg of osmotic-release oral methylphenidate, and his mother has noted good improvement.

During a semiannual follow-up appointment, Robert’s mother reports that he is having difficulty completing his in-class work and is forgetting to turn in homework assignments. She has also noticed increased arguments with his older brother, and Robert resents her reminders about homework and other chores. She wonders whether Robert’s dosage should be increased because the current level may no longer be effective.

During the interview, Robert seems bored and somewhat sullen. As in past meetings, he is not very communicative. When asked his opinion about increasing the dose or changing to a new medication, he says he does not see the point in taking medication at all.

Robert’s mother reminds him of his dropping grades. On further questioning, Robert reports that he is “no fun” when he takes the medication—he does not talk much or make jokes—and from time to time he “forgets” to take them. His mother asks if she should return to making sure that Robert takes his medication, something she has not done in at least a year. The physician, realizing that Robert now has more responsibility for using medication,

**Key Points: Theory of Reasoned Action and Planned Behavior**

*Actual pill-taking behavior can be enhanced when clinicians:*

- Ask young people for their opinion about using medication.
- Acknowledge reality of diminished sociability with increased dose.
- Discuss tradeoffs of personality flattening versus improved concentration.
- Adjust dose downward to decrease personality flattening.
- Engage teens in their own care by suggesting “experiments” (eg, a discontinuation trial) to clarify loss of efficacy.
asks him directly about his beliefs regarding medication. Robert does not think he is having any more trouble finishing assignments than his classmates. He finds his classes boring and has been spending more time talking with friends at school this year compared with last year. He has forgotten his pills many days except when there is going to be a test. This has only been a problem when the teacher gives a surprise quiz. In addition, his father doesn’t think he needs medication and believes that Robert just needs to be motivated to work harder.

After collecting this information, the doctor negotiates with Robert to try an “experiment.” He suggests trying 36 mg of osmotic-release oral methylphenidate during school days, compared with no medication. The smaller dose may strike an acceptable balance between “being no fun” and helping him focus on his work. Robert agrees to fill out a symptom checklist for each dose level and to ask a teacher to do the same. His mother agrees to help him organize the details of the trial. A follow-up appointment is scheduled in one month.

In this vignette, the responsibility for using medication on a daily basis was transferred from the parent to the youth. It is important to remember that this transfer of responsibility takes place at different times for different families. In anticipation of this occurrence, clinicians should remember to inquire about the young person’s point of view about medication use. Youths with ADHD often see themselves as less impaired than their parents see them.20 When teens do not think that their symptoms require treatment, they are less likely to accept (or adhere to) medication.21 Young teens may value academic success less than the ability to get along with peers. Therefore, adverse effects for young people may not always be physical; embarrassment, peer issues, stigma about taking medications, or experiencing themselves as less sociable can also result in medication refusal.21,23

Adjusting medication dosages and formulations can improve the balance between adverse effects and effectiveness, thereby improving adherence. However, for some families, the clinician must recognize that the more challenging step may be accepting the recommendation to use stimulants. Indeed, parents of children and adolescents who take stimulants describe receiving the initial diagnosis of ADHD and the subsequent decision to use medication as difficult hurdles that need to be negotiated.12

**TRANS-THEORETICAL MODEL OF CHANGE**

Both HBM and TRAPB illustrate adherence behavior at a given point. In contrast, the Trans-Theoretical Model of Change highlights how health behavior changes over time.24 This model identifies differences in the parents’ or young person’s level of readiness for change and describes how an individual can move through stages from not yet acknowledging the health problem (precontemplation) to recognizing and considering seeking help (contemplation) to actively participating in treatment (action).

The clinician needs to evaluate the family’s current level of motivation, both when initiating medication and throughout treatment. Prematurely offering a stimulant prescription, such as when the parent is still coming to terms with the child’s diagnosis, may be experienced negatively.16 Families often require time to adjust to the psychiatric diagnosis while they experiment with alternative treatment approaches, including educational and psychosocial interventions. Progression from contemplation to action is illustrated by the continuation of the first vignette.

### CASE VIGNETTE 1

**Susie at Follow-up**

Susie returns for follow-up in April of third grade. She has received weekly tutoring to help with organizational skills and school assignments. Parents and teachers communicate regularly about class assignments and homework. Several times a week, she has leftover tasks that need to be completed at home; she often spends much time on this homework and ends up in tears. Her parents further research ADHD and attend public workshops organized by a local parent support group for families who have children with ADHD. In re-

**Key Points: Trans-Theoretical Model of Change**

Willingness to begin or continue medication is supported when clinicians:

- Encourage families to attend parent support groups and offer quality sources for information.
- Provide parent, teacher, or youth with standardized symptom checklists: the SWAN Rating Scale and the SNAP-IV Rating Scale (available at www.adhd.net).
- Encourage the teen to fill out his/her own symptom and adverse effect checklists (eg, the Barkley Adverse Events Rating Scale).
- Teach adolescents how to adjust dose of stimulants as required for concentration.
This vignette illustrates that access to accurate information about ADHD and evidence-based treatment approaches is very important when parents are contemplating medication use for their children. Support groups are helpful not only for access to information but also for parents to speak with others who have gone through the same process and have had similar experiences.

