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Cost-benefit Analysis of the Coping and Promoting Strength Program

Eric P. Slade[1] · **Golda S. Ginsburg**[2] · **Mark A. Riddle**[3]

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Abstract
This study sought to estimate the net benefits and return on investment (ROI, %) of the Coping and Promoting Strength (CAPS) program to families and insurers, respectively, using data from a multi-year follow up of 136 US families who had participated in a randomized efficacy trial of CAPS. CAPS is a brief parent-focused psychosocial intervention that was compared to information monitoring in the trial. Of the 136 original participants, 113 (83%) completed follow-up interviews 7.1 years, on average, after the CAPS study baseline (mean follow-up age: 15.8 years; range: 13.1 to 20.8 years). Parent-reported willingness-to-pay values and estimates of behavioral healthcare cost savings from delayed onset of anxiety were used to simulate the average net benefits of CAPS to families and insurance plans, respectively, assuming patients pay 20% coinsurance. Psychologists in private offices were expected to charge an average of approximately $195 per CAPS session or $1417 in total in 2020 dollars. The estimated family share of the total CAPS session cost was $283 per youth, while the insurer share was $1134 per youth. Given these costs, the CAPS intervention was estimated to result in average overall net benefits of $1033 per youth (95% CI: -$546 to $2611). Families gained $344 (95% CI: $232 to $455 per family) for an ROI of 121%. Insurance plans on average gained a net savings of $689 per youth (95% CI: -$778 to $2156 per youth) for an average ROI of 61%. In this multiyear follow-up of offspring of anxious parents, exposure to the CAPS pediatric anxiety prevention program was found to be more economically efficient than was waiting for an anxiety disorder to be diagnosed. ClinicalTrials.gov Identifier: NCT00847561.

Keywords Prevention · Pediatric anxiety · Cost-benefit analysis · Health insurance

Introduction

Lifetime prevalence of anxiety disorders in children and adolescents has been estimated as being between 8 and 27% (Costello et al., 2005; Ezpeleta et al., 2001), and offspring of parents who have anxiety disorders are estimated to be four times more likely to have an anxiety disorder than are other children (Micco et al., 2009). Although several preventive interventions for pediatric anxiety have been shown safe and effective in reducing the hazard for onset of pediatric anxiety (Fisak et al., 2011; Moreno-Peral et al., 2017), US health insurance plans generally do not cover these preventive interventions, creating a barrier to their use in practice. Covering anxiety prevention in health insurance plans could be more efficient than waiting until a diagnosis is made before intervening and may benefit families. Onset of pediatric anxiety disorders is associated with increased expenses for mental health care and with other non-financial costs to families (Pella et al., 2020; Towe-Goodman et al., 2014; Angold et al., 1998), increased child absences from school (Pella et al., 2020; Finning et al., 2019), and special accommodations by parents (Storch et al., 2015). Interventions that delay or prevent onset consequently may result in savings to families and their insurers, especially if preventive interventions are targeted to offspring known to have above-average risk due to family history and other risk factors (Micco et al., 2009). This study sought to estimate the net benefits and return on investment (ROI, %) of the Coping and Promoting Strength (CAPS) program (Ginsburg, 2009)

Location of work: The Johns Hopkins University School of Medicine, Department of Psychiatry, Baltimore, MD.

✉ Eric P. Slade
eslade@jhu.edu

[1] Johns Hopkins University School of Nursing, Baltimore, MD, USA

[2] School of Medicine, University of Connecticut, Farmington, CT, USA

[3] Johns Hopkins University School of Medicine, Baltimore, MD, USA

to families and insurers, respectively, compared to waiting for a disorder to be diagnosed, using data from a multi-year follow up of families that had participated in a prior randomized intervention trial of CAPS.

CAPS Trial

CAPS is a brief psychosocial family-based intervention designed to prevent the onset of anxiety disorders in offspring of parents with anxiety disorders (Ginsburg, 2009). The efficacy of CAPS was previously evaluated in a randomized controlled trial conducted between 2008 and 2012 with a sample of 136 anxious parents and an age-eligible offspring (Ginsburg et al., 2015). The families were randomized either to CAPS or Information Monitoring (IM), an information-only no-intervention control condition. Compared to offspring in the IM group, offspring in the CAPS group had a 30% lower incidence of anxiety disorders at 12 months post-intervention (Ginsburg et al., 2015).

CAPSLE Study

The present study used data from the earlier CAPS trial and from the Child Anxiety Prevention Study Long-term Extension or CAPSLE study, a one-time long-term follow-up with the 136 CAPS study families conducted between 2015 and 2018 (Ginsburg et al., 2020). The overall purpose of CAPSLE was to investigate the long-term impacts of CAPS, including clinical efficacy and cost savings. Primary results from CAPSLE showed that the CAPS intervention delayed the onset of pediatric anxiety disorder cases by 27 months, on average (Ginsburg et al., 2020). This cost-benefit simulation used retrospective data on children's utilization of behavioral healthcare services and on parents' willingness to pay for CAPS collected during the CAPS trial and the CAPSLE follow-up interviews to estimate the potential benefits of CAPS to families and insurance plans, respectively.

Insurance and Anxiety Prevention Services

In the USA, commercial insurance plans regularly cover a range of preventive services such as immunizations, colonoscopies, and fluoride treatments (Davis, 2020). However, except for screening, insurance coverage of preventive interventions for mental health has not taken root in the USA. One reason for this gap in coverage may be insurers' concern that such coverage may increase plan spending and financial exposure without adding sufficient value to enrollees (Garber, 2001, 2004). To offset this concern, economic evaluations are needed to fill gaps in knowledge about the economic impacts of evidence-based anxiety prevention programs on families and insurers, including whether such programs result in any savings. Such knowledge could help inform future decisions by health insurers to cover pediatric mental health preventive interventions.

