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## Building a Theoretical Model for Supporting Teens' Autonomy Daily (STAND): A Network Analysis of Family-Perceived Changes

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### Abstract

Little is known about processes through which behavior therapy (BT) for adolescent ADHD improves outcomes. The purpose of this study was to build a theoretical model for the processes through which a BT for adolescent ADHD (Supporting Teens' Autonomy Daily; STAND) impacts functioning. Seventy-eight audio recordings from a standard therapeutic task in the final STAND session were analyzed as parents and adolescents (ages 11–16) reflected upon *what* changed during STAND and *why*. Qualitative coding sorted parent and teen statements into orthogonal categories of perceived changes. Network analysis examined inter-relations between categories. Results indicated twenty-one categories of perceived change areas. Parent use of behavioral strategies, adolescent motivation, and adolescent organization skills were central nodes in the network of perceived changes, with strong relations to academic and parent-teen relationship outcomes. A model is proposed in which skills training in STAND increases parent behavioral strategy use and teen organization skills, while Motivational Interviewing (MI) in STAND increase parent behavioral strategy use and initial adolescent motivation. In turn, parent behavioral strategy use is proposed to further reinforce teen motivation through contingency management, thereby increasing teen application or organization skills to daily life. As a result of improved teen motivation and organization skills, the model proposes that ADHD symptoms, academic problems, and parent-teen conflict abate. We discuss secondary mechanisms and outcomes in this model, the

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#### Declaration of interests

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possibility of person-specific processes, implications for community-based adaptation of STAND, and plans to validate this conceptual model using sophisticated mediational models.

## Keywords

ADHD; Behavior Therapy; Motivational Interviewing

Behavior therapy (BT) is evidence-based for the treatment of adolescent Attention Deficit/Hyperactivity Disorder (ADHD) with core elements that include skills training in organization, time management, and planning (OTP), administration of rewards (by a provider or parent) to incentivize skill application, and engagement strategies to spark interest in treatment such as motivational interviewing and recreational activities (Chan et al., 2016; Rios-Davis et al., under review; Sibley et al., 2014). In randomized controlled trials (RCTs), BT leads to medium to large improvements in ADHD symptom severity and functional impairments (i.e., academic failure, parent-teen conflict) relative to control groups (Evans et al., 2011, 2016; Langberg et al., 2012; Sibley et al., 2013, 2016; Sprich et al., 2016). Though adolescent BT processes and their impact on outcomes are well-researched (Breux et al., 2018, 2019; Langberg et al., 2013, 2016), less is known about the mediational processes through which these components lead to ADHD symptom reduction during treatment.

Very few extant studies test mediator models that examine the active mechanisms of BT for ADHD (for review see Van der Oord & Daley, 2015). Two mediational studies suggest that childhood BT reduces ADHD-related impairments by improving parenting behaviors (Haack, Villodas, McBurnett, Hinshaw, & Pffner, 2017; Hinshaw et al., 2000). Preliminary evidence also suggests that BT delivering OTP training to youth can improve skills that, in turn, correlate with academic outcomes in children (Hennig, Schramm, Linderkamp, & Koglin, 2016; Pffner, Villodas, Kaiser, Rooney, & McBurnett, 2013) and adolescents with ADHD (Breux et al., 2019; Langberg et al., 2013), though formal tests of this proposed mediational pathway are yet to be published. Thus, the effect childhood and adolescent BT on ADHD symptoms and impairments may be driven by either parent or adolescent mediators. However, further work is needed to elucidate these processes for adolescent ADHD BT. Very few formal mediational analyses have been conducted for ADHD BT in general (Van der Oord & Daley, 2015) and most studies were conducted in childhood, when parents play a more active role in treatment and adolescent-directed components may be limited. Though some work suggests that parent involvement and adolescent skill use predict adolescent ADHD BT outcomes (Breux et al., 2018, 2019; Langberg et al., 2013, 2016), conceptualization and testing of specific mediator models is warranted.

Supporting Teens' Autonomy Daily (STAND; Sibley et al., 2016, 2020) is one of several evidence-based BTs for adolescent ADHD. STAND is a ten-session manualized treatment that is delivered individually to parent-teen dyads. Like other BTs for adolescent ADHD, STAND directly teaches OTP skills (e.g., Evans et al., 2016; Langberg et al., 2012) and leverages parent-administered rewards to incentivize adolescent skill application outside of treatment (e.g., Langberg et al., 2012; Sprich et al., 2016). Because patient barriers

often prompt premature disengagement from adolescent ADHD treatment (e.g., Barkley et al., 2001; Sibley et al., under review), STAND includes engagement-focused components that target additional unique mechanisms. These components include: (1) an emphasis on parent-teen collaboration, (2) Motivational Interviewing (MI; Miller & Rollnick, 2013), (3) a strength-based, autonomy-supportive framework, and (4) modular treatment (e.g., Chorpita et al., 2017) that allows families to request personalized skills training in areas such as note-taking, study skills, and homework management. Based on its components, STAND is conceptualized as engaging known parent and adolescent mediators of BT outcome—specifically, teen OTP skill use and parent use of behavioral strategies. In addition, STAND is conceptualized as engaging several mediators that are novel to its model: (1) improved parent-teen relationships, (2) increased motivation, (3) improved self-confidence, and (4) autonomy. Finally, STAND is conceptualized as possessing person-specific mechanisms that map onto STAND's individualized modules (e.g., note-taking, problem-solving, and study skills) and may not be detected when data is analyzed at the group level.

Three randomized controlled trials (RCTs) demonstrate STAND's efficacy on primary outcomes (ADHD symptoms, grade point average, and parent-teen conflict; Sibley et al., 2013, 2016, 2019) and provide initial evidence that STAND engages several of the proposed mediators as proximal targets. However, research has not yet considered how change in STAND's proximal targets relates to improvements in outcome. A pilot RCT ( $N=36$ ) of STAND compared to treatment as usual (TAU) demonstrated significant, large, pre-to-post-treatment effects for ADHD symptoms and significant small to medium effects on GPA and parent-teen conflict (Sibley et al., 2013). A larger RCT ( $N=128$ ; Sibley et al., 2016) demonstrated full or partial maintenance of selected outcomes at six-month follow-up ( $d=.31$  to  $.63$ ). This trial also detected effects on a broader range of proximal STAND targets that are hypothesized to mediate treatment outcomes: OTP skills ( $d=1.12$ ), reductions in disruptive behavior ( $d=.40$ ), parenting stress ( $d=.60$ ), teen use of a homework recording system ( $d=.45$ ), and parent use of behavioral strategies ( $d=.49$  to  $1.07$ ). However, these proximal targets were not tested as formal mediators due to limitations in statistical power. A third trial ( $N=123$ ) compared STAND to standard parent training and teen organization skills training to test the impact of the dyadic, engagement-focused model on outcomes. This trial found medium-sized effects for STAND on ADHD symptoms (distal outcome) and OTP skills (proximal target) when parents exhibited elevated ADHD symptoms, depression, or conflict with the teen (Sibley et al., 2020). Thus, the engagement-focused targets that are unique to STAND'S model (i.e., parent-teen collaboration, motivation, self-confidence, autonomy) could be candidate mediators of treatment outcome—at least when dyads demonstrate certain risk factors. Despite STAND'S established effects on proximal targets and distal outcomes, there is no research confirming causal processes through which these variables improve outcomes for adolescents with ADHD. This work is an important next step for intervention testing and refinement.

Identifying mediational processes in STAND and other treatments for adolescent ADHD is particularly important as the treatments broaden their implementation to community-based settings and increasingly diverse patient and provider populations. For example, a randomized community-based trial of STAND ( $N=278$ ), revealed that clinicians at community clinics struggled to implement STAND with adequate fidelity (Sibley et al.,

2020), which in turn impacted effectiveness (Sibley et al., 2021). Thus, STAND'S content and/or implementation strategy must be adapted to better fit ecologically valid settings. Knowing the key mediators that are responsible for a treatment's efficacy will indicate components that should be retained in the adaptation process. If some components are not associated with meaningful patient change, treatment parsimony might be improved by excluding them.