Where families wish their teenager to participate in the decisions about medication, the youth’s readiness to change is also important. The clinician should discuss treatment options and patient preferences with a flexible attitude, accepting the need for passage of time by offering the opportunity for future meetings to discuss and re-discuss treatment options.

Initiating medication with a trial of psychostimulants is an excellent way to assist families who continue to have doubts about psychostimulant treatment for their child.⁸⁻¹⁰ Stimulants, especially immediate-release stimulants, often show an immediate effectiveness that offers parents (although not always children) an example of the benefits of increased attention, concentration, and reduced impulsiveness. Parents need feedback that the treatment is effective, either by experiencing the improvements themselves or from teacher feedback. The child also benefits from feedback regarding his or her progress.

When the trial is successful, the experience of benefits in the context of few adverse effects will encourage parents and children to continue with medication. Use of standardized symptom and adverse effect checklists during the trial is helpful when comparing efficacy and safety of different preparations. Standardized checklists useful for symptom monitoring are available online for no cost. James M. Swanson, PhD, of the University of California, Irvine, offers the SWAN Rating Scale for ADHD and ODD, and the SNAP-IV Rating Scale at www.ADHDb.net. While these are designed to screen for diagnoses, the initial subscales for ADHD and ODD symptoms have been used for monitoring symptom response to medications in clinical trials. The Barkley Adverse Events Rating Scale has been used (by parents and child) for monitoring safety in medication trials for children and youth with ADHD.²⁸ Useful checklists can also be found in the physician guidelines published by the Canadian ADHD Resource Alliance, available at www.CADDRA.ca.

Not all stimulants offer the same pattern of benefits and adverse effects. Thus, regular monitoring (that includes documentation of blood pressure, weight, and height) is an important part of the treatment plan and is essential for encouraging long-term adherence. Such monitoring will detect potential adverse effects or changes in effectiveness. It will also identify doubts about medication use as they arise, as in Robert’s case.

**CASE VIGNETTE 2**

**ROBERT AFTER TRIAL**

As Robert completes the trial of a lower dose of osmotic-release oral methylphenidate compared with no medication, he reports that he used the medication during 2 of the weeks that he was scheduled not to take medication because he had midterm exams. Furthermore, he found that completing a project was more difficult during the week of no medication than completing similar projects while taking medication. He reports that 2 of his teachers complimented him on his improved work attitude. Robert also discussed medication use with his father, who said Robert could make up his own mind.

On the basis of this trial, Robert decided to keep using 36 mg of osmotic-release oral methylphenidate for most school days, and asked if he could use extra on days that he had to work on lengthy homework projects. The clinician discussed how practical it was to know early in the day whether he would need a higher dose that afternoon. Based on this discussion, a small amount of immediate-release methylphenidate was prescribed on a trial basis to be used after school or on weekends for homework projects.

In both vignettes, the treatment decision was made in the context of both the patient’s and parents’ concerns. Susie’s family used information from her schoolteachers and from the parent support group to decide about the assessment and treatment. Robert’s decisions were influenced by his peers, his father, and his teachers.

**NETWORK EPISODE MODEL**

A fourth model of health behavior, the Network Episode Model, emphasizes both changes over time and the dynamic relationships between the patient and extended family and between the patient and the larger community, including school.²⁵ Often, other family members, neighbors, or friends question a parent’s or young person’s decision to use stimulants.¹² Disapproval of using medication for childhood behavior problems is common.²⁶ Media stories raise concerns about overmedicating children, and valued community leaders may express negative opinions; these experiences can complicate the decision process.²⁷ In
addition, comments from peers can interfere with a child’s willingness to cooperate.

For medication to remain an integral part of the young person’s overall treatment plan, the prescribing physician and associated health care team must remain accessible over time and become embedded as part of the family’s community network, with contact frequent enough to counter other influences.

**A FINAL NOTE**

Clinicians need to keep in mind that parent beliefs and attitudes strongly influence treatment choices for their child. However, beliefs and attitudes can change with time. An important aspect of initial assessment and ongoing monitoring should be an exploration of the family’s and young person’s perspectives, since patient preferences are an integral part of the best clinical practices. We also know that peoples’ experiences—including those that they have with health care practitioners—will have an impact on these beliefs. Clinicians need to provide a flexible and open-minded approach, communicating with patients and their parents that their doubts and concerns about medications and the illness will be heard and responded to with respect and with a fundamental regard for their health and welfare.

**REFERENCES:**


Key Point: Network Episode Model

**Negative connotations of stimulant use can be overcome when clinicians:**

- Encourage families to become collaborative in the decision process about interventions.