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Impact of Treatment Improvement on Long-term Anxiety: Results from CAMS and CAMELS

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Abstract

Objective: This paper examined associations between change in youth and family characteristics during youth anxiety treatment and long-term anxiety severity and overall functioning.

Method: Participants ($N = 488$; age 7-17 years; 45% male; 82% white) were randomized to 12 weeks of cognitive behavioral therapy (*Coping Cat*), medication (sertraline), their combination, or pill placebo in the Child/Adolescent Anxiety Multimodal Study (CAMS). A subset participated in the naturalistic follow-up Child/Adolescent Anxiety Multimodal Extended Long-term Study (CAMELS; $n = 319$; 3.70-11.83 years posttreatment). The current secondary analyses examined how change in anxiety severity (Child Global Impression-Severity), overall functioning (Children's Global Assessment Scale), caregiver psychopathology (Brief Symptom Inventory), caregiver strain (Family Burden Assessment Scale), and family dysfunction (Brief Family Assessment Measure) during CAMS was associated with anxiety severity and overall functioning years later ($M = 7.72$ years). CAMS procedures were registered on clinicaltrials.gov.

Results: Changes in factors related to functioning (i.e., overall functioning, family dysfunction, caregiver strain) were associated with improvements in anxiety severity in CAMELS ($|\beta_{ys}| \geq .04$, $ps \leq .04$). Changes in factors related to psychopathology (i.e., anxiety severity, caregiver psychopathology) were associated with improvements in overall functioning in CAMELS ($|\beta_{ys}| \geq .23$, $ps \leq .04$). It was *changes* in each of the variables examined (rather than baseline values) that predicted anxiety severity and overall functioning.

Conclusions: Both youth and family factors play a significant role in long-term treatment outcomes. Therapists would be wise to monitor how these factors change throughout treatment.

Keywords: Anxiety, treatment, follow-up, cognitive behavior therapy, sertraline

Public Health Impact

- Both youth and family factors play an important role in anxiety and overall functioning 4-12 years post-treatment.
- Change (and not pre-treatment levels) in youth and family factors predict long-term outcomes.

Impact of Treatment Improvement on Long-term Anxiety:

Results from CAMS and CAMELS

Anxiety disorders are common (Costello et al., 2003) and associated with considerable functional impairments (Swan & Kendall, 2016). Left untreated, these disorders confer risk for a range of negative sequelae (Lopez et al., 2005; Rudd et al., 2004). Fortunately, several treatments are efficacious for treating youth anxiety. For example, in the Child/Adolescent Anxiety Multimodal Study (CAMS), approximately 60% of youth who received cognitive behavioral therapy (CBT), sertraline, or their combination were treatment responders (Walkup et al., 2008).

Although research has found consistent short-term benefits from anxiety treatment, the extant literature on long-term gains is inconsistent. In the Child/Adolescent Anxiety Multimodal Extended Long-term Study (CAMELS), a naturalistic long-term follow-up study to CAMS, only 21.7% of participants did not meet anxiety disorder diagnostic criteria at any time (Ginsburg et al., 2018). In contrast, a separate study found that 7.4 years after receiving CBT, over 60% of youth no longer met diagnostic criteria for their pre-treatment primary anxiety disorder (Kendall et al., 2004). Other reviews indicate that many of youth relapse (e.g., Gibby et al., 2017). Given the mixed results, clarifying predictors of posttreatment course is critical.

Studies examining predictors of long-term follow-up response also have reported inconsistent results (Gibby et al., 2017). In CAMELS, younger age, male sex, absence of a social anxiety diagnosis, higher youth functioning, and higher family functioning at baseline predicted stable remission throughout follow-up (Ginsburg et al., 2018; 2014). Increased incidence of negative life events during follow-up and posttreatment responder status were also associated with a chronic course of anxiety during follow-up. Other studies have examined similar categories of predictors, with only socioeconomic status emerging as a consistent predictor of

long-term response in more than three studies (Gibby et al., 2017). Few studies have examined how *change* in youth and family characteristics during treatment, rather than static pretreatment variables, may be associated with differential maintenance of gains.

This study examined whether acute treatment change in youth and family characteristics predicted treatment response 4-12 years later. Youth and family characteristics were selected based on data suggesting that child anxiety severity and family variables are associated with treatment outcome (Compton et al., 2014; Ginsburg et al., 2018). We hypothesized that greater reduction in anxiety severity, caregiver strain, caregiver psychopathology, and family dysfunction, as well as greater improvements in overall child functioning during the acute treatment (CAMS), would be associated with lower anxiety severity and higher overall functioning at follow-up (CAMELS). We further hypothesized that anxiety severity and overall functioning in the long-term would be impacted more by change in, rather than pre-treatment values of, youth and family characteristics.