The present study takes an observational approach to studying parent and teen perspectives on processes that may mediate STAND's outcomes. Information gleaned in this mixed-methods study will inform theory building and model specification in future mediational analyses. Audio recordings ( $N=78$ ) of the final STAND session from two previously published RCTs (Sibley et al., 2016, 2020) were analyzed thematically for categories of parent- and teen-perceived changes using qualitative methodology (Glaser, 1978). In this session, families engaged in two standard discussions on changes made during STAND and how these changes impacted treatment goals. Following category construction and qualitative coding, the network of within-conversation relations between these categories was mapped using network analysis (Borgatti et al., 2009). Network analysis is an analytic technique that identifies relationships within complex systems. Network analysis can be applied to qualitative data to promote detection and visualization of relationships between extracted categories and critically examine study findings (Pokorny et al., 2018). The resulting network was used to identify potential inter-relations between categories that may signal mediational processes. Results identify the most common parent and teen-perceived mechanisms of change in outcome, processes that appear to co-occur during STAND, and change variables that serve as hubs within the network. From these data, a theoretical structure for STAND's mediational processes will be proposed, which will be tested prospectively in a future investigation.

## Method

### Participants

Participants were 78 adolescents with ADHD (ages 11–16) and their parents who participated in one of two randomized controlled trials (RCTs) that evaluated the efficacy of STAND. This subgroup of participants possessed a full-length, audible audio recording of their final STAND session. As a part of respective study inclusion criteria, all participants met DSM criteria for ADHD during a comprehensive psychiatric evaluation that included a structured parent interview (Shaffer et al., 2001) and parent and teacher symptom and impairment ratings (Fabiano et al., 2006; Sibley & Kuriyan, 2016) that were integrated and reviewed by licensed clinical psychologists using an “or rule” that established ADHD symptoms to be present if endorsed by any informant (Bird, Staghezza, & Gould, 1992). Autism spectrum disorders and intellectual disability were exclusionary in both trials. Participants with all other comorbidities were included. All study participants were permitted to continue stimulant medication and special education interventions at school during the trials, which were monitored for inclusion in analyses as appropriate. Demographic characteristics of the current subsample ( $N=78$ ) are presented in Table 1. Participants from the combined intent to treat samples ( $N=130$ ) were excluded because they

never began treatment after randomization to STAND ( $n=4$ ), discontinued treatment prior to the final session ( $n=30$ ), or lacked an audible recording ( $n=18$ ). The subsample was compared to the excluded participants on all Table 1 variables. The included participants were significantly less likely to have a single parent [30.8% vs. 53.8%;  $X^2(1)=6.92$ ,  $p=.009$ ].

## Procedures

**Recruitment and Data Collection.**—All procedures were approved by the university's institutional review board. In both studies, participants were recruited through referral from local schools and parent inquiry at the university clinic. Prospective participants completed a screener containing DSM ADHD symptoms and questions about impairment that was administered to a parent. Families were invited for an eligibility assessment if the parent endorsed four or more of either inattention or hyperactivity/impulsivity symptoms *and* clinically significant (at least a 3 on a 0 to 6 impairment scale). At the eligibility assessment, informed parental consent and youth assent were obtained and participant demographic and clinical information was assessed. All participants in the both studies were randomized to receive 10 sessions of Supporting Teens' Autonomy Daily (STAND) from a clinician in a university clinic (pre or post-doctoral trainee, clinical psychologist, or master's level clinician). For more information about the trials that contributed data to the present study, see Sibley et al., 2016, 2020. Clinicians in both trials were instructed to record all therapy sessions and submit them to a secure computer drive immediately post-session.

**Treatment Description.**—STAND is manualized and consists of ten one hour weekly individual sessions attended by the adolescent and primary caregiver together. Treatment was offered in English and Spanish. Therapists received three days of training prior to implementing treatment. Training consisted of small group discussions, role plays, video demonstrations, skill building games, didactic instruction, and individualized feedback. The treatment is fully described elsewhere (Sibley, 2016). In STAND, client skill instruction is blended with Motivational Interviewing (MI; Miller & Rollnick, 2013) and guided parent-teen behavioral contracting. Sessions move through three phases. In the engagement phase, MI increases awareness of personal values and goals, identifies strengths, and recognizes ways to achieve personal goals and act consistently with values. The skills phase teaches parent behavioral strategies and OTP skills applied to homework, school, and chores. Treatment is modular; families and therapists collaboratively select skills relevant to families' personal goals. Rather than a didactic approach, the skills phase introduces strategies (see Table 2) using MI strategies that emphasize dyadic autonomy and shared-decision making. This phase includes guided parent-teen contracting, in which MI is incorporated to build commitment to weekly skill practice outside of session. As part of this process, therapists review adherence to contracts, building recognition of progress, confidence in treatment, and awareness of consequences of parent and teen choices. Planning sessions teach families to integrate skills into a daily routine, transfer new habits to school settings, and build a final parent-teen contract.

In STAND's final session, families review of progress and plan for maintenance of change after termination. The session agenda includes: (1) review therapy homework, (2) reflect on positive changes family members made in treatment, (3) discuss progress on treatment

goals, (4) make plans for continued skill practice, (5) generate advice for new families just starting STAND, and (6) identify concrete next steps for continued improvement post-termination. In line with Motivational Interviewing best practices, the language that the therapist used to introduce topics and amount of time spent on each topic was permitted to vary naturalistically according to the family's needs. For more information about delivering STAND'S final session see Sibley (2016).

**Final Session Coding.**—All available sessions were transcribed verbatim using Express Scribe Transcription Software (<http://www.nch.com.au/scribe/>) and checked for accuracy by research assistants. Full transcripts were used for all coding. This study aimed to identify parent and teen perceptions of: (a) what changed for the parent as a result of treatment and (b) what changed for the teen as a result of treatment. Research assistants extracted relevant units of parent and teen speech from transcribed STAND sessions utilizing a standardized procedure that specified how to identify discrete units of speech, discriminate speech units that were relevant versus irrelevant to research questions, extract and supplement contextual information needed for the interpretation of quotes, apply decision rules, and establish speaker-perceived causation (i.e., that the speaker viewed the change to occur as a *result* of STAND). Extraction and coding occurred using *Dedoose* coding software (Salmona et al., 2019). Spanish speaking coders extracted information from therapy sessions conducted in Spanish and translated them into English for review by non-Spanish-speaking coders (Oxley et al., 2017).

Three coders contributed to category construction using a grounded theory framework (Charmaz, 2014). Coding began with open coding. The focus of this procedure is creating a consensus list of codes that saturate available data (for examples see: Abba et al., 2008; Schraw et al., 2007). First, two coders (fifth and sixth author) independently sorted all extracted speech units into initial groupings based on comparing speech units and asking the question, “is this the same or different?” This process was completed for the first 50% therapy sessions, with each coder taking careful notes on the code generation process. Next, the two coders met with a third coder (first author) and reconciled the proposed categories to create a consensus list of categories and codebook with category names, definitions, and rare, challenging, and typical examples of each code. The two coders coded the second 50% of interviews using the new codebook, refining the codebook as necessary. In the next step, three new coders (second, third, and fourth author) were enlisted to conduct the final coding using the completed codebook. Codes were oblique, meaning that some units of speech were assigned multiple codes. Twenty percent of speech units were double coded to assess inter-rater reliability. *Kappa* was .84, indicating strong inter-rater reliability.

**Role of Researchers in Coding.**—The first, fifth, and sixth authors of this paper contributed to category construction and completion of the codebook. As researchers in the field of ADHD, they may possess presuppositions about the constructs of interest that may influence the lens through which they view the data. They may have preferences for certain informant statements that support these presuppositions, which may lead to blind spots or a priori judgments. Validity enhancing procedures included independent coding of interviews



by a second set of coders who were not informed of study hypotheses, linking codes to direct quotations (see Results), and recoding interviews to ensure full saturation of data.