Evidence of Cost-effectiveness

Cost-effective ratios estimated from a societal perspective are routinely used in the UK, the European Union, and Australia to inform national insurance coverage determinations for new services (Gold et al., 2009; Bryan et al., 2009). Two prior studies have estimated the cost-effectiveness of pediatric anxiety preventive interventions from a broad societal perspective (Simon et al., 2012; Mihalopoulos et al., 2015). Both were conducted outside the USA and featured unique interventions. Simon and colleagues conducted a study in the Netherlands (Simon et al., 2012) that compared the cost-effectiveness of a parent-focused intervention, a child-focused intervention, and a non-intervention group of 136 children ages 8 to 12 years who screened positive for elevated anxiety. Cost-effectiveness was assessed using the cost per child who improved on an anxiety severity rating scale. The authors simulated societal willingness to pay for improvements in child anxiety by assigning a range of values for willingness to pay for anxiety improvement. Although both the child and parent interventions were superior to no intervention, neither intervention was found to be cost-effective in a majority of cases given assumed willingness to pay values (Simon et al., 2012). Mihalopoulos et al. (Mihalopoulos et al., 2015) developed a population cost-effectiveness microsimulation model for Australia to simulate the 3-year cost-effectiveness of an evidence-based anxiety prevention program (Rapee et al., 2005) offered to preschool-aged children who screened positive for inhibition temperament. That study found that the intervention resulted in a cost-effectiveness ratio of AUD$8000 per disability-adjusted life year (DALY) averted and concluded that the intervention represented good value relative to a cost-effectiveness threshold of AUD$50,000 per DALY averted. Neither of these studies collected data on families' willingness to pay for anxiety prevention.

Are Anxiety Prevention Services Insurable in the USA?

Compared with Europe and Australia, societal cost-effectiveness ratios have more limited use among US insurers (Gold et al., 2009; Bryan et al., 2009). Among US health insurers, each insurer effectively makes its own coverage decision for non-mandated experimental preventive services (Garber, 2001). According to a national survey of insurance plans (Bergthold et al., 2002), evidence of safety and comparative effectiveness are paramount concerns in coverage decisions. Cost-effectiveness, if considered at all, is usually considered from a limited organizational perspective rather than from a societal perspective. For

insurance plans, the potential impacts on plan spending and enrollment may also influence coverage decisions for mental health prevention (Frank & McGuire, 2000; Garber, 2001). Plans must weigh the benefits of prevention to enrollees against the potential impacts of coverage on plan spending and plan premiums. To the extent that the costs of anxiety prevention are offset by lower future mental healthcare costs, evidence-based prevention services may be viewed as more cost-effective from a plan budgetary perspective. For families, the crucial factor in the use of a covered service is whether the benefits of the covered service exceed its out-of-pocket costs. There is little information available regarding pediatric anxiety prevention services' impacts on families' willingness to pay for anxiety prevention.

Cost-benefit Analysis

In contrast to earlier societal cost-effectiveness studies, this study used cost-benefit analysis to compare the benefits and costs to insurers and families from insuring evidence-based pediatric anxiety prevention services in the USA The benefits of CAPS to families were proxied by caregivers' indicated willingness to pay for CAPS sessions, whereas families' costs were simulated by their expected out-of-pocket costs for CAPS sessions assuming 20% coinsurance (i.e., 80% coverage). For insurers, the simulation considered the net impact of CAPS on insurance plans' costs based on the market cost of CAPS sessions and the downstream savings from reduced expenses for behavioral healthcare services.

Methods

CAPS Trial Design

CAPS is an eight-session intervention delivered weekly to an individual family. Each meeting lasts approximately 50 min, and there are three optional monthly booster sessions. CAPS strategies are based on those used in cognitive-behavioral therapy for youth with anxiety disorders. For the first two sessions, therapists meet with parents alone to address parents' anxiety and parenting (e.g., reducing child anxiety-enhancing parenting behaviors such as modeling of anxiety, overcontrol/overprotection); the remaining sessions include all interested family members and focus on reducing physiological arousal, behavioral avoidance, social avoidance/withdrawal, maladaptive cognitions, and deficits in problem-solving skills.

Of the 136 families who had voluntarily enrolled in the prior CAPS randomized controlled efficacy trial (Ginsburg et al., 2015), 70 were randomized to the CAPS group and 66 were randomized to the IM group. Prior to enrollment, parents/guardians provided written informed consent, and offspring under 18 years old provided assent. The university Institutional Review Board approved the study. Original inclusion criteria were (1) at least one parent with a current anxiety disorder and (2) offspring (ages 6–13 years) who did not meet the criteria for a current anxiety disorder. IM consisted of giving each participant a free 36-page pamphlet published by the American Psychological Association that contained information about anxiety disorders and treatments but lacked detailed information about the anxiety reduction strategies included in CAPS. IM families were offered CAPS after they completed the 1-year CAPS study follow-up. Participants from 113 of these original 136 families (83%) enrolled in the long-term CAPSLE follow-up study (child mean age 15.8 years, range 13 to 21) (Ginsburg et al., 2020). The mean length of the period from CAPS baseline to the CAPSLE follow-up interviews was 7.1 years (range: 5.8-9.4 years). Data collection in the CAPS efficacy trial and the CAPSLE study were generally collected on laptop computers by trained interviewers during face-to-face interviews with caregivers and their offspring; in a few instances, interviews were completed by telephone.

