A Cost Analysis of a Stepped Care Treatment Approach for Anxiety Disorders in Youth

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Abstract

Objective: To address the high demand for youth anxiety treatment, researchers have begun to evaluate stepped care approaches to use limited resources efficiently. Quantifying cost savings can inform policy decisions about optimal ways to use limited resources.

Method: This study presents a cost analysis of a stepped care treatment approach for anxiety disorders in youth. Youths (N=112) completed an 8-session computer-administered attention bias modification treatment (ABMT) (Step 1) and families were given the option to 'step up' to cognitive behavioral therapy (CBT) (Step 2). Stepped care treatment cost estimates were based on: 1) resources used in treatment (i.e., clinician/paraprofessional time, equipment/materials); and 2) Medicaid reimbursement rates for clinician and paraprofessional time. We compared these two cost estimates with a hypothetical standard treatment approach for youth anxiety disorders: CBT only. We also tested predictive models to determine whether they could guide decisions about which youths, based on baseline characteristics, should be assigned to stepped care or directly to CBT only to avoid the costs associated with Step 1.

Results: Compared to a hypothetical standard CBT approach, the stepped care treatment was associated with an overall cost savings of 44.4% for the Medicaid reimbursement model and 47.7% for the resource cost model. The predictive models indicated that assigning all youths to stepped care would be more cost-effective than assigning certain youths directly to CBT only.

Conclusion: This study provides the first evidence that a stepped care treatment approach for youth anxiety is associated with substantial cost savings compared with a standard CBT.

In the United States, only about one-third of children and adolescents, hereon referred to as youths, with psychiatric disorders receive mental health services, highlighting an inability to meet the high demand for treatment (Merikangas et al., 2011). Youths with anxiety disorders are less likely to receive mental health services compared with youths who have other psychiatric disorders; only about one in five youths with anxiety disorders receive treatment services for anxiety (Merikangas et al., 2011). Thus, there is a large gap between the number

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of youth who experience anxiety disorders and the number of youth who receive treatment services for anxiety disorders. In an effort to reduce this gap, researchers have moved toward developing and evaluating novel service delivery models such as stepped care approaches (Kazdin, 2017). Stepped care service delivery models can increase access to effective treatment without diluting treatment effects. Stepped care treatment approaches may increase access and reduce the costs of treatment in part through task shifting, which involves increasing the total number of health workers that can provide treatment by redistributing intervention tasks from doctoral and masters level professionals to paraprofessionals who require less compensation and provide more affordable services (see Kazdin, 2017). This study presents a cost analysis of a recent open trial of a stepped care treatment approach for anxiety disorders in youth (Pettit et al., 2017).

Anxiety disorders are among the most common and impairing youth mental health problems, and are associated with a high economic burden to society, in part due to the high cost of and demand for services (Ezpeleta, Keeler, Erkanli, Costello, & Angold, 2001; Konnopka, Leichsenring, Leibing, & König, 2009). Quantifying costs of treatments for anxiety disorders documents the economic impact of novel service delivery models and can inform decisions amongst relevant stakeholders (e.g., families, service providers, insurance companies, policy makers) about optimal ways that service providers can use limited resources to provide cost-effective services with appropriate levels of care (Kazdin, 2017; Konnopka et al., 2009). Identifying approaches that lead to cost savings also is critical to increasing access to care, as inability to afford treatment is a common barrier for individuals with anxiety (Olfson et al., 2000).