### Analytic Plan

The proportion of the sample who displayed each category was calculated. Network analysis was performed using the R-package *igraph* (Csardi & Nepusz, 2006) to estimate the network structure of the resulting categories across participants. The network was made up of “nodes” (i.e., observed categories) and “edges” (i.e., associations between observed categories). Edges were formed based on observation of two qualitative categories within the same session. Edges were modeled as undirected parameters (i.e., directionality of the association was not modeled); however directionality was embedded within categories. Edges were weighted according to the number of participants with observations of the edge. Network visualization utilized the Fruchterman-Reingold algorithm (Fruchterman & Reingold, 1991). Node diameters and edge widths were weighted visually according to logarithmic functions. Centrality was estimated to characterize the role of individual nodes within the network (Opsahl et al., 2010). Strength (i.e., cumulative edge weights associated with a node) was selected as a centrality index as it represents the magnitude of the association between a node and all other nodes (i.e., how well-connected a node is with the other nodes).

## Results

### Observed Categories

To achieve saturation, open coding generated 21 categories. Final category definitions are presented in Table 2. Below, an in-depth characterization of each category is described, along with example statements, in order of prevalence.

### Adolescent Change Areas

**Motivation. (46.2%).**—Described as the degree of commitment to positive behaviors due to intrinsic or extrinsic motivators. One teen describes how they understand the program and its benefits leading to their commitment to positive behaviors:

“It is kinda motivating me because now that I see how it works and how it benefits me. Now that I see it in effect it makes me want to write down all my homework and make sure I write down all homework, and even if I do my homework in class to bring it home so my mom can check it and make sure I do all my homework.”

**Organization of Materials. (42.3%).**—Defined as establishing and maintaining a system that promotes access to materials when needed. For example, this code included keeping an organized backpack, fewer loose papers, organizing one’s room, lighter or cleaner backpack, able to find materials faster or more frequently, and remembering materials. A parent reported that the youth was able to establish and maintain a clean backpack accompanying an organized binder:

“Her backpack is pretty neat, the binder is pretty organized...No loose papers.”

**Academic Performance. (41.0%).**—Defined as academic achievement demonstrated through subject knowledge, test scores, grades and consistency in submitting school assignments. For example, one parent reported that their youth had shown improvement in grades:

“because I’ve seen improvement in the grades and I haven’t seen any like lower grades besides the science thing, but I know why, you know. That means that she’s doing the homework, that means that she’s turning in all the work.”

**Work Completion. (35.9%).**—Defined as increased quantity of completed work or increased quality of completed work. For example, a youth reported:

“Yeah, because when I was like, sometimes at night time, like for example for math, I had to do a worksheet at night time, sometimes like he, like he grades on completion so sometimes I wouldn’t get the right answer and I’ll still get As but when I do it in the day time I actually get the right answers.”

Another youth reported that:

“I’m more caught up with my work now, I don’t have this many missing assignments and ... it’s just easier for me to keep track of and... do the assignments than it was before.”

**Time Management and Planning. (34.6%).**—Defined as a demonstration of behaviors that improve efficiency and productivity including structure and time allotment for school assignments. Time management and planning behaviors may include reduced procrastination, setting aside time for homework, working on larger assignments ahead of time, not having to stay up as late, having more free time, more structure, and remembering appointments. One parent reported that their youth had developed a schedule:

“I see on a daily thing that, you know like, we now have, I mean, we now know that homework has to be done and we have to spend time studying. And we know this time is assigned to this, and we are disciplined about that.”

**Writing in Planner. (34.6%).**—Defined as utilization of planner through knowledge of homework assignments including due dates and description of assignments. One youth reported:

“The planner helps a lot, I’ve gotta admit. I’ve noticed like, I get home and I just open the planner, I look to see what I have for English, I just write it down and when I get to class, I just turn it in to her. Free hundred.”

**Autonomy. (29.5%).**—Defined as the extent to which teen is performing positive behaviors more independently. An example of an extracted statement made by a parent that demonstrated perceived change in teen autonomy:

“I feel like he’s more like independent and he does thing more on his own. Like I don’t have to...I still do it because I feel like I have to do it. But I notice that he’s more, he’s more aware of what he has to do. And he gets there, and tries to do it.”



**Improved Stress or Mood. (23.1%).**—Described as improvement in teens overall mood or reduction of stress. One youth reflects on treatment and how they have less stress now:

“Oh, I actually came from being an [dis]organized kid and failing and doing stuff to now becoming a successful kid passing on tenth grade and actually learning how to do stuff a lot more easier without the stress and constant reminders.”

**Study Skills. (21.8%).**—Defined as the use of study active study strategies or increased time devoted to studying. Strategies may include use of flashcards, a primary skill taught in STAND. For example, one parent reported that the youth was using the study skills, which resulted in better test grades:

“And the flashcards to study. He’s been doing the flashcards and he’s been doing great. He’s been doing good grades on those tests that he had done the flashcards.”

**Fewer Behavioral Problems. (19.2%).**—Described as teen engaging in positive behaviors in terms of following rules or the reduction of negative behaviors. One youth compares their behavior from the present to the past:

“I’m actually doing, improving more than last year and I’ve been more calm than I used to be and you see me screaming a lot (less), like, fighting a lot (less) with my parents, arguing, hardly disrespecting, not, not like that.”

**Note-Taking. (12.8%).**—Note-taking was defined as practice of the skill of note-taking or completion of notes during class or other academic tasks. For example, one youth indicated writing notes improved studying:

“(writing down notes has) been helping me to study for what’s coming up...the test.”

**Home Responsibilities. (12.8%).**—Defined as participation and effectiveness in performing household tasks independently and consistently adhering to morning and evening routines. One teen describes the improvement of their routine compared to before the program:

“like before I (would) leave it to last minute but now I put my stuff in my bag every morning I mean every night ... Um I’m not to stress thinking about the morning I just have to get ready myself.”

**Interpersonal Skills. (6.4%).**—Improvement in non-parental relationships (i.e., peer relationships, relationships with teachers). One young adult describes the improvement in their relationship with students of the same grade:

“Well, I mean, I’m making more friends now, like, for, like I have like 8th grade friends now, um... Like in the cafeteria, I talk to a lot more people. And uh, um... and like um, like I just have more friends, that’s it.”

**Confidence/Self-Esteem. (6.4%).**—Described as improvement in teen’s self-esteem or confidence in abilities. One teen describes a moment where they felt good about themselves:

“It feels good to just hand the paper to the teacher and know that you did it... Accomplishment.”

**Medication Adherence (3.8%).**—Defined as taking medication consistently and independently as prescribed. For example, one parent describes how their youth now takes their medication alone:

“Now, she does it. I don’t need to tell her. She does it and not only does she take her (medication), she (also) takes her vitamins.”

## Parent Changes

**Parent Use of Behavioral Strategies. (44.9%).**—Defined as parents defining expectations of teen behavior and providing positive reinforcements for positive behaviors including utilization of contract for defining expectations and consequences. For example, one parent reflected that:

“(I) make sure the contract is followed but (I) also make sure to follow it up appropriately with the...consequences or with the privileges when he does a good job.”

**Reduced Parental Intrusiveness. (34.6%).**—Defined as the parent providing teen with opportunity to act independently or encouraging teen to take more responsibility and initiative. For example, one parent noted:

“I don’t bother with (being on top of him with his school stuff) anymore, I just let him do whatever he thinks he’s supposed to do, and he knows that I haven’t been on top of him.”

**Lower Parenting Stress. (23.1%).**—Defined as psychological or emotional benefits for the parent. An example of an extracted statement made by a parent that demonstrated perceived change in lower amounts of parental stress:

“I feel more secure, more calm, a lot more content...because well I see that he is having his accomplishments as well.”