Measures

ADIS

The ADIS was used to assess anxiety disorder onset and severity in the CAPS efficacy trial and in the CAPSLE follow-up interviews. Separate, age-appropriate, versions of the ADIS were used with youth respondents ages 17 years and younger (Albano & Silverman, 2018) and with adults ages 18 and over (Brown & Barlow, 2014), respectively. The ADIS interviews are considered gold standard assessment tools for determining anxiety disorders and are well-validated. The ADIS yields both a diagnosis (present/absent) and a Clinical Severity Rating (CSR) that ranges from 0 to 8; scores of 4 or higher are indicative of a clinical disorder. CSR scores represent the degree of impairment and interference in functioning associated with a specific disorder. This study used the ADIS severity (CSR) scores collected during the CAPS baseline post-intervention, and at 6- and 12-months follow-ups well as at the CAPSLE interview. Independent evaluators administered the ADIS and were rigorously trained prior to seeing study participants and supervised by a senior child psychiatrist, who reviewed all diagnoses and clinical severity ratings. Independent evaluators and their supervisors remained masked to intervention condition throughout the study.

Behavioral Healthcare Utilization

Data on utilization of mental health and substance use services and psychotropic medication use were collected retrospectively at the CAPSLE follow-up. Caregivers and youth (≥18 years) completed in-depth interviews regarding the youth's use of behavioral healthcare services and psychotropic medications during the time period since their final interview in the CAPS trial and ending with the CAPSLE follow-up interview. The recall period was 5.5 years on average (range: 4.3–8.1 years). To aid recall, respondents were provided calendars and reminders of information they had given in prior CAPS interviews. The *Child and Adolescent Services Assessment* (*CASA*) (Farmer et al., 1994; Ascher et al., 1996) was used to record use of mental health and substance use services in 21 categories, including inpatient and outpatient office- and clinic-based encounters, partial hospitalizations, case management services, residential rehabilitation, and overnight mental health acute inpatient stays, school counseling, and other specialty psychiatric care services (e.g., treatment foster care). For each type of service, the CASA questionnaire asked whether the youth had ever used that service during the timeframe of interest, and if they had, how many visits or days of care were used. The *Psychiatric Treatment Form* (*PTF*), developed by the study team, was used to record the use of prescribed psychotropic medications, including drug name, dose, and start and end dates for each medication episode. These study forms captured mental health utilization regardless of the location where it occurred; their main limitation is the potential for underreporting of service events due to recall bias. Interviewers used prompts and calendars as memory aids. Reasons for service use given by caregivers indicated mostly (71%) anxiety or anxiety-related problems (e.g., trouble sleeping), with the remainder attributed to ADHD (19%) and mood problems (10%).

Behavioral Healthcare Costs

Behavioral healthcare costs were collapsed into categories for acute/subacute care, outpatient, SSRI/SNRI medications, other psychiatric medications, and school services. Costs were calculated by multiplying a price per unit of service by the quantity used for each service setting. Unit costs for services were obtained from local and national sources, including public mental health reimbursement schedules, published research studies, and from professional online sources (see Table 1), and were adjusted to reflect dollar values in 2020. The average cost of psychotropic medications, per pill, was drawn from the National Average Drug Acquisition Cost database (Medicaid.gov, 2020), with differentiation by dosage and form. A pharmacy dispensing fee of $11 was added to each prescription fill to account for dispensing costs (Myers & Stauffer, LC, 2011). Medication

Table 1 Price per unit for behavioral health services, by category

Type of service	Service category	Unit of measure	Price per unit ($ in 2020)
Inpatient hospital[a]	Acute/subacute	Stay	$7692.00
Emergency department[b]	Acute/subacute	Visit	$1085.00
Residential rehabilitation[c]	Acute/subacute	Day	$290.00
Outpatient mental health and substance use[c]			
Partial hospital/day treatment	Outpatient	Day	$231.00
Crisis center	Outpatient	Day	$231.00
Case management	Outpatient	Visit	$89.73
Psychotherapy	Outpatient	Visit	$194.48
Medication management	Outpatient	Visit	$80.15
Mental health evaluation	Outpatient	Visit	$190.84
Other/don't know	Outpatient	Visit	$113.76
School services[d]			
Guidance counselor	School	Visit	$44.16
School psychologist	School	Visit	$44.16
Social worker	School	Visit	$44.16
Nurse	School	Visit	$29.44
Other	School	Visit	$29.44

[a]Owens et al. (2019)

[b]Agency for Healthcare Research and Quality (2020)

[c]Beacon Health Options (2017)

[d]US Bureau of Labor Statistics (2020)

costs for antidepressant medications used to treat pediatric anxiety, including selective serotonin reuptake inhibitor medications (SSRIs) and selective norepinephrine reuptake inhibitors (SNRIs), were calculated separately from costs for other psychotropic medications (antipsychotics, stimulants, and mood stabilizers). Because the initial CAPS trial did not record detailed information on behavioral healthcare utilization during the CAPS study period (i.e., during the first 12-months following the CAPS baseline), these costs (CAPS months 1–12) were imputed based on whether the youth had onset of an anxiety disorder during the CAPS study period. Behavioral cost estimates were converted to 2020 dollars using the Personal Consumption Expenditures Price Index (Federal Reserve Bank of St. Louis, 2020).