Economic costs of treatment can be considered from a variety of perspectives - patients, families, healthcare providers, insurers, society, and others - depending on the specific questions being addressed. In estimating the costs of stepped-care treatments and their potential to reduce spending at a health system level, the two most relevant questions are 1) What would be the cost savings to a healthcare provider or community-based organization delivering the stepped treatment?; and 2) What would be the cost savings to an insurer reimbursing the stepped treatment? Therefore, two perspectives were adopted to estimate the potential cost savings of a stepped care treatment approach for treating child anxiety: (1) the cost of resources used in treatment to providers and patients (i.e., a resource cost model) and (2) the cost of treatment to third-party payers such as Medicaid (i.e., a reimbursement cost model) (Konnopka et al., 2009). Resources, also referred to as "inputs" in cost analysis, differ between the two types of models. In resource cost models, inputs include fixed inputs that do not change throughout the course of treatment, such as treatment manuals or equipment, and variable inputs that change as a function of treatment for each individual, such as therapist time, transportation, and clients' time off from work (see Page et al., 2016; Salloum et al., 2016). The resource cost model provides information regarding the total cost of each treatment. In reimbursement models, inputs include the cost of service delivery based on standardized reimbursement rates for therapists' time spent administering treatment (e.g., Medicaid reimbursement rates), but do not include other resources such as treatment manuals or equipment.

Stepped care treatment approaches aim to optimize the use of limited resources and reduce treatment costs by starting with low intensity (i.e., first step) treatments and then stepping up to higher intensity treatment as needed (Davison, 2000, Kazdin, 2017; Kendall et al., 2016; Salloum et al., 2016). We know of three trials of stepped care treatment approaches for youth anxiety disorders. In an open trial of 133 youths with anxiety disorders, van der Leeden and colleagues (2011) evaluated a stepped care approach using three levels of cognitive-behavioral therapy (CBT), with each successive step using higher levels of parental involvement. Following the stepped care approach, 74% of youths no longer met criteria for an anxiety disorder. In a randomized controlled trial of 281 youths with anxiety disorders, Rapee et al. (2017) examined the efficacy of a stepped care approach using self-help resources and brief consultation (Step 1), up to 10 sessions of individual CBT (Step 2), and up to 12 sessions of individually tailored treatment (Step 3), compared with a standard approach of 10 sessions of individual CBT. Remission rates did not differ between the stepped care and standard care study arms (~67%), but stepped care resulted in 13% less therapist time than standard care (Rapee et al., 2017). In an open trial of 124 youths with anxiety disorders, Pettit et al. (2017) evaluated a stepped care approach using an 8-session computer administered attention bias modification treatment (ABMT) (Step 1) and 12–14 sessions of individual CBT (Step 2). After completing the stepped care treatment, 69% of youths were rated as either much improved or very much improved. Moreover, the stepped care treatment resulted in approximately 50% less time spent in treatment sessions with a therapist compared with a hypothetical scenario in which all youths received CBT.

The data overall from these three trials support the promise of anxiety reduction effects, with two of the trials also reporting 13–50% less time in treatment for stepped care approaches compared with standard CBT approaches (Pettit et al., 2017; Rapee et al., 2017). These preliminary findings suggest that stepped care treatment approaches for youth anxiety disorders may be efficacious and may reduce costs of treatment. Indeed, researchers have proposed that a stepped care service delivery model using ABMT in step 1 may be associated with cost savings compared with standard CBT approaches (McNally, 2018). ABMT is ideal as a low intensity step 1 because it is brief, portable, and does not require skilled clinicians. At least eight meta-analyses demonstrate a significant effect of ABMT for anxiety disorders over various controls, with small to medium effect sizes (e.g., Price et al., 2016). Despite the call for research into cost-effectiveness of stepped care treatment, no study has quantified the cost savings associated with a stepped care treatment for youth anxiety.