**Parental Self-Awareness. (16.7%).**—Defined as the parent’s recognition of personal responsibility in the teen’s behavioral change process. An example of an extracted statement made by a parent that demonstrated a perceived change in parental self-awareness:

“I think we have more of a handle on what her needs are. Before it was like you know, what is it? I think now we kind have pinpointed where she was really, what has helped. You know, like what she really needed.”

**Parental Involvement (12.8%).**—Defined as the extent to which parents provide teen with needed support or tools to succeed. An example of an extracted statement made by a teen that demonstrated perceived change in parental involvement:

“I have more support from my mom and from people around me and educational purposes that my mom have been always there with me this year more than she

has ever since we've started this program, she's always been um, helping me and supporting me and telling me oh always face your goals."

### Parent-Teen Changes

**General (41.0%).**—Defined as a general indication of improvement not otherwise categorized. An example of an extracted statement made by a teen that demonstrated perceived general improvement:

"The habits that I've learned to, the habits that I've started making...since I've been here. Pretty good."

**Parent-Teen Relationships (37.2%).**—Described as the improvement of parent-teen relationship demonstrated by increased trust, quality of communication, level of connection, and reduction of conflict within the family. One teen reported the relationship with their parent had improved because of communication:

"[she is] a better listener yea... [it is beneficial for me] So I can voice myself... [I] feel more heard."

### Network Analysis

Figure 1 provides visualization of the network of coded change categories. Twenty-one nodes (i.e. categories) and 202 edges (i.e., relationships between categories) were modeled. Within the 202 edges, those with weights in the 90<sup>th</sup> percentile and above are presented in Table 3. The highest weighted edge was the association between parent use of behavioral strategies and motivation (*weight*=32) followed by the associations between parent use of behavioral strategies and organization (*weight*=24), motivation and academics (*weight*=23), motivation and organization (*weight*=23), and parent use of behavioral strategies and academics (*weight*=23). Figure 2 provides visualization of node strength. Parent use of behavioral strategies possessed the highest node strength (*strength*=311), followed by motivation (*strength*=290), organization (*strength*=271), academics (*strength*=264), the parent-teen relationship (*strength*=236), and work completion (*strength*=236).

### Discussion

This observational study revealed 21 unique areas of change perceived by parents and teens participating in BT for ADHD. These areas included known distal outcomes (i.e. academic performance, parent-teen conflict) and proximal targets (i.e., organization, time management and planning, parent use of behavioral strategies, parenting stress, planner use, reductions in behavior problems; Breaux et al., 2019; Langberg et al., 2013; Sibley et al., 2013, 2016). Parents and teens also perceived novel proximal targets that have not been tested empirically (i.e., motivation, completion of home responsibilities, autonomy, adolescent stress, interpersonal skills, confidence/self-esteem, parental self-awareness) as well as targets that have been tested empirically with null or mixed intervention effects (i.e., work completion, medication adherence; Sibley et al., 2016, 2021). Finally, this study detected a less prevalent set of targets that map onto individualized intervention components (see Table 2; note-taking, study skills, parent involvement, reduced parental intrusiveness).

Motivation (46.2%), parent use of behavioral strategies (44.9%), organization skills (42.3%), and academic performance (41.0%) were the most commonly perceived treatment-related changes. Network analysis revealed that parent use of behavioral strategies, motivation, and organization skills possessed the strongest associations with the full network of changes, as well as with each other (see Figure 1). Based on these results, we hypothesize that these three variables likely comprise the core BT processes for adolescent ADHD with possible cascading effects to other proximal targets as well as distal outcomes (see Figure 2).

For the most part, parent- and teen-perceived changes mirrored previous adolescent ADHD intervention effects on proximal targets and distal outcomes (Evans et al., 2011; Langberg et al., 2012; Sibley et al., 2013, 2016, 2020). Divergence from the literature was also noted. Improvements in work completion were perceived for over a third of the subsample (36.4%); however, percentage of work turned in (from online gradebooks) was a non-significant outcome in STAND's efficacy trial (Sibley et al., 2016). Though it is possible that differences in sample composition produced these disparate findings, STAND also may increase *completion* of work but not the proportion of work turned-in (Langberg et al., 2019). Future work should examine this possible area of weakness in clinic-based adolescent ADHD interventions. School-based components may be needed to promote in-school behaviors such as turning in work (Langberg et al., 2012). Improvements in medication adherence were noted for a handful of adolescents ( $n=3$ ; 3.8% of the sample, 10% of those medicated at baseline). Though this category was uncommon, it points to a subset of families that may experience synergistic effects from combined medication and BT for adolescent ADHD. Effects of BT on medication utilization were previously noted in STAND's community-based RCT (compared to usual care; Sibley et al., 2021a), an integrated data analysis of four adolescent ADHD treatment studies (Sibley et al., 2021b), and qualitative work with another BT model for adolescent ADHD (Sibley et al., 2020). Further work is needed to understand how BT they improve medication adherence in adolescents with ADHD.

The novel targets detected in this study were consistent with theoretical models for adolescent ADHD treatment generally and STAND specifically. Parent use of behavioral strategies is used to target motivation in most evidence-based BTs for adolescent ADHD (Langberg et al., 2012; Sibley et al., 2016; Sprich et al., 2016). Unlike other packages, in STAND, adolescent motivation is additionally targeted by continuous MI. Previously undetected person-specific effects map onto modular components such as study skills (21.8%) and note-taking (12.8%) and individualized parenting targets such as reducing parental intrusiveness (34.6%) and mitigating parental disengagement (12.8%; Sibley, Campez, et al., 2016). In future research, moderated mediational analyses might elucidate whether baseline parenting style or module selection influences the extent to which STAND improved individualized target domains.

Some newly detected targets are logical in retrospect. Completion of home responsibilities is often a target on behavioral contracts. Furthermore, STAND's delivery style is meant to increase adolescent autonomy and self-confidence (Sibley, 2016). Several components in STAND target parental self-awareness (i.e., parenting psychoeducation, weekly analysis of parenting strategy use; Sibley, 2016). Though not hypothesized *a priori*, it is also

not surprising some adolescents experienced improved stress and interpersonal skills. Several targets of BT for adolescent ADHD (i.e., academic success, positive parent-teen relationships, autonomy support) improve well-being in adolescents (Lekes et al., 2010; Silva et al., 2020; Weidman et al., 2015). STAND's parent-teen communication module also might transfer new conflict-resolution skills non-parental relations. These novel targets should be measured and modeled in future adolescent ADHD treatment studies to elucidate the extent to which they serve as treatment mediators.

Considering the network analysis results alongside the extant literature, we retain our initial conceptualization of STAND's theoretical model, adding several new components (see Figure 3). In the initial model, we posited that skills training in STAND increases parent behavioral strategy use and teen organization skills; meanwhile, MI in STAND increases parent behavioral strategy use and initial adolescent motivation. In turn, parent behavioral strategy use further reinforces teen motivation through contingency management, thereby increasing teen application or organization skills to daily life. As a result of improved teen motivation and organization skills, ADHD symptoms, academic problems, and parent-teen conflict abate. The secondary teen skill targets detected herein (e.g., time management and planning, work completion, study skills, note-taking, planner use) can be substituted for organization skills in this model, depending on the customized skill modules selected in STAND. In our revised model we now integrate secondary parenting factors such as improved parental self-awareness, increased parental engagement, and reduced parental intrusiveness, which may be targeted by MI as a road to increasing parental use of behavioral strategies (Sibley, Campey, et al., 2016). Similarly, MI may improve new detected secondary teen factors such as sense of autonomy and self-confidence, which may contribute to enhanced teen motivation (Miller & Rollnick, 2013). Additionally, the revised model includes old and new secondary outcomes of STAND, which may be person-specific, and include reduced parent and teen stress, decreased behavior problems, increased completion of household responsibilities, stronger medication adherence, and improved interpersonal relations. Given the apparent universal and person-specific mechanisms and outcomes in STAND's theoretical model, idiographic assessment (e.g., the Top Problems Assessment; Weisz et al., 2011) and larger sample sizes will likely be needed to fully validate the proposed model, and test models for adolescent ADHD interventions more broadly.