WTP for CAPS

CAPSLE respondents completed a willingness-to-pay (WTP) questionnaire to assess the parent's valuation of the benefits of CAPS. In cost-benefit analysis theory, an individual's WTP for a good refers to the price that leaves the individual indifferent between purchasing and not purchasing the good (Gertler & Gaag, 1990). The willingness-to-pay amount (measured in $) thus establishes the value of the good to the purchaser. In the willingness-to-pay questionnaire, parents were asked to imagine that they had never participated in CAPS and were being asked to pay for CAPS sessions by "cash" or "credit card," with no insurance reimbursement. They were also presented with information about CAPS' effectiveness. Then they were asked, "Given what you know about CAPS, what is the most amount of money you would be willing to pay out of pocket for each CAPS session (8 sessions total)?" Response options were categorical and ranged from <$30 to >$300 per session. Total willingness-to-pay for CAPS was calculated by multiplying the reported amount by the sample average number of sessions attended. Willingness-to-pay estimates were used as a global measure of family benefit. Consequently, any reduction in economic costs that may have resulted from the CAPS intervention, such as reduced costs for behavioral healthcare services, reduced opportunity costs due to youth absences from school, and reductions in caregiver lost work time, were assumed to be reflected in caregivers' reported willingness-to-pay amounts.

CAPS Session Cost

An estimate of the total reimbursement amount that a psychologist in private practice might be expected to obtain in return for delivering the CAPS intervention was needed for comparison to the benefits of CAPS to insurers and families. To estimate this market-based reimbursement cost, the average number of CAPS sessions attended (7.4 visits) was multiplied by a cost of $194.48 per session, the US average total reimbursement given for a standard child psychotherapy provider office visit (Benson & Song, 2020) adjusted to the price level in 2020 using the Producer Price Index for healthcare. Psychotherapy costs were not based on the actual costs per session in the CAPS efficacy trial, because intervention costs were not assessed in the initial CAPS efficacy trial (Ginsburg et al., 2015), and because sessions in that trial were conducted in a psychology research lab setting that differed aesthetically and organizationally from that of private psychologist office spaces. For these reasons, a market-based psychotherapy rate visit was thought to more accurately reflect the market cost of CAPS sessions. The visit cost does not include other costs to families that result from attending visits, such as the costs of transportation and the costs of parent time spent traveling and waiting for the visit; our method assumes that these costs were factored by parents when they reported their willingness to pay for CAPS visits. The cost of CAPS sessions also does not reflect training costs for CAPS. Although CAPS is a manualized evidence-based intervention, it requires no specialized clinical skills or training beyond that of most masters- and doctoral-level licensed psychologists.

Demographic Characteristics and Income

At the CAPS efficacy trial baseline, the caregiver reported on child age, gender, race-ethnicity (white non-Hispanic or Other), and family income.

Multiple Imputation

All analyses were completed based on an intent-to-treat, full case analysis of the original $N = 136$ families randomized to either CAPS or IM. As was indicated, above, 23 of the 136 families did not complete the CAPSLE follow-up (11 in the CAPS group and 12 in the IM group). Because casewise deletion may introduce bias and would have further weakened statistical power in a study with a limited sample size, missing values due to sample attrition at CAPSLE follow-up were imputed using predictive mean matching in STATA16 (StataCorp 2019). Imputations were made using baseline demographic characteristics (child age, gender, non-white race), intervention group assignment, CAPS baseline ADIS CSR youth anxiety severity, and parent distress at the CAPS baseline.

Statistical Analyses

Two sets of analyses were conducted. The first analysis estimated the additional costs associated with onset of a pediatric anxiety disorder by comparing costs among CAPSLE respondents with and without a current anxiety disorder. A

second set of analyses estimated the impacts of CAPS on behavioral healthcare costs accrued from CAPS baseline to the CAPSLE follow-up. Here, exposure to CAPS versus IM could have resulted in long-term savings, because youth assigned to CAPS had later onset and consequently spent less total time living with an anxiety disorder. Analyses were estimated first without any covariate adjustment and then again with covariate adjustment.

Covariate-adjusted models were estimated using generalized linear regression models (GLM) in Stata 16 (StataCorp, 2019; McCulloch, 2000). The GLM models were specified using a negative binomial outcome distribution function to account for clustering at zero costs and overdispersion. Covariate adjustments in the GLM models were child gender (male or female), age at CAPS baseline, and ADIS anxiety severity score at CAPS baseline. These adjustments were needed to achieve unbiased estimates of the marginal impacts of CAPS versus IM. As was discovered in preliminary descriptive analyses, girls, older youth, and youth with higher pre-intervention anxiety ratings had higher anxiety costs during the follow-up period, regardless of CAPS study group. Predictive margins for the CAPS and IM groups and the between-group differences were estimated using the `margins` command in Stata 16.

Simulation of CAPS Net Benefits

For the families, the benefits of CAPS are represented in our model by the parent-reported willingness-to-pay for CAPS (described earlier under "Measures"). Under this scenario, insurance plans were assumed to cover 80% of the provider cost of delivering CAPS, and families were assumed to be responsible for the remaining 20% out-of-pocket. Eighty percent was chosen as the insurance coverage because US commercial insurance plans usually cover at least 80% of the allowable costs of healthcare services. The cost of CAPS to families is represented by their out-of-pocket costs, which are simulated as 20% of the delivery cost of CAPS. The difference between family benefits and family costs provides the estimate of family net benefits. For insurance plans, the benefit of CAPS is 80% (i.e., the insurance share) of the reduction in behavioral healthcare costs obtained from the delay in onset of anxiety disorders in youth. These savings from delayed anxiety were estimated by taking 80% of the average difference in discounted costs of behavioral health services and medications in the CAPS versus the IM groups. The average mean differences used in this calculation were obtained from the results of the GLM regression model, described above. Benefits were discounted using a standard 3% annual rate, per convention in US studies (Neumann et al., 2016). The insurance plan cost of CAPS was estimated as 80% of the market reimbursement to psychotherapy providers, described above. The overall net benefit of CAPS was estimated by summing the net benefits to families and insurance plans, respectively, minus CAPS delivery costs. A 95% confidence interval representing within-sample variability in net benefits was simulated using bootstrap (Efron & Tibshirani, 1994; Efron, 1987).