In this study we aimed to quantify the cost savings associated with the stepped approach for youth anxiety evaluated by Pettit et al., 2017, relative to a hypothetical situation in which youths received a standard treatment approach: CBT only. We estimated the cost of this stepped care treatment approach using both a resource costs model (i.e., the total cost of resources used in treatment) and a reimbursement costs model (i.e., the cost of treatment based on Medicaid reimbursement rates; see Konnopka et al., 2009). We next compared the costs from these two models to the hypothetical standard CBT only approach. We hypothesized that the stepped care approach would result in cost savings compared with the hypothetical standard approach, using both resource costs and reimbursement costs models. We also aimed to determine whether we could develop a predictive model, using baseline

characteristics, to guide decisions about which youths should be assigned to either the stepped care approach beginning with low intensity treatment (ABMT) or skip directly to higher intensity CBT. In Pettit et al., 2017, youths with higher clinician-rated anxiety severity at baseline and a co-occurring diagnosis of attention-deficit/hyperactivity disorder (ADHD) were significantly more likely to step up from ABMT to CBT than youths without these baseline characteristics. We hypothesized that initiating treatment with CBT instead of ABMT for youths with these characteristics would be associated with cost savings, as it would forgo costs associated with Step 1 (ABMT) in youths who are likely to need higher intensity treatment (CBT).

Method

Participants and Procedures

Full details on participants and procedures are provided in Pettit et al., 2017. Briefly, 124 youths (65 girls; M_{age}=9.66 years; SD=2.47) with one or more primary anxiety disorders participated in an open-trial of a stepped care treatment approach for youth anxiety at a university-based clinic in Pettit et al., 2017. Of the 124 youths, twelve were lost to follow-up assessment, resulting in a final sample of N=112. See Table 1 for demographic and clinical characteristics of the sample. All parents and youths provided informed consent/assent prior to participation in the study's procedures.

All eligible youths were assigned to participate in Step 1, ABMT. Youths completed two weekly sessions of ABMT on a laptop computer in the clinic over the course of four weeks for a total of eight sessions. In each session, participants completed four blocks of 40 trials of ABMT for a total of 160 trials. The ABMT protocol used the modified emotional faces dot-probe training task (Abend, Pine, & Bar-Haim, 2014). In each trial, a fixation cross appeared first, followed by two faces of the same actor, one above the other. One face depicted the actor emoting an angry expression and the other depicted the actor emoting no expression. After presentation of the faces for 500 milliseconds, a probe (< or >) appeared in the location of the neutral face. Participants indicated the type of probe (< or >) by pressing either the left or the right mouse button on the computer. The probe remained on the screen until participants responded. On 80% of trials, angry face location predicted probe location (i.e., in the location opposite the angry face). On the other 20% of trials, participants saw neutral-neutral face pairs. Each ABMT session was no more than 15 minutes in duration and was facilitated by master's level mental health counselors. All counselors were trained to stay out of direct line of sight of the child to minimize interruptions and to restart the training task if the child appeared distracted by external stimuli or disengaged from the task. Furthermore, the training task was programmed to notify counselors and participants if participants' accuracy rate fell below 70% after each block of 40 training trials. Counselors were instructed to restart the task if this occurred.

After the eight ABMT sessions, participants completed a post-evaluation and feedback session in which clinicians provided families with information on youths' current levels of anxiety symptoms and related impairment and discussed a potential step up to CBT, including the format and content of CBT. Following this, 67 families (59.8%) opted to discontinue treatment after Step 1 and 45 families (40.2%) opted to step up. Youths who

stepped up to individual CBT completed 12–14 weekly sessions of CBT (*M*=12.00). Sessions were approximately one hour in duration and targeted youth anxiety symptoms using exposures and cognitive strategies using a treatment manual developed in a past trial of CBT (Silverman, Kurtines, Jaccard, & Piña, 2009). CBT therapists were psychology graduate students with masters-level clinical training. Across the stepped care treatment, 12 youths (10.7%) were lost to follow-up after Step 1 and seven youths discontinued treatment after stepping up to CBT (15.6%). Overall, 68.6% of all youths were rated as either very much improved or much improved on the Clinical Global Impressions-Improvement scale after completing the stepped care treatment (Pettit et al.,2017).