This study possesses important limitations. Our study was observational and parent and teen perceptions of change during STAND were documented in an externally valid context. Though STAND therapists are trained to elicit client perspectives and avoid opinion sharing as a matter of MI-adherence (Moyers et al., 2014), it is possible that some parent and teen perceptions were influenced by the therapist questions and reflections that elicited their responses or a desire to please the therapist. Our sample was primarily middle class (~65% of parents had a bachelor's degree), of ethnic minority heritage, and from a single metropolitan area. There could be socioeconomic, cultural, or regional influences that might not generalize to dissimilar client populations. Furthermore, participants who were unable to be included in this study due to data loss or premature dropout were more likely to have a single parent. This could create biases in the data. Some categories detected in our qualitative model may possess conceptual overlap with other categories.

When conceptual overlap is high, this can inflate centrality estimates in network analyses. Because categories were designed to be conceptually orthogonal, we included all categories in the network. Although perceived direction of effects (i.e., *improved* organization, *reduced* parental intrusiveness) were embedded in the category definitions, the cross-sectional nature of our data required network analysis to model undirected parameters. Thus, all directional relationships between nodes are theoretical and not empirically confirmed. Finally, although our proposed theoretical model was informed both by typical examples of parent and teen statements, as well as network analysis, these hypothesis generating methods must be empirically validated through prospective data approaches and advanced modeling (i.e., structural equation modeling, latent growth curve analysis).

This study offered support for parent use of behavioral strategies and adolescent motivation and organization skills as primary candidate mediators for adolescent ADHD BT with possible effects of these variables on multiple outcomes. We also hypothesize a powerful role of increasing teen motivation at the hub of the STAND model's efficacy, with increased parent use of behavioral strategies and MI as likely contributors to this process. Prevailing models of ADHD highlight both executive functions (like organization, time management, and planning) and motivation as underlying symptom mechanisms (Sonuga-Barke, 2002; Castellanos et al., 2006); thus, this dual pathway conceptualization may also extend to clinical therapeutics. Based on our findings, we recommend that adapted models of adolescent ADHD BT retain parent training in behavioral strategies, motivational interviewing, and organization skills training as key targets of treatment. Treatment dismantling studies are needed to confirm whether all of these components must be in place to produce meaningful effects on outcome. This work could vary the motivational strategies employed (i.e., delivering treatment with or without MI, with or without parent training in use of rewards). It might also investigate the extent to which person-specific treatment modules contribute to outcome effects. Similar work should be conducted with additional adolescent ADHD BT packages, which may target similar outcomes through both common and unique pathways. Understanding common treatment mediators could promote streamlined treatment. Knowledge of unique treatment mediators could contribute to treatment matching algorithms that consider what works for whom (and why) in the treatment of adolescent ADHD.

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## References

- Abba N, Chadwick P, & Stevenson C (2008). Responding mindfully to distressing psychosis: A grounded theory analysis. *Psychotherapy research*, 18, 77–87. 10.1080/10503300701367992 [PubMed: 18815958]
- Barkley RA, Edwards G, Laneri M, Fletcher K, & Metevia L (2001). The efficacy of problem-solving communication training alone, behavior management training alone, and their combination for parent-adolescent conflict in teenagers with ADHD and ODD. *Journal of consulting and clinical psychology*, 69(6), 926–941. 10.1037/0022-006X.69.6.926 [PubMed: 11777120]



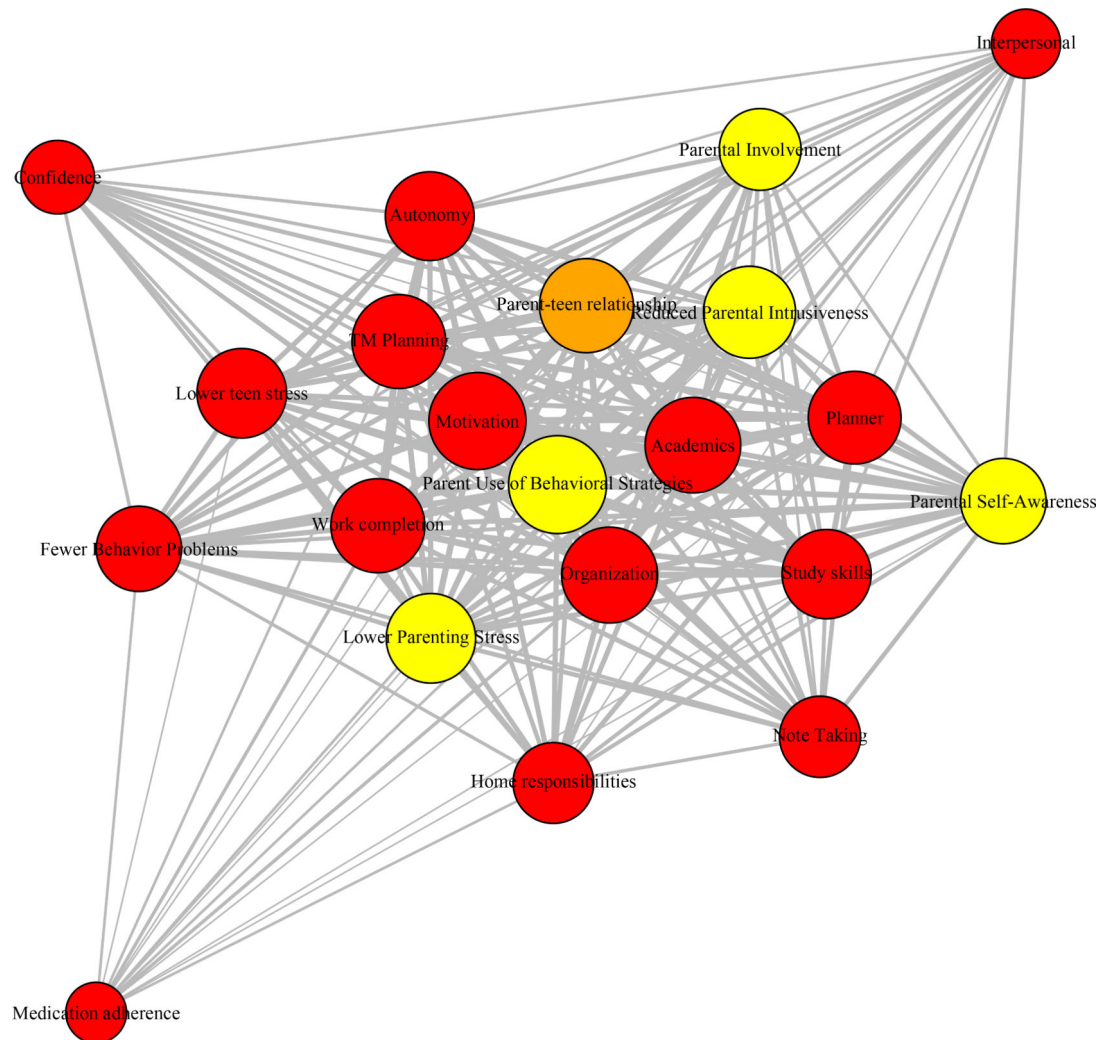
- Bird HR, Gould MS, & Staghezza B (1992). Aggregating data from multiple informants in child psychiatry epidemiological research. *Journal of the American Academy of Child and Adolescent Psychiatry*, 31, 78–85. 10.1097/00004583-199201000-00012 [PubMed: 1537785]
- Borgatti SP, Mehra A, Brass DJ, & Labianca G (2009). Network analysis in the social sciences. *Science*, 323, 892–895. 10.1126/science.1165821 [PubMed: 19213908]
- Breaux RP, Langberg JM, McLeod BD, Molitor SJ, Smith ZR, Bourchtein E, & Green CD (2018). The importance of therapeutic processes in school-based psychosocial treatment of homework problems in adolescents with ADHD. *Journal of consulting and clinical psychology*, 86(5), 427–438. 10.1037/ccp0000300. [PubMed: 29683700]
- Breaux RP, Langberg JM, Molitor SJ, Dvorsky MR, Bourchtein E, Smith ZR, & Green CD (2019). Predictors and trajectories of response to the Homework, Organization, and Planning Skills (HOPS) intervention for adolescents with ADHD. *Behavior therapy*, 50(1), 140–154. 10.1016/j.beth.2018.04.001 [PubMed: 30661554]
- Castellanos FX, Sonuga-Barke EJ, Milham MP, & Tannock R (2006). Characterizing cognition in ADHD: beyond executive dysfunction. *Trends in cognitive sciences*, 10(3), 117–123. 10.1016/j.tics.2006.01.011. [PubMed: 16460990]
- Charmaz K (2014). *Constructing grounded theory* (2nd ed., Introducing qualitative methods). London; Thousand Oaks, California: SAGE Publications.
- Chorpita BF, Daleiden EL, Park AL, Ward AM, Levy MC, Cromley Tet al. , (2017). Child STEPs in California: A cluster randomized effectiveness trial comparing modular treatment with community implemented treatment for youth with anxiety, depression, conduct problems, or traumatic stress. *Journal of consulting and clinical psychology*, 85.
- Csardi G, Nepusz T (2006). “The igraph software package for complex network research.” *InterJournal, Complex Systems*, 1695. <https://igraph.org>.
- Evans SW, Langberg JM, Schultz BK, Vaughn A, Altaye M, Marshall SA, & Zoromski AK (2016). Evaluation of a school-based treatment program for young adolescents with ADHD. *Journal of consulting and clinical psychology*, 84(1), 15–30. 10.1037/ccp0000057 [PubMed: 26501496]
- Evans SW, Schultz BK, Demars CE, & Davis H (2011). Effectiveness of the Challenging Horizons After-School Program for young adolescents with ADHD. *Behavior therapy*, 42, 462–474. 10.1016/j.beth.2010.11.008 [PubMed: 21658528]
- Fabiano GA, Pelham WE Jr, Waschbusch DA, Gnagy EM, Lahey BB, Chronis AM et al. , (2006). A practical measure of impairment: psychometric properties of the impairment rating scale in samples of children with attention deficit hyperactivity disorder and two school-based samples. *Journal of clinical child and adolescent psychology*, 35, 369–385. 10.1207/s15374424jccp35033 [PubMed: 16836475]
- Fruchterman TMJ and Reingold EM (1991). Graph Drawing by Force-directed Placement. *Software - Practice and Experience*, 21(11):1129–1164. 10.1002/spe.4380211102
- Haack LM, Villodas M, McBurnett K, Hinshaw S, & Pfiffner LJ (2017). Parenting as a mechanism of change in psychosocial treatment for youth with ADHD, predominantly inattentive presentation. *Journal of abnormal child psychology*, 45, 841–855. 10.1007/s10802-016-0199-8 [PubMed: 27628742]
- Hennig T, Schramm SA, Linderkamp F, & Koglin U (2016). Mediation and moderation of outcome in a training intervention for adolescents with attention-deficit/hyperactivity disorder. *Journal of Cognitive Education and Psychology*, 15, 412–427. 10.1891/1945-8959.15.3.412
- Hinshaw SP, Owens EB, Wells KC, Kraemer HC, Abikoff HB, Arnold LE, et al. , (2000). Family processes and treatment outcome in the MTA: negative/ineffective parenting practices in relation to multimodal treatment. *Journal of abnormal child psychology*, 28, 555–568. 10.1023/a:1005183115230 [PubMed: 11104317]
- Langberg JM, Epstein JN, Becker SP, Girio-Herrera E, & Vaughn AJ (2012). Evaluation of the homework, organization, and planning skills (HOPS) intervention for middle school students with attention deficit hyperactivity disorder as implemented by school mental health providers. *School Psychology Review*, 41(3), 342–364. [PubMed: 25355991]