Sensitivity Analysis

A sensitivity analysis examined the impact of varying the cost of CAPS sessions. The main analysis was calibrated using the national mean of costs of psychotherapy delivered by psychologists in private practice. However, the average cost of psychotherapy visits varies regionally and by clinical setting. Community mental health clinics and schools are usually lower-cost settings for psychotherapy, while hospital-based clinics are usually higher-cost settings. Psychologists' compensation can also vary depending on regional variation in the rental cost of office space and on differences in the income and wealth of patients. To account for the fact that average costs for psychotherapy visits may vary regionally and by setting, the cost per CAPS session was varied higher and lower by 50% (range: $97.00–$292.00 per session), and the impact on the probability CAPS has positive net benefits was estimated.

Results

Sample Characteristics

The demographic and clinical characteristics of participants and families in the CAPS and IM groups, respectively, are shown in Table 2. The CAPS group had slightly more females (63% in CAPS versus 48% in IM; $p = 0.093$), and CAPS parents were younger on average than IM parents (39.9 years in CAPS versus 41.7 years in IM; $p = 0.03$). Child age, race, and pre-intervention anxiety severity rating, parent marital status, parent education, and family income were similar between groups ($p > 0.10$). One-hundred-seventeen of the 136 parent respondents (86%) had completed college, and 107 of 136 families (79%) had annual household incomes greater than $80,000.

Costs of Anxiety Disorders

Having a current anxiety disorder was associated with greater costs during the prior year in both the unadjusted and in the adjusted analyses (Table 3), though regression-adjusted estimates were more precise. In the adjusted analyses, having a disorder was associated with additional behavioral healthcare costs of $1204 per family ($X^2(1) = 45.87$, $p < 0.001$). Youth with anxiety disorder had higher costs in

Table 2 Characteristics of CAPS and IM groups ($N = 136$)

Characteristic	CAPS ($N = 70$) *n* (%) or mean (SD)	IM ($N = 66$) *n* (%) or mean (SD)	$F(1135)$	*p*-value
Male gender	26 (37%)	34 (52%)	2.85	0.093
Age at CAPS (years, mean, and SD)	8.5 (1.8)	8.9 (1.8)	1.17	0.281
Race (*n*, %)				
White	58 (83%)	57 (86%)	0.32	0.574
Black/other	12 (17%)	9 (14%)		
ADIS Anxiety CSR at CAPS baseline (mean, SD)	8.0 (4.5)	7.8 (4.3)	0.06	0.810
Parent/caregiver				
Age (years, mean, and SD)	39.9 (4.8)	41.7 (5.0)	4.76	0.031
Married	64 (91%)	57 (86%)	0.87	0.353
College degree or higher	61 (87%)	56 (86%)	0.02	0.894
Family income >$80K (*n*, %)	52 (74%)	55 (85%)	2.32	0.128

Data reported are the means and standard deviations (SD) of the data on a total $N = 136$ families. An *F*-test of rejection of the null of no difference between groups and corresponding *p*-value are provided. ADIS CSR was used in the analyses as both an anxiety clinical rating scale score (shown here) and for determination of an anxiety diagnosis.

CAPS coping and promoting strength, *IM* information monitoring control

all service categories except other psychotropic medications, which were significantly lower among youth with anxiety disorders by $155 per youth ($X^2(1) = 3.97$, $p = 0.046$). By contrast, spending for SSSR/SNRI medications was significantly greater among youth with anxiety disorders compared to other youth ($102 versus $42, respectively, $X^2(1) = 19.35$, $p < 0.001$).

CAPS Long-term Cost Impacts

Estimates of the mean differences in long-term behavioral health costs between the CAPS and IM groups are shown in Table 4. These estimates reflect costs incurred over the entire period from CAPS baseline to CAPSLE follow-up. Negative cost differences indicate costs were lower in the CAPS group. In unadjusted comparisons, there were no statistically significant differences in costs. Regression adjusted estimates indicated CAPS was associated with an overall behavioral health spending savings of $2390 per family ($X^2 = 5.43$, $p = 0.020$). These savings were concentrated in three categories: acute/subacute care ($1164 per youth; $X^2 = 24.52$, $p < 0.001$), outpatient services ($1550 per youth; $X^2 = 4.67$, $p = 0.031$), and other psychotropic medications ($280 per youth; $X^2 = 3.85$, $p = 0.049$).