Cost Estimation

Costs were estimated using two methods. The first, resource cost model, calculated the cost of the resources used for the stepped and standard approaches using wage estimates from the Bureau of Labor Statistics and material costs from project records. The second, reimbursement cost model, assumed that the services were being delivered in a healthcare setting and were reimbursed at Florida Medicaid rates for mental health services ($15 per quarter hour). The quantity of treatment inputs over the course of the stepped care approach was determined from study personnel and records of psychosocial services provided for each youth.

Resource Cost Model—For the resource cost model we computed both fixed inputs and variable inputs. Fixed inputs for Step 1, ABMT, included a laptop computer ($200) and software to run the ABMT program (E-Prime software program: $995). Fixed inputs for Step 2, individual CBT, included two treatment manuals, one for children and one for adolescents ($24 each). Variable inputs included provider time in delivering the interventions. Given that the delivery of ABMT does not require skilled clinicians, we calculated costs for clinician time using estimates of paraprofessional wages for Step 1. Thus, for Step 1, variable inputs included paraprofessional time required to implement the ABMT protocol. We calculated costs for clinician time in Step 2 (CBT) using estimates of master's level mental health counselor wages. Thus, for Step 2, variable inputs for included master's level counselor time to deliver CBT in a clinic setting and fixed inputs included CBT workbooks for each youth. The cost of each input was obtained from publicly available data sources and analyses. The mean hourly wages of mental health counselors and paraprofessionals were taken from the Bureau of Labor Statistics' Occupational Employment Statistics survey (U.S. Department of Labor, 2017). Total savings of the stepped care treatment were determined by comparing the cost of the stepped care treatment in the resource cost model to a hypothetical standard approach in which all youths received CBT only.

Medicaid Reimbursement Model—For the reimbursement model, therapist time was estimated at Florida Medicaid rates for mental health services ($15 per quarter hour). Step 1 consisted of eight 15-minute sessions, assumed to cost $15 per quarter hour. Step two consisted of 13 hour-long sessions, assumed to cost $15 per quarter hour, or $60 per hour. There were no other relevant costs since this method assumed only the cost of insurance reimbursement. Total savings of the stepped care treatment were determined by comparing

the cost of the stepped care treatment in the reimbursement model to a hypothetical standard approach in which all youths received CBT only.

Predictive Models

As noted, clinician rated anxiety severity at baseline and ADHD were significant predictors of stepping up to CBT (Pettit et al., 2017). To determine whether these variables could be used to refine the treatment approach by identifying youths who would step up to CBT (thereby avoiding the costs associated with Step 1) predictive models were tested incorporating these two variables. Three variations of the model were tested. One model included only ADHD diagnosis as a predictor, a second model included only anxiety rating as a predictor, and a third model included both variables. For each model, predicted probabilities of stepping up were computed from results of logit models. If the models correctly classify enough participants, Step 1 costs could be avoided for youths who stepped up to CBT, resulting in cost savings. However, if there are significant numbers of false-positives for stepping up to CBT, additional costs would be incurred from youths who would have responded to the Step 1 treatment and therefore would have been able to avoid the additional cost of CBT.

Results

Cost Savings Outcomes

In the resource cost model, the total cost of the stepped care treatment approach was $25,914 or $231.38 per child. Had all youth received CBT only rather than this stepped care protocol the total cost of treatment would have been $49,649, or $443.30 per child. Total savings for the stepped care protocol compared to CBT only was $23,735, or $211.92 per child. Accordingly, the stepped care protocol resulted in 47.7% savings compared to a hypothetical situation in which all youths received CBT only.

In the reimbursement model, the total cost of the stepped care protocol was $48,540 or $433.39 per child. Had all youth received CBT only rather than this stepped care protocol the total cost of treatment would have been $87,360, or $780.00 per child. Total saving for the stepped care protocol compared to CBT only was $38,820, or $346.61 per child. Accordingly, the stepped care protocol resulted in 44.4% savings compared to a hypothetical situation in which all youths received CBT only. See Table 2 for comparative costs for each model.