- Langberg JM, Evans SW, Schultz BK, Becker SP, Altaye M, & Girio-Herrera E (2016). Trajectories and Predictors of Response to the Challenging Horizons Program for Adolescents With ADHD. *Behavior therapy*, 47, 339–354. 10.1016/j.beth.2016.01.001 [PubMed: 27157028]
- Langberg JM, Becker SP, Epstein JN, Vaughn AJ, & Girio-Herrera E (2013). Predictors of response and mechanisms of change in an organizational skills intervention for students with ADHD. *Journal of child and family studies*, 22(7), 1000–1012.
- Langberg JM, Smith ZR, & Green CD (2019). Addressing Homework Problems in Adolescents with ADHD. *ADHD in Adolescents: Development, Assessment, and Treatment*, 330. Guilford Press.
- Lekes N, Gingras I, Philippe FL, Koestner R, & Fang J (2010). Parental autonomy-support, intrinsic life goals, and well-being among adolescents in China and North America. *Journal of youth and adolescence*, 39, 858–869. 10.1007/s10964-009-9451-7 [PubMed: 19771500]
- Miller WR, & Rollnick S (2013). *Applications of motivational interviewing* (3rd edition). Guilford Press.
- Moyers TB, Manuel JK, & Ernst D (2014). *Motivational Interviewing Treatment Integrity Coding Manual 4.1*. Unpublished manual.
- Opsahl T, Agneessens F, & Skvoretz J (2010). Node centrality in weighted networks: Generalizing degree and shortest paths. *Social networks*, 32(3), 245–251. 10.1016/j.socnet.2010.03.006
- Oxley J, Günhan E, Kaniyattam M, & Damico J (2017). Multilingual issues in qualitative research. *Clinical linguistics & phonetics*, 31(7–9), 612–630. 10.1080/02699206.2017.1302512 [PubMed: 28665758]
- Pfiffner LJ, Villodas M, Kaiser N, Rooney M, & McBurnett K (2013). Educational outcomes of a collaborative school-home behavioral intervention for ADHD. *School Psychology Quarterly*, 28(1), 25–36. 10.1037/spq0000016 [PubMed: 23506023]
- Pokorny JJ, Norman A, Zanesco AP, Bauer-Wu S, Sahdra BK, & Saron CD (2018). Network analysis for the visualization and analysis of qualitative data. *Psychological methods*, 23(1), 169–183. 10.1037/met0000129. [PubMed: 28569530]
- Salmona M, Lieber E, & Kaczynski D (2019). *Qualitative and mixed methods data analysis using Dedoose: A practical approach for research across the social sciences*. Sage Publications.
- Schraw G, Wadkins T, & Olafson L (2007). Doing the things we do: A grounded theory of academic procrastination. *Journal of Educational Psychology*, 99, 12–25. 10.1037/0022-0663.99.1.12
- Shaffer D, Fisher P, Lucas CP, Dulcan MK, & Schwab-Stone ME (2000). NIMH Diagnostic Interview Schedule for Children Version IV (NIMH DISC-IV): description, differences from previous versions, and reliability of some common diagnoses. *Journal of the American Academy of Child and Adolescent Psychiatry*, 39, 28–38. 10.1097/00004583-200001000-00014 [PubMed: 10638065]
- Sibley MH, Coxe SJ, Page TP, Pelham WE, Yeguez CE, LaCount PA, & Barney S (2020). Four-Year Follow-up of High versus Low Intensity Summer Treatment for Adolescents with ADHD. *Journal of Clinical Child and Adolescent Psychology*. 10.1080/15374416.2020.1833734
- Sibley MH, Coxe SJ, Stein MA, & Meinzer MC, & Valente MJ (in press). Predictors of Treatment Engagement and Outcome among Adolescents with ADHD: An Integrative Data Analysis. *Journal of the American Academy of Child and Adolescent Psychiatry*.
- Sibley MH, Graziano PA, Kuriyan AB, Coxe S, Pelham WE, Rodriguez L, Sanchez F, Derefinko K, Helseth S, & Ward A (2016). Parent-teen behavior therapy + motivational interviewing for adolescents with ADHD. *Journal of consulting and clinical psychology*, 84(8), 699–712. 10.1037/ccp0000106 [PubMed: 27077693]
- Sibley MH, & Kuriyan AB (2016). DSM-5 changes enhance parent identification of symptoms in adolescents with ADHD. *Psychiatry research*, 242, 180–185. 10.1016/j.psychres.2016.05.036 [PubMed: 27288736]
- Sibley MH, Pelham WE, Derefinko KJ, Kuriyan AB, Sanchez F, & Graziano PA (2013). A pilot trial of Supporting Teens' Academic Needs Daily (STAND): A parent-adolescent collaborative intervention for ADHD. *Journal of Psychopathology and Behavioral Assessment*, 35(4), 436–449. 10.1007/s10862-013-9353-6
- Sibley MH, Rodriguez L, Coxe S, Page T, & Espinal K (2020). Parent-Teen Group versus Dyadic Treatment for Adolescent ADHD: What Works for Whom?. *Journal of clinical child and adolescent psychology*, 49, 476–492. 10.1080/15374416.2019.1585257 [PubMed: 30990088]