CAPS Net Benefits

Table 5 summarizes the result of the cost-benefit simulation. Families were willing to pay $627 on average for CAPS (95% CI: $499–$755). With 80% insurance coverage of CAPS, families would be asked to pay 20% of the $1417 average cost of CAPS per youth out-of-pocket, or $283 per youth (95% CI: $267–$300). Consequently, families' net benefit would be $344 (95% CI: $232–$455). Insurance plans would be expected to save 80% of the $2390 (95% CI: $380–$4400) mean behavioral healthcare savings from CAPS, or $1823 (95% CI: $290–$3355) per youth, and insurance plans would be responsible for covering 80% of the reimbursement cost of CAPS, or $1134 per youth (95% CI: $1068–$1199). As a result, CAPS would be expected to result in an average net benefit to insurance plans of $689 (95% CI: −$733 to $2156). Under this scenario, the average return on investment (ROI) to insurance plans would be 61% (95% CI: −73% to 180%), while families would obtain an average ROI of 121% (95% CI: 87 to 152%). The overall net benefits of CAPS would then be $1033 per youth (95% CI: -$778 to $2156) on costs of $1417, for an average ROI of 73% (95% CI: −41 to 174%).

Cost Sensitivity Analysis

Figure 1 shows the results of a sensitivity analysis that examined the implication of varying the assumed provider cost of CAPS sessions from a lower bound of $97.00 per session to an upper bound of $292.00 per session. Variation in provider session costs could reflect cost differences between locations as well as differences in provider labor costs and is not necessarily indicative of differences in provider quality. The simulated probability that CAPS resulted in overall positive net benefits to insurers and families, conditional on the provider cost per CAPS session, is represented by the solid curved line. The vertical dashed line corresponds to a provider cost per session of $194.48, the cost value used to derive the simulation

Table 3 Association of anxiety disorder with prior-year anxiety-related behavioral healthcare costs ($ in 2020)[a]

Service category	Unadjusted estimates					Regression-adjusted estimates				
	Youth with anxiety disorder ($ in 2020)	Youth without anxiety disorder ($ in 2020)	Cost Diff.[b]	$F(1,135)$	P	Youth with anxiety disorder	Youth without anxiety disorder	Cost Diff.[c]	$X^2(1)$	p
Behavioral health care	$1503	$235	$1268	17.09	<0.001	$1437	$233	$1204	45.87	<0.001
Acute and subacute care	$197	$20	$177	8.69	0.004	$294	$7	$287	49.01	<0.001
Outpatient mental health and substance use	$1195	$123	$1072	16.03	<0.001	$1112	$123	$989	52.12	<0.001
SSRI/SNRI medications	$104	$48	$56	2.96	0.088	$102	$42	$60	19.35	<0.001
Other psychotropic medications	$437	$593	−$156	0.16	0.693	$328	$483	−$155	3.97	0.046
School services	$198	$59	$139	13.22	<0.001	$196	$54	$142	28.59	<0.001

[a]Table reports predicted (mean) annual costs per youth by whether youth met criteria for onset of anxiety disorder, their standard deviations (SD), and the estimated incremental cost associated with a disorder. Estimates were obtained using a generalized linear model (glm in STATA 16; see text for details) and were adjusted for child age at CAPS baseline, gender, and baseline ADIS anxiety rating. Dollar values reported are in terms of price levels as of July 2020

[b]Differences in mean costs between youth who did versus did not meet DSM criteria for an anxiety disorder from the CAPS baseline to the CAPSLE follow-up

[c]Differences in the conditional mean of the cost distribution comparing youth with and without any lifetime anxiety disorder according to ADIS interviews. Estimates were obtained using the margins command in STATA 16. Additional columns show the corresponding chi-square test statistic and p-value for the difference in costs

Table 4 CAPS incremental impacts on long-term anxiety-related costs per youth ($ in 2020)[a]

Service category	Unadjusted estimates					Regression adjusted estimates				
	CAPS Mean ($ in 2020)	IM mean ($ in 2020)	Cost Diff.	$F(1135)$	P	CAPS Adj. mean ($ in 2020)	IM Adj. Mean ($ in 2020)	Cost Diff.[b]	$X^2(1)$	p
Behavioral health care	$4831	$6711	−$1880	0.78	0.378	$4298	$6688	−$2390	5.43	0.020
Acute & subacute care	$521	$944	−$423	1.08	0.300	$263	$1426	−$1164	24.52	<0.001
Outpatient mental health & substance use	$3794	$4831	−$1037	0.32	0.573	$3168	$4718	−$1550	4.67	0.031
SSRI/SNRI medications	$73	$81	−$8	0.06	0.810	$71	$74	−$3	0.04	0.833
Other psychotropic medications	$330	$706	−$376	0.90	0.344	$283	$563	−$280	3.85	0.049
School services	$113	$149	$36	0.82	0.366	$100	$146	−$45	4.06	0.044

[a]Table reports predicted mean values of costs per youth since the final CAPS evaluation in each study group. Reported dollar values have been inflation-adjusted to price levels present during July 2020. Adjusted values were estimated for each of study groups, IM and CAPS, using glm in STATA 16 (see "Methods" for details). glm performs generalized linear regression model estimation. Regressions were adjusted for child age at CAPS baseline, gender, and ADIS anxiety scale rating

[b]The cost difference between CAPS and IM was estimated as the model-predicted marginal difference in mean costs between CAPS and IM using the post-estimation margins command in STATA 16. Additional columns show a Chi-square test statistic with $df = 1$ and a p-value for the test of difference in the CAPS and IM group means, respectively

Table 5 Simulated costs and benefits of CAPS to families and insurance plans (in 2020 dollars)