Predictive Models Outcomes

For the resource cost model, $42.34 would be saved for each youth correctly predicted to step up to CBT. This value is equal to the additional variable costs associated with each youth's participation in Step 1 (two hours of paraprofessional time at $21.17/hour), which would be avoided if the youth were predicted to step up to CBT. For each youth incorrectly identified as stepping up to CBT (i.e., youth who did not step up but were predicted to step up according to the model), an additional $400.53 would be incurred. This amount is the difference between the additional variable costs associated with each youth's participation in in CBT, $442.87 per youth (13 hours of clinician time at $31.99/hour plus $27 for

workbooks), and the Step 1 cost of $42.34 per youth. In light of these cost differences, the ratio of true positives to false positives would have to be approximately 10:1 for a predictive model to result in a cost savings. In reality, the ratio of true positives to false positives was 5:3 for the ADHD predictor model, 1:1 for the anxiety severity predictor model, and 5:4 for the ADHD + anxiety severity predictors model.

For the reimbursement cost model, $120 would be saved for each youth correctly predicted to step up to CBT. For each youth incorrectly identified as stepping up to CBT, an additional $780 would be incurred. In light of these costs, the ratio of true to false positives would have to be at least 6:1 for a predictive model to result in a cost savings. As noted, none of the three models (i.e., ADHD only, anxiety severity only, and ADHD + anxiety severity) came close to generating accurate enough predictions to result in a cost savings compared to the stepped care protocol even as different predicted probability threshold values were applied.

Discussion

There is enthusiasm in the mental health field about stepped care treatment approaches because of the potential to do "more with less" (Davison, 2000; Kazdin, 2017; Silverman, Pettit, & Lebowitz, 2016). Consistent with our hypothesis, this study shows that a stepped care approach for youth anxiety costs almost half as much as a standard approach to treatment. Specifically, a stepped care treatment approach with ABMT as a low intensity first step and CBT as a higher intensity second step was associated with overall cost savings of approximately 45% compared with a hypothetical situation in which youths received CBT only. This cost savings was comparable across both a resource cost model and an insurance reimbursement model indicating comparable cost savings to healthcare providers or community-based organizations delivering the stepped treatment (resource cost model) and to potential insurers reimbursing the stepped treatment (i.e., Medicaid).

These findings shed light on a path toward optimizing the use of limited treatment resources and reducing costs of treatment for youth anxiety. Importantly, the anxiety reduction effects of this stepped care approach suggest that more efficient use of resources and reduced costs of treatment may be realized without sacrificing patient outcomes (69% of patients were rated as much improved or very much improved).

Predictive models indicated that personalizing treatment assignment based on ADHD and clinician rated anxiety severity at baseline would not result in additional cost savings than those achieved by the stepped approach. Therefore, the more cost-effective approach would be to assign all youths to stepped care. The greater cost-effectiveness of the stepped care approach relative to personalized treatment assignment can be explained by the low ratio of true positives to false positives in our predictive models and the low cost of ABMT compared to CBT. Although the presence of co-occurring ADHD and higher clinician rated anxiety severity at baseline significantly predicted a step up to higher intensity CBT (Pettit et al., 2017), the accuracy of predictive models was relatively low. That is, the models incorrectly predicted that some youths would step up to higher intensity CBT when in reality they did not. Each instance of these false positives resulted in an additional $400 cost. For stepped care approaches that use a higher cost treatment at Step 1, or a lower cost treatment

at Step 2, personalized treatment assignments might result in cost savings. Further research should prioritize the identification of variables that have higher accuracy in predicting response to low intensity treatments at Step 1 that could guide cost-efficient personalization of treatment.