- Sibley MH, Link K, Torres Antunez G, & Greenwood L (under review). Engagement Barriers to Behavior Therapy for Adolescent ADHD. Paper submitted for publication.
- Silva K, Ford CA, & Miller VA (2020). Daily Parent-Teen Conflict and Parent and Adolescent Well-Being: The Moderating Role of Daily and Person-Level Warmth. *Journal of youth and adolescence*, 49, 1601–1616. 10.1007/s10964-020-01251-9 [PubMed: 32472471]
- Sonuga-Barke EJ (2002). Psychological heterogeneity in AD/HD--a dual pathway model of behaviour and cognition. *Behavioural brain research*, 130, 29–36. 10.1016/s0166-4328(01)00432-6 [PubMed: 11864715]
- Sprich SE, Safren SA, Finkelstein D, Remmert JE, & Hammerness P (2016). A randomized controlled trial of cognitive behavioral therapy for ADHD in medication-treated adolescents. *Journal of child psychology and psychiatry, and allied disciplines*, 57, 1218–1226. 10.1111/jcpp.12549
- Van der Oord S, & Daley D (2015). *Moderators and mediators of treatments for youth with ADHD. Moderators and mediators of youth treatment outcomes*. Oxford University Press, New York, 123–145.
- Weidman AC, Augustine AA, Murayama K, & Elliot AJ (2015). Internalizing symptomatology and academic achievement: Bi-directional prospective relations in adolescence. *Journal of Research in Personality*, 58, 106–114. 10.1016/j.irp.2015.07.005
- Weisz JR, Chorpita BF, Frye A, Ng MY, Lau N, Bearman SK, Ugueto AM, Langer DA, Hoagwood KE, & Research Network on Youth Mental Health (2011). Youth Top Problems: using idiographic, consumer-guided assessment to identify treatment needs and to track change during psychotherapy. *Journal of consulting and clinical psychology*, 79(3), 369–380. 10.1037/a0023307 [PubMed: 21500888]

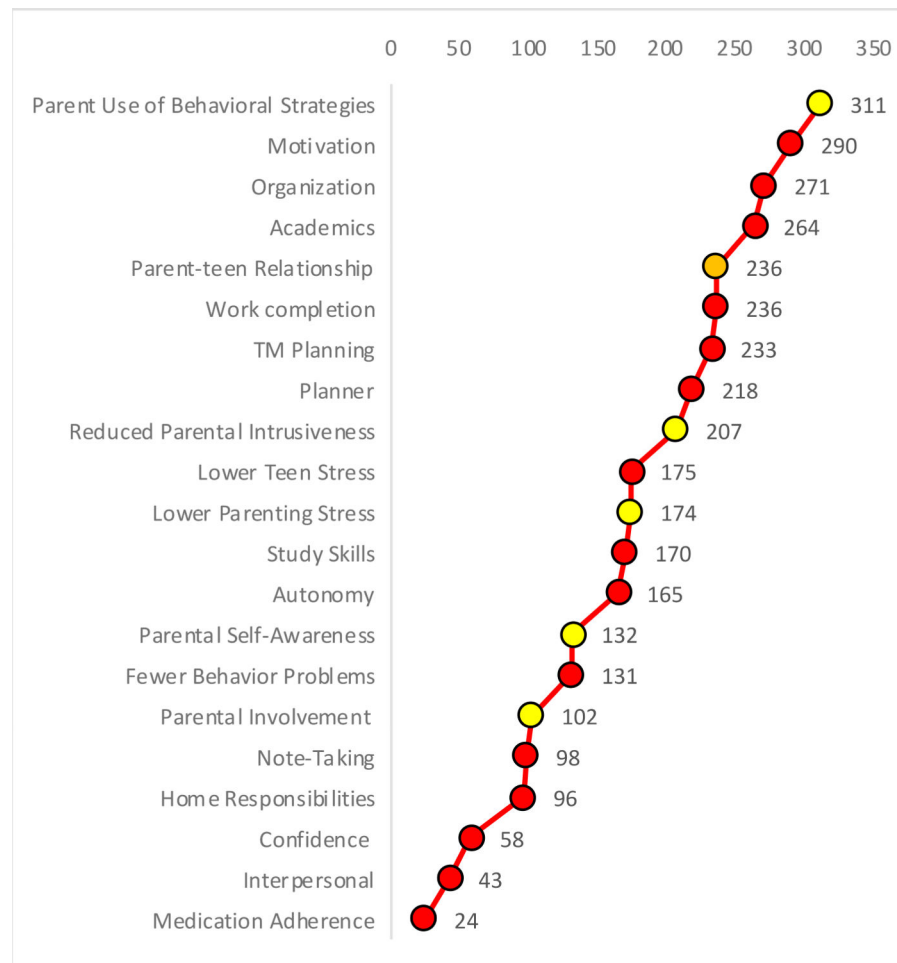
**Highlights**

- Methods included qualitative coding and network analysis.
- Common and person-specific therapeutic processes were perceived.
- Parent use of behavioral strategies was a primary therapeutic mechanism for parents
- Motivation and organization skills were primary therapeutic mechanisms for teens.



**Figure 1. Visualization of the Observed Category Network using the Fruchterman-Reingold Algorithm**

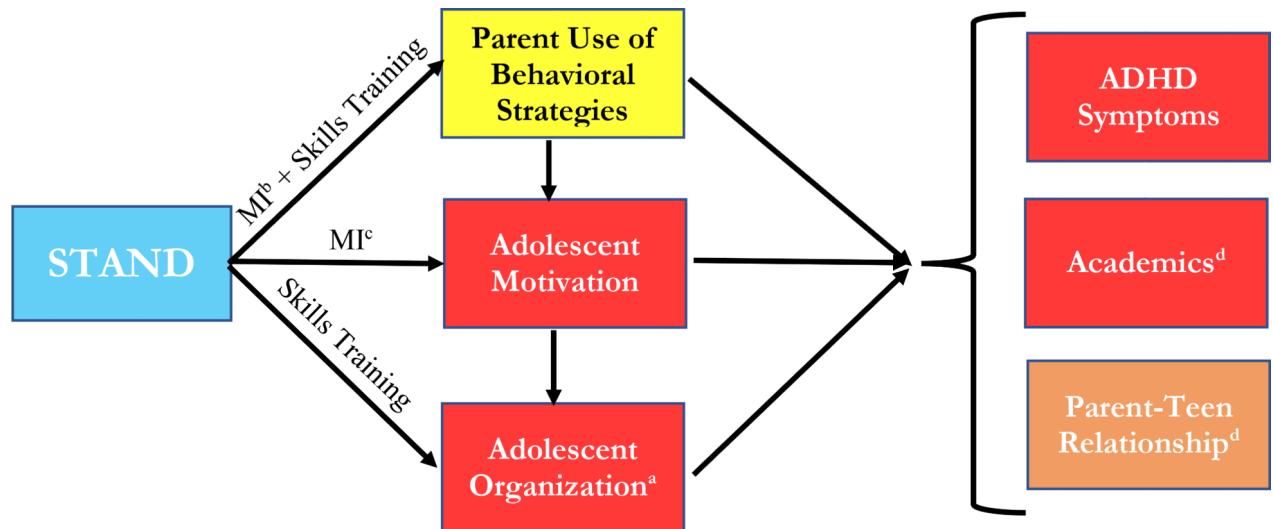
*Note.* Red nodes are teen changes, yellow nodes are parent changes, and orange nodes are dyadic changes. Categories at the center of the network possess stronger total associations with the other nodes in the network. Thicker edges (i.e., paths) between nodes indicate stronger associations. Larger nodes indicate greater incidence of connections with other nodes.