	Mean	95% CI LL	UL
Family benefits and costs ($ per youth)			
A. Family willingness to pay for CAPS ($ per youth)[a]	$627	$499	$755
B. CAPS cost to families with 20% coinsurance	−$283	−$267	−$300
C. Family net benefits from CAPS[b] (A+B)	$344	$232	$455
Insurance plan benefits and costs ($ per youth)[c]			
D. CAPS savings to plans ($ per youth)[b]	$1823	$290	$3355
E. CAPS cost to plans with 80% coverage ($ per youth)	−$1134	−$1068	−$1199
F. CAPS net benefits to plans ($ per youth)[b] (D+E)	$689	−$773	$2288
Overall CAPS benefits and costs ($ per youth)			
G. Overall benefits ($ per youth) (A+D)	$2,450	$789	$4,110
H. Overall costs (B+E)	−$1,417	−$1,335	−$1,499
I. Net benefits of CAPS ($ per youth)[b] (G+H)	$1033	−$546	$2,611

[a]Willingness to pay for each CAPS session, as reported by caregivers

[b]Net benefits of CAPS represent the net difference of CAPS benefits less CAPS costs per youth

results in Table 5. At a provider cost of $194.48 per session, the simulation model predicts an 88.7% probability of positive net benefits. At all cost values of $142.00 or less per session, the probability of positive net benefits exceeds 95.0%, and at the lower bound of $97.00 per session, the probability of positive net benefits is 98.0%. At all cost values greater than $238.00 per session, there is less than an 80.0% chance that net benefits are positive, and at the upper bound of $292.00 per session, the probability of positive net benefits is only 64.8%.

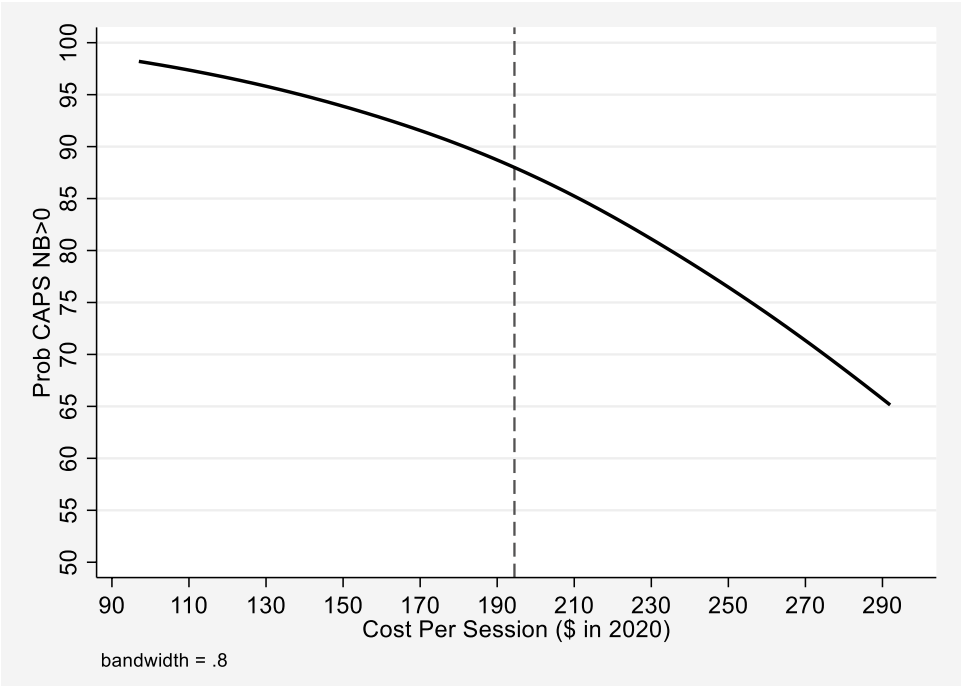

Fig. 1 CAPS probability of positive net benefits, by cost per session. The solid curve in Fig. 1 shows the simulated probabilities that the CAPS intervention has positive overall net benefits compared to a no-intervention control condition depending on the cost of CAPS sessions. The vertical dashed line shows the average cost of a psychotherapy visit based on an analysis of nationwide data in the USA (Benson & Song, 2020)

Notes. The solid curve in Figure 1 shows the simulated probabilities that the CAPS intervention has positive overall net benefits compared to a no-intervention control condition depending on the cost of CAPS sessions. The vertical dashed line shows the average cost of a psychotherapy visit based on an analysis of nationwide data in the U.S. (Benson and Song 2020)

Discussion

This study estimated the long-term economic benefits and costs to families and to insurance plans from the evidence-based Coping and Promoting Strength (CAPS) program. In an efficacy trial setting, CAPS delayed onset of anxiety disorders in children by an average of 27 months (Ginsburg et al., 2020) compared to an information-only control condition. This study found this delay in anxiety onset was associated with net benefits of $1033 per youth in 2020 dollars (95% CI: -$778 to $2156). Under a simulation scenario in which families pay 20% of the delivery cost of CAPS and insurers pay 80%, families who receive CAPS were estimated to gain $344 per family (95% CI: $232 to $455 per family) in added value and pay $283 per youth out-of-pocket for CAPS (95% CI: $267–$300), which would net families a 121% return on investment. Insurance plans were estimated to gain net savings of $689 per youth (95% CI: -$778 to $2156 per youth) on costs of $1134 per youth (95% CI: -$1068 to -$1199), on average, for an average return on investment of 61%. Health insurance plans could probably recover enough in savings on future mental healthcare costs to fully cover the providers' costs for CAPS sessions, so long as CAPS is targeted to offspring of an anxious parent and so long as the family remains in the same plan for long enough (e.g., 5 to 7 years). Targeting CAPS to higher-risk youth increases the likelihood that they will benefit from prevention and, consequently, increases the cost-effectiveness of intervention.