In this study, we evaluated ABMT as a low intensity treatment in Step 1. Although not available for our study, it would be worthwhile for future research to consider how families' satisfaction with low intensity treatment and perceived failures to respond to low intensity treatment impacts their engagement with higher intensity treatment. Furthermore, continued evaluation of the efficacy and costs of other low intensity treatment approaches (e.g., bibliotherapy, computer-assisted CBT; Kendall et al., 2016; Rapee et al., 2017; Salloum, 2010) represents a promising direction to increase the options available for inclusion in stepped care treatment approaches.

As research on stepped care approaches progresses, it will also be important to consider the influence of decision-making strategies on overall treatment costs. For example, decisions to discontinue treatment or step up in treatment intensity based solely on algorithms or cut-scores might optimize cost-efficiency by restricting expensive high-intensity treatments to youth who are most in need. However, a failure to consider families' desires in the decision-making process may lead families to seek additional services from other providers, resulting in added costs to health care systems.

This is the first study to demonstrate the cost-effectiveness of ABMT and opens up exciting new directions for future research. For example, future research may build on the cost analyses presented in this study by examining comparative costs of stepped care approaches with CBT using larger randomized controlled trials to determine if these treatment approaches improve access to evidence-based treatments, without sacrificing anxiety reduction outcomes. The perspective of the economic analysis could also be expanded to include more sources of costs, such as parental time, and benefits, such as quality of life improvements. Reduced costs of treatments may reduce perceived barriers of anxiety treatments given that inability to afford treatment is a commonly reported barrier to care (Olfson et al., 2000).

Study findings should be interpreted in the context of their limitations. First, we did not randomly assign youths to a standard individual CBT arm and collect data on cost, but instead estimated the cost of standard individual CBT using a hypothetical situation. Consequently, it is possible that treatment expectations influenced outcomes given that all youths received ABMT in step 1. Second, we did not have data on other variables relevant to costs, including additional services pursued elsewhere, transportation, and reductions in parents' work hours to attend treatment sessions. Third, the generalizability of these findings from an urban, predominately Hispanic sample to other populations is unknown. Finally, it is possible that this study was not adequately powered to generate an accurate predictive model of stepping up based on individual differences in baseline participant characteristics.

In spite of these limitations, this study provides the first documentation that a stepped care treatment approach for youth anxiety results in cost savings of approximately 45% compared

to a standard treatment approach. Extending these findings in a controlled trial would provide critical information to guide policy and insurance reimbursement approaches for outpatient mental health treatment of youth anxiety disorders.

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Table 1.

Demographic and Clinical Characteristics of the Sample

Demographic	
Age *M* (*SD*)	9.66 (2.47)
Sex (%)	
Female	52.4
Male	47.6
Race/Ethnicity (%)	
Non-Hispanic White	9.7
Hispanic Any Race	84.7
Black	0.8
Other	4.8
Annual Family Income (%)	
Less than $21,000	11.3
$21,000 - $61,000	42.6
$61,000 - $100,000	24.3
Greater than $100,000	21.7
Diagnostic	
Primary DSM-IV Anxiety Diagnosis (%)	
Generalized Anxiety Disorder	33.1
Social Phobia	28.2
Separation Anxiety Disorder	21.0
Specific Phobia	14.5
Panic disorder	3.2
Co-Occurring Anxiety Disorder (%)	61.2
Co-Occurring Attention-Deficit/Hyperactivity Disorder	15.5
Co-Occurring unipolar depressive disorders	3.4
Current ADHD Medication (%)	10.3
Current Serotonin Reuptake Inhibitor Medication (%)	2.6

Table 2.

Comparative Cost Analyses

	Total Cost	Cost per Child
Resource Cost Model		
Stepped approach cost	$25,914	$231.38
CBT Only cost [*]	$49,649	$443.30
Savings	$23,735	$211.92
Reimbursement Model		
Stepped approach cost	$48,540	$433.39
CBT Only cost [*]	$87,360	$780.00
Savings	$38,820	$346.61

Note. CBT = Cognitive Behavioral Therapy

[*] Hypothetical situation in which all youths received CBT only