**Figure 2. Visualization of Node Strength**

*Note.* Red nodes are teen changes, yellow nodes are parent changes, and orange nodes are dyadic changes. Node strength indicates the magnitude of the association between a node and all other nodes.





**Figure 3. Proposed STAND Theoretical Model for Future Testing**

<sup>a</sup>Organization skills can be replaced with additional person-specific skills such as time management and planning, work completion, study skills, note-taking, or planner use. <sup>b</sup>MI directed at the parent may sometimes target parental self-awareness, reducing parental intrusiveness, or increasing parental engagement in order to support implementation of parent behavioral strategies. <sup>c</sup>MI directed at the adolescent may increase sense of autonomy or self-confidence in support of building teen motivation. <sup>d</sup>Primary functional outcomes in this model can be replaced by secondary functional outcomes that may be person-specific such as parent and teen stress reduction, reduced behavior problems, improved medication adherence, increased completion of home responsibilities, and improved interpersonal relations.

**Table 1.****Demographic and Clinical Characteristics of the Sample ( $N=78$ )**

Age $M(SD)$	13.02 (1.14)
Sex % (n)	
Male	71.8 (56)
Female	28.2 (22)
Race/Ethnicity % (n)	
White Non-Latinx	7.7 (6)
African-American	7.7 (6)
Latinx Any Race	79.5 (62)
Asian-American	2.6 (2)
Mixed Race	2.6 (2)
Receives ADHD Medication % (n)	38.5 (30)
Primary Caregiver % (n)	
Mother	87.2 (68)
Father	10.3 (8)
Grandmother	2.6 (2)
Highest Parent Education Level % (n)	
High School or less	11.5 (9)
Some college or Associate's	24.4 (19)
Bachelor's degree	38.5 (30)
Master's degree or higher	24.4 (19)
Undisclosed	13 (1)
Single Parent % (n)	30.8 (24)
Parent English Proficiency % (n)	79.5 (62)
School Services	
Individualized Education Plan	19.2 (15)
Section 504 Plan	25.6 (20)
None	52.6 (41)
Undisclosed	2.6 (2)
ADHD Subtype % (n)	
ADHD-Predominantly Inattentive Type	46.2 (36)
ADHD-Combined Type	53.8 (42)
Oppositional Defiant Disorder % (n)	50.0 (39)

**Table 2.****Observed Categories of Parent and Teen Perceived Changes during in the Final STAND Session**

	<b>%</b>	<b>Definition Emerging from Codes</b>
<u>Adolescent Changes</u>		
Motivation	46.2	The degree of commitment to positive behaviors due to intrinsic or extrinsic motivators.
Organization of Materials	42.3	Establishing and maintaining a system that promotes access to materials when needed. For example, keeping an organized backpack, fewer loose papers, organizing room, lighter or cleaner backpack, able to find materials faster or more frequently, remembering materials.
Academic Performance	41.0	Academic achievement demonstrated through subject knowledge, test scores, grades and consistency in submitting school assignments.
Work Completion	35.9	Increased quantity of completed work or increased quality of completed work.
Time Management and Planning	34.6	Demonstration of behaviors that improve efficiency and productivity including structure and time allotment for school assignments.
Writing in Planner	34.6	Utilization of planner to promote academic achievement through knowledge of homework assignments including due dates and description of assignments.
Autonomy	29.5	The extent to which teen is performing positive behaviors more independently.
Improved Stress or Mood	23.1	Improvement in teens overall mood or reduction in level of stress.
Study Skills	21.8	The use of study active study strategies or increased time devoted to studying. Strategies may include use of flashcards, a primary skill taught in STAND.
Fewer Behavior Problems	19.2	Teen engaging in positive behaviors in terms of following rules or the reduction of negative behaviors.
Note Taking	12.8	Practice of the skill of note-taking or completion of notes during class or other academic tasks.
Home Responsibilities	12.8	Participation and effectiveness in performing household tasks independently and consistently adhering to morning and evening routines.
Interpersonal Skills	6.4	Improvement in non-parental relationships (i.e., peer relations or relationships with teachers).
Confidence/Self-Esteem	6.4	Improvement in teen's self-esteem or confidence in abilities.
Medication Adherence	3.8	Taking medication consistently and independently as prescribed.
<u>Parent Changes</u>		
Parent Use of Behavioral Strategies	44.9	Defining expectations of teen behavior and providing positive reinforcements for positive behaviors including utilization of contract for defining expectations and consequences.
Reduced Parental Intrusiveness	34.6	Parent providing teen with opportunity to act independently or encouraging teen to take more responsibility and initiative.
Lower Parenting Stress	23.1	Psychological, logistical, or emotional benefits for the parent.
Parental Self-Awareness	16.7	Parents recognition of personal responsibility in behavioral change process in teen.
Parental Involvement	12.8	The extent to which parents provide teens with needed support or tools to succeed.
<u>Parent-Teen Changes</u>		
General	41.0	General indication of improvement not otherwise categorized.
Parent-Teen Relationship	37.2	The improvement of parent-teen relationship demonstrated by increased trust, quality of communication, level of connection, and reduction of conflict within the family unit.

**Table 3.**Node connections observed at or above the 90<sup>th</sup> percentile in edge weights

Node 1	Node 2	Edge Weight	% Sample
Parent Use of Behavioral Strategies	Motivation	32	41.6
Parent Use of Behavioral Strategies	Organization	24	31.2
Motivation	Academics	23	29.9
Motivation	Organization	23	29.9
Parent Use of Behavioral Strategies	Academics	23	29.9
Organization	Academics	22	28.6
Organization	Work Completion	22	28.6
Motivation	TM Planning	21	27.3
Parent Use of Behavioral Strategies	Planner	21	27.3
TM Planning	Academics	21	27.3
TM Planning	Work Completion	21	27.3
Work Completion	Academics	20	26.0
Motivation	Parent-Teen Relationship	20	26.0
Motivation	Planner	20	26.0
Motivation	Work Completion	20	26.0
Planner	Organization	20	26.0
Parent Use of Behavioral Strategies	Parent-Teen Relationship	20	26.0
Parent Use of Behavioral Strategies	TM Planning	20	26.0
Parent Use of Behavioral Strategies	Work Completion	20	26.0
Planner	Academics	20	26.0
Reduced Parental Intrusiveness	Parent-Teen Relationship	20	26.0
Organization	Parent-Teen Relationship	19	24.7
Organization	TM Planning	18	23.4
Parent Use of Behavioral Strategies	Autonomy	18	23.4
Parent-Teen Relationship	Academics	18	23.4
Parent Use of Behavioral Strategies	Reduced Parental Intrusiveness	18	23.4

Note. TM=time management; edge weight=number of final sessions where edge is present.