Although the results were generally supportive of insurance plan coverage of CAPS, the 95% confidence interval around the estimated mean of net savings to plans included negative values. As a result, offering insurance plan coverage for CAPS would entail significant financial risk to the plans, though these individual risks would be pooled in the plan, lowering the risk to insurers. The risk of financial loss also depends on the market cost of CAPS sessions. The results of a sensitivity analysis that varied the cost of CAPS sessions suggested that at a cost of $194.48 per CAPS session, there was an 88.7% probability that CAPS would have positive net benefits, and at a cost of $142.00 per session or less, the probability that CAPS would have positive net benefits exceeded 95.0%. However, if the cost of CAPS exceeds $238.00 per session, the probability that CAPS results in net benefits is below 80.0%. As a result, insurance plans could sharply reduce risks of financial loss by guiding families to lower-cost providers, when available, or might reserve access to CAPS for offspring at greater risk of anxiety onset due to family history and other factors. More evidence from research could also be brought to bear on better targeting of CAPS to youth who are more likely to develop an anxiety disorder.

Two prior studies report on the healthcare cost-offsets (i.e., savings) that may result from pediatric anxiety preventive interventions (Simon et al., 2012; Mihalopoulos et al., 2015). Simon et al. (2012) reported data from a randomized prevention trial conducted in schools in the Netherlands with children aged 8–12 years who had scored in a high range on an anxiety symptom screen. A parent-focused intervention and a child-focused intervention were compared with no intervention. Data on anxiety-related costs were collected using cost diaries that parents completed during two 2-week intervals preceding follow-up. Cost estimates for the 2-week recall periods were used to impute healthcare costs over a 1.5-years post-intervention period. The child-focused intervention was associated with a healthcare cost-offset of $805 adjusted for US cost inflation between 2008 and 2020, while the parent-focused intervention resulted in higher healthcare costs than no intervention. By contrast, the current study examined cost-offsets over an average 7.1-year timeframe and found an average healthcare cost-offset of $2390 per youth. When comparing these values, it should be kept in mind that, in 2019, Netherlanders spent $5765 per capita on health care versus $10,966 per capita in the USA (Kamal et al., 2020). In a second study, Mihalopoulos et al. (2015) developed a microsimulation model for Australia, wherein parameters drawn from multiple sources were combined to form a projection of expected costs over a 3-year period for 3- to 5-year-olds who screen positive for "inhibited temperament" during preschool, and are subsequently offered an evidence-based preventive intervention (Rapee et al., 2005); a restrictive assumption was that a "case" of pediatric anxiety results in a one-time treatment cost of AUD$312 per youth in 2013, an average value drawn from a 2005 nationwide claims-based disease cost analysis. This is equivalent to approximately $316 (in USD) in 2020. By contrast, in this study, onset of anxiety resulted in additional prior-year costs of $1204 per youth, and some youths continued receiving some type of mental health care for several years. These two cost estimates also might differ due to this study's estimates being for all anxiety-related behavioral healthcare costs, whereas claims-based analyses typically only include costs that are linked with a claims-based anxiety diagnosis.

Several limitations of the study data and analysis deserve mention. The sample was small and not explicitly powered to detect significant differences in costs. Also, most participants described themselves as white youth from middle/upper income, college-educated, households with two parents at home. Consequently, findings may not generalize to families from diverse racial and ethnic backgrounds, less economically advantaged families, and to families who lack insurance coverage. The use of a one-time follow-up

assessment and data collection was also a limitation. The long recall period may have resulted in either under- or overestimation of behavioral healthcare costs, and costs had to be imputed for the period between the CAPS baseline and 1-year follow-up. Future studies could address this limitation by collecting these data annually and including service use diaries. Another limitation was that anxiety-related medical costs may have been underestimated because the CASA survey did not record the frequency of general medical visits for pain and other physical symptoms that may be caused by anxiety. Anxiety-related costs were also significantly higher for girls than for boys, and it is not clear whether this result would generalize to other samples. Onset of an anxiety disorder was also specifically related to higher spending for SSRI/SNRI medications and was not related to use of other psychotropic medications. This bolsters the interpretation that CAPS affected costs by delaying onset of an anxiety disorder.

Conclusions

This cost-benefit evaluation found that targeted exposure to the CAPS pediatric anxiety prevention program was more economically efficient than was waiting for an anxiety disorder to be diagnosed in offspring of anxious parents. Families' willingness to pay for CAPS exceeded their share of out-of-pocket costs for CAPS. Insurance plans would likely save enough on future child mental healthcare costs to more than recover the upfront costs of CAPS, so long as the CAPS intervention is appropriately targeted to offspring of anxious parents and so long as parents remain within the same plan for several years. At the same time, the possibility that insurance plans will lose money by covering CAPS cannot be ruled out. Obtaining CAPS from lower-cost providers could sharply reduce plans' financial risk. Opportunities to better target CAPS to those families who may benefit the most from CAPS could be explored in future research. Given the limited sample size of this study and its reliance on retrospectively collected utilization data, larger demonstrations that include well-designed long-term cost-benefit evaluations are also needed.

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Declarations

Disclaimer The funding source had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; preparation, review, or approval of the manuscript; and decision to submit the manuscript for publication.

Ethics Approval Approval was obtained from the Institutional Review Board of the Johns Hopkins University School of Medicine. The procedures used in this study adhere to the tenets of the Declaration of Helsinki.

Consent to Participate Informed consent was obtained from adult participants, and assent was obtained from youth participants.

Conflict of Interest The authors declare that they have no conflict of interest.

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