Method

Participants

Of the original CAMS sample ($N=488$ individuals, ages at CAMS baseline=7-17 years), 319 participated in CAMELS (3.70-11.83 years from pretreatment). Demographic and clinical characteristics are in Table 1. Attrition analyses revealed that CAMELS participants were more likely to be female, of non-Hispanic ethnicity, and from families with higher SES than non-CAMELS participants (Ginsburg et al., 2018). CAMS participants received treatment for 12 weeks from one of six university clinics in geographically diverse areas of the United States.

Measures

Baseline DSM-IV diagnoses were determined using the Anxiety Disorders Interview Schedule for DSM-IV, Child and Parent Versions (ADIS-C/P; Silverman & Albano, 1996). The Clinical Global Impression-Severity and Improvement (CGI-S; CGI-I; Guy, 1976) were used to measure anxiety severity and treatment improvement, respectively. The Children's Global Assessment Scale (CGAS; youth < 18 years; Shaffer et al., 1983) and Global Assessment of Functioning (GAF; adults $\geq$ 18 years; Endicott et al., 1976) were used to assess functional impairment. Caregiver psychopathology, family dysfunction, and caregiver burden were assessed respectively with the Brief Symptom Inventory (BSI; Derogatis & Melisaratos, 1983), the Brief Family Assessment Measure-III (BFAM; Skinner et al., 1995); and the Family Burden Assessment Scale (FBAS; Reinhard et al., 1994). Masked independent evaluators (IEs) administered the ADIS-C/P, CGI-S, CGI-I, and CGAS/GAF; caregivers completed the BSI, BFAM, and FBAS. Mothers' scores were used if more than one caregiver completed the BFAM. Caregivers reported their child's age, sex, ethnicity, and race. Hollingshead Index (Hollingshead, 1975) measured caregiver SES at CAMS baseline. See Appendix A for additional information on study measures, including psychometric properties.

Procedure

CAMS participants were randomized (2:2:2:1) to receive individual CBT (*Coping Cat*), medication (sertraline), a combination of the two, or pill placebo. Given that treatment type was not associated with remission status across the CAMELS period time (Ginsburg et al., 2018), all four conditions were included. Caregiver psychopathology and family dysfunction were not a treatment focus in any condition. This study examined a subset of CAMS and CAMELS measures. See Compton et al. (2010) and Ginsburg et al. (2018) for additional procedural details. In CAMS, the CGI and CGAS were administered every 4 weeks (weeks 0, 4, 8, and 12), and the

BSI, BFAM, and FBAS were administered pre- and post-treatment. In CAMELS, independent evaluators (IEs) completed the CGI-S and CGAS/GAF annually for five years. Figure 1 provides the CONSORT diagram. The IRBs approved study procedures. The CAMS study was registered on clinicaltrials.gov.

Analytic Plan

The CAMS and CAMELS datasets were analyzed separately, with estimated changes in pathology over the duration of the CAMS study imported as predictors in the CAMELS dataset. The CAMS sample was powered both for tests of differential outcomes and for tests of mediators of differential outcomes (see Compton et al., 2010); the CAMELS sample was powered to detect a small effect ($f^2 = 0.07$) for the present analyses. Missing data in CAMS (12% in CAMS) was handled using multiple imputation (SPSS, version 2; for details, see Walkup et al., 2008). Missing data was not imputed in CAMELS (37% of data was missing in CAMELS) because the CAMELS variables were the dependent variables.

All analyses used multilevel linear-models (MLMs) with restricted maximum likelihood estimation, a random intercept, and a random slope for time; models were estimated in Stata. Figures were created in R using the Ggplot package. To improve interpretation, CGI-S, CGAS/GAF, BSI, BFAM, and FBAS were *z*-standardized. Change in BSI, BFAM, and FBAS during the CAMS treatment period was calculated as a change score (CAMS week 12 – CAMS baseline), with lower values indicating greater improvement. Because there were more than two observations of CGI-S and CGAS in the CAMS period, change in these variables and baseline values were estimated using MLMs, in which CGI-S and CGAS were regressed on time. These models produced Empirical Bayes estimates of the random slope of time (a change score) and a random intercept (an estimated baseline value) for each participant.

Using MLMs, CGI-S and CGAS/GAF in CAMELS was regressed on the interaction between time and each of the five predictors variables (change in CGI-S, BSI, CGAS, FBAS, and BFAM), controlling for the interaction between time and the baseline value of the predictor. Each of the five predictors were entered in separate models. Other control variables included: CAMS treatment condition, baseline ADIS diagnosis, CAMS treatment response (1 or 2 on the CGI-I), and baseline demographic characteristics (age, sex, race, SES). To understand the relative contributions of each of the five predictors, a joint model was conducted to include all significant predictors. This paper is a secondary analysis on published data (e.g., Walkup et al., 2008; Ginsburg et al., 2018); these analyses have not been previously reported (see Appendix B).

Results

Summary statistics are in Table 1. These models indicated significant variation for the random intercept and slopes in all analyses. In line with prior CAMS findings, anxiety severity (CGI-S) significantly decreased ($b = -5.87$, $SE = 0.26$, $p < .001$) and overall functioning (CGAS) significantly increased ($b = 5.49$, $SE = 0.22$, $p < .001$) during CAMS.

Results (see Table 2) suggest that a greater improvement in overall functioning and caregiver strain during CAMS predicted significantly lower levels of anxiety severity in CAMELS ($|\beta_{ys}| \geq 0.14$, $SEs \leq 0.16$, $ps \leq .04$). These effects did not attenuate throughout the CAMELS period ($|\beta_{ys}| \leq 0.03$, $SEs \geq 0.01$, $ps \geq .15$). To assess whether change in overall functioning or caregiver strain during CAMS had a bigger impact on sustained improvements in anxiety severity during CAMELS, anxiety severity in CAMELS was regressed on all predictors from the overall functioning and caregiver strain models. After controlling for the other variables, the main effect of neither overall functioning ($\beta_y = -0.09$, $SE = 0.07$, $p = .22$) nor caregiver strain ($\beta_y = 0.32$, $SE = 0.18$, $p = .08$) was significant. As shown in Figure 2, the impact

of change in family dysfunction during CAMS on anxiety severity during CAMELS became more pronounced over time ($\beta_y = -0.04$, $SE = 0.02$, $p = .03$). However, changes in anxiety severity and caregiver psychopathology during CAMS were not significantly associated with anxiety severity in CAMELS ($\beta_{ys} \leq 0.25$, $SEs \geq 0.01$, $ps \geq .11$). In all five models, the estimated main effect of time in CAMELS on anxiety severity was close to zero and was not significant ($|\beta_{ys}| \leq 0.01$, $SEs = 0.02$, $ps \geq .52$). Furthermore, the main effect of the baseline value of the predictors, as well as the interaction between the baseline value of the predictors and time, on anxiety severity in CAMELS was not significant ($|\beta_y| \leq 0.56$, $SEs \geq 0.02$, $ps \geq .20$).

Results further suggest that a greater reduction in anxiety severity and caregiver psychopathology during CAMS predicted significantly higher levels of overall functioning in CAMELS ($|\beta_{ys}| \geq 0.23$, $SEs \leq 0.22$, $ps \leq .04$). These effects did not attenuate throughout the CAMELS period ($|\beta_{ys}| = 0.02$, $SEs \geq 0.01$, $ps \geq .08$). To assess whether change in anxiety severity or caregiver psychopathology during CAMS had a bigger impact on sustained improvements in overall functioning during CAMELS, overall functioning (CGAS/GAF) in CAMELS was regressed on all predictors from the anxiety severity (CGI-S) and caregiver psychopathology (BSI) models. After controlling for the other variables, the main effect of change in anxiety severity on overall functioning in CAMELS was still significant ($\beta_y = -0.21$, $SE = 0.09$, $p = .01$); the main effect of caregiver psychopathology on overall functioning in CAMELS was no longer significant ($\beta_y = -0.30$, $SE = 0.23$, $p = .19$). As shown in Figure 2, the impact of CAMS change in overall functioning and in caregiver strain on overall functioning during CAMELS attenuated over time ($|\beta_{ys}| \leq 0.06$, $SEs \leq 0.02$, $ps \leq .03$). Change in family dysfunction during CAMS was not significantly associated with anxiety severity in CAMELS ($|\beta_{ys}| \leq 0.32$, $SEs \geq 0.02$, $ps \geq .06$). Additionally, results from the anxiety severity and family

dysfunction models suggested that overall functioning decreased throughout CAMELS ($|\beta_{ys}| \geq 0.04$, $SEs = 0.02$, $ps \leq .03$). As seen in the anxiety severity models, the main effect of the baseline value of the predictors, as well as the interaction between the baseline value of the predictors and time, on overall functioning in CAMELS was not significant ($|\beta_y| \leq 0.34$, $SEs \geq 0.02$, $ps \geq .14$).

Discussion

This study is the first to examine how *change* in youth and family factors during anxiety treatment (CBT, sertraline, their combination, or pill placebo) is associated with long-term improvements in anxiety and overall functioning. Hypotheses were partially supported. Changes in anxiety severity, caregiver psychopathology, caregiver strain, overall functioning, and family dysfunction during treatment were associated with either anxiety severity or overall functioning during CAMELS. In particular, changes in factors related to functioning were associated with improvements in anxiety severity in CAMELS. Conversely, changes in factors related to psychopathology were associated with improvements in overall functioning in CAMELS, with change in anxiety severity identified as the more important predictor. As hypothesized, *changes* in each of the variables examined (rather than baseline values) predicted anxiety severity and overall functioning 4-8 years later. This highlights the importance of examining treatment changes as predictors. Additionally, the inconsistent pattern of predictors of treatment outcomes in previous studies may be because most studies only examined baseline predictors (Gibby et al., 2017).

Findings indicate that both youth and family factors play an important role in short- and long-term treatment outcomes, in line with previous analyses (Ginsburg et al., 2018; Swan et al., 2018). Previous research also found that low levels of baseline family dysfunction were

associated with more favorable treatment outcomes (Compton et al., 2014; Crawford & Manassis, 2001; Ginsburg et al., 2014; 2018). Results suggest that the beneficial effects of reduced caregiver strain and family dysfunction on posttreatment anxiety severity (Keeton et al., 2013; Schleider et al., 2015) persist 4-12 years later. Taken together with the findings that parental symptom severity is inversely associated with treatment response (Keeton et al., 2013), it is possible that the improvements of parental psychopathology during treatment play a key role in ensuring that treatment effects are sustained long-term. This is in line with findings that reductions in parental depression are associated with less psychopathology in their children (Weissman et al., 1987), as well as the importance of parenting factors on the development and maintenance of youth anxiety (Wei & Kendall, 2014).

Limitations warrant mention. First, these results are from a naturalistic follow-up; CAMELS lacked a control group, and causal relationships cannot be inferred. Families, caregivers, and individuals could have received treatment during the CAMELS period, which was not accounted for in this study. Diagnoses other than anxiety disorders that emerged during CAMELS were also not considered. Second, the majority of the sample was White and from a high SES background, which limits the generalizability of study findings to families from more diverse backgrounds. SES was only assessed at baseline; changed SES may have differentially affected anxiety severity and overall functioning. Attrition also may have entered bias. Third, this study used single item measures (i.e., CGI-S, CGAS/GAF, CGI-I) to assess anxiety severity, overall functioning, and treatment remission. Although used extensively (e.g., Walkup et al., 2008), multi-item measures may be more sensitive to minor changes. Last, caregiver strain, caregiver psychopathology, and family dysfunction were measured twice during CAMS. Given

that Empirical Bayes estimates only can be made when there are more than two observations per individual, change in these three variables was calculated as a change score.

Future research should examine other predictors to account for variance in long-term treatment response. The CAMELS models only accounted for a small proportion of variance (<10%) in anxiety severity and overall functioning across the long-term follow-up period. Our results indicated a surprising discrepancy between anxiety severity and overall functioning outcomes: treatment improvements were differentially associated with these factors, and some models suggested that overall functioning, but not anxiety severity, declined during CAMELS. Future studies should assess both symptom severity and functioning to examine whether predictors differentially affect these outcomes. Future work also should systematically evaluate the number and timing of therapy sessions needed to sustain treatment improvement.

Clinical implications suggest that therapists would be wise to monitor youth anxiety and caregiver factors throughout treatment. Although direct research is needed, it may be that individual and family factors, such as parental accommodation (Lebowitz et al., 2020), have an impact on youth anxiety long-term. For youth who do not experience benefits, therapists may modify treatment by integrating family therapy or parent-focused interventions (e.g., SPACE; Lebowitz et al., 2020). Parent-focused interventions target factors that are not as explicitly targeted in individual CBT. The present findings provide therapists and families with information on prognosis and relapse prevention. Our findings suggest that caregivers who do not experience a decrease in caregiver psychopathology may benefit from seeking individual therapy. For some families, booster sessions may be needed to maintain treatment gains.

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Table 1.*Summary Statistics*

	CAMS		CAMELS	
	(N = 488)		(n = 319)	
Variable	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Time since CAMS Baseline (year)	0.12	0.09	7.72	1.84
Anxiety Severity (CGI-S, z)	0.00	1.00	1.36	1.03
Overall Functioning (CGAS/GAF, z)	0.00	1.00	0.41	1.28
Caregiver Psychopathology at Baseline (BSI, z)	0.19	1.04	n/a	n/a
Caregiver Psychopathology Change (BSI, z) ^a	-0.37	1.10	n/a	n/a
Caregiver Strain at CAMS Baseline (FBAS, z)	0.32	0.98	n/a	n/a
Caregiver Strain Change (FBAS, z) ^a	-0.65	1.03	n/a	n/a
Family Dysfunction at CAMS Baseline (BFAM, z)	0.11	0.99	n/a	n/a
Family Dysfunction Change (BFAM, z) ^a	-0.21	0.94	n/a	n/a
Age at CAMS Baseline (years)	11.17	2.81	11.11	2.81
Hollingshead SES at CAMS Baseline (z)	4.03	0.94	4.15	0.89
	N	%	N	%
Sex: Male	242	50	176	55
Race: White	385	79	260	82
Hispanic	59	12	26	8
Treatment: Combination	140	29	92	29
Treatment: CBT	133	27	90	28
Treatment: Sertraline	139	28	90	28

Table 1 (continued)

	CAMS		CAMELS	
	(N = 488)		(n = 319)	
Variable	N	%	N	%
Treatment: Placebo	76	16	47	15
Separation anxiety at CAMS baseline	264	54	173	54
Social anxiety at CAMS baseline	400	82	262	82
Generalized anxiety at CAMS baseline	384	79	259	81
Comorbid internalizing at CAMS baseline	215	44	147	46
Comorbid externalizing at CAMS baseline	90	18	57	18
Treatment response after CAMS (CGI-I)	313	64	211	66

Note. Means and standard deviations were calculated after z-standardization; ^a = change scores calculated by subtracting the score at CAMS baseline (week 0) from CAMS posttreatment (week 12); CGI-S = Clinical Global Impression, Severity; CGAS = Children's Global Assessment of Functioning Scale; GAF = Global Assessment of Functioning; BSI = Brief Symptom Inventory; FBAS = Family Burden Assessment Scale; BFAM = Brief Family Assessment Measure; CBT = cognitive-behavioral therapy; combination = CBT and sertraline; and CAMS treatment response (Clinical Global Impressions, Improvement ≤ 2). A correlation matrix is available from the first-author upon request.

Table 2.*Anxiety Severity and Overall Functioning in CAMELS*

	CAMELS					
	CGI-S (z)			CGAS/GAF (z)		
	b	SE	<i>p</i>	b	SE	<i>p</i>
<i>Anxiety Severity</i>						
Time (years since CAMS baseline)	0.01	0.02	.59	-0.05	0.02	.01
Change in CGI-S During CAMS ^a	0.11	0.07	.11	-0.23	0.09	.01
CGI-S at CAMS Baseline ^b	0.56	0.76	.46	-0.09	0.94	.93
Change in CGI-S x Time	-0.01	0.01	.50	0.02	0.01	.08
CGI-S at CAMS Baseline ^b x Time	-0.05	0.09	.60	-0.02	0.12	.84
R ²	0.11			0.10		
<i>Caregiver psychopathology</i>						
Time (years since CAMS baseline)	0.01	0.02	.69	-0.04	0.02	.06
Change in BSI During CAMS ^c	0.25	0.18	.17	-0.46	0.22	.04
BSI at CAMS Baseline	0.13	0.17	.45	-0.32	0.22	.14
Change in BSI x Time	-0.003	0.02	.88	0.02	0.03	.41
BSI at CAMS Baseline x Time	0.005	0.02	.83	0.01	0.03	.85
R ²	0.12			0.11		

Table 2 (continued)

	CAMELS					
	CGI-S (z)			CGAS/GAF (z)		
	b	SE	<i>p</i>	b	SE	<i>p</i>
<i>Overall Functioning</i>						
Time (years since CAMS baseline)	0.01	0.02	.52	-0.05	0.02	.01
Change in CGAS During CAMS ^a	-0.14	0.07	.04	0.27	0.08	.001
CGAS at CAMS Baseline ^b	-0.10	0.42	.82	-0.34	0.52	.52
Change in CGAS x Time	0.01	0.01	.41	-0.02	0.01	.03
CGAS at CAMS Baseline ^b x Time	-0.002	0.05	.98	0.06	0.06	.32
R ²	0.12			0.10		
<i>Caregiver Strain</i>						
Time (years since CAMS baseline)	-0.01	0.02	.67	-0.01	0.02	.72
Change in FBAS During CAMS ^c	0.38	0.16	.02	-0.67	0.20	.001
FBAS at CAMS Baseline	0.19	0.15	.22	-0.23	0.19	.24
Change in FBAS x Time	-0.03	0.02	.15	0.06	0.02	.01
FBAS at CAMS Baseline x Time	-0.01	0.02	.73	0.003	0.02	.90
R ²	0.11			0.09		

	CAMELS					
	CGI-S (z)			CGAS/GAF (z)		
	b	SE	p	b	SE	p
<i>Family Dysfunction</i>						
Time (years since CAMS baseline)	0.003	0.02	.83	-0.04	0.02	.03
Change in BFAM During CAMS ^c	0.26	0.15	.09	-0.32	0.19	.09
BFAM at CAMS Baseline	0.18	0.15	.20	-0.20	0.18	.27
Change in BFAM x Time	-0.04	0.02	.03	0.04	0.02	.06
BFAM at CAMS Baseline x Time	-0.01	0.02	.59	0.004	0.02	.85
R ²	0.12			0.10		

Note. All models were calculated using MLM with restricted maximum likelihood estimation, a random slope for time and a random intercept. SE = standard error; ^a = change in CGI-S and CGAS were the Empirical Bayes slope estimates of the rate of change over time during the CAMS 12-week treatment period. ^b = CAMS baseline values for CGI-S and CGAS were the Empirical Bayes intercept estimates examining the rate of change over time during the CAMS 12-week treatment period. ^c = change in BSI, FBAS, and BFAM were calculated by subtracting the score at CAMS baseline (week 0) from CAMS posttreatment (week 12). The CGI-S, CGAS/GAF, BSI, FBAS, and BFAM were z-standardized. CGI-S = Clinical Global Impression, Severity; CGAS = Children's Global Assessment of Functioning Scale; GAF = Global Assessment of Functioning; BSI = Brief Symptom Inventory; FBAS = Family Burden Assessment Scale; BFAM = Brief Family Assessment Measure. All models included the following control variables: age at CAMS baseline (in years); treatment condition; sex; minority status; caregiver SES (Hollingshead Index); CAMS baseline presence of separation anxiety

disorder, social anxiety disorder, generalized anxiety disorder, comorbid externalizing disorders, or comorbid internalizing disorders; CAMS treatment response (Clinical Global Impressions, Improvement ≤ 2).

Figure 1*Child/Adolescent Anxiety Multimodal Extended Long-term Study (CAMELS) Participant Flow*

Note. CAMS = Child/Adolescent Anxiety Multimodal Study; CBT = Cognitive-behavioral therapy

Figure 2

Anxiety Severity and Overall Functioning in CAMELS by Time and Change in Family

Dysfunction, Overall Functioning, and Caregiver Strain during CAMS.

Note. ± 1 SD = ± 1 SD from the average change; CGI-S = Clinical Global Impression, Severity;

CGAS = Children's Global Assessment of Functioning Scale; GAF = Global Assessment of

Functioning; FBAS = Family Burden Assessment Scale; BFAM = Brief Family Assessment

Measure. Lower change scores (i.e., - 1 SD) indicates greater change for the BFAM and FBAS, and higher change scores (i.e., +1 SD) indicates greater change for the CGAS.

Appendix A

Additional Information about Study Measures

Anxiety Disorders Interview Schedule for DSM-IV, Child and Parent Versions (ADIS-C/P; Silverman & Albano, 1996)

Baseline DSM-IV diagnostic criteria was determined using the ADIS-C/P, which was administered by masked independent evaluators (IEs). Interrater reliability was high in CAMS (ICCs 0.82-0.88).

Clinical Global Impression-Severity and Improvement (CGI-S; CGI-I; Guy, 1976)

The IEs who completed the ADIS rated the youth's (1) anxiety severity using the CGI-S, a single-item scale ranging from 1 (*normal, not at all ill*) to 7 (*extremely ill*) and (2) overall improvement using the CGI-I, a single-item scale ranging from 1 (*very much improved*) to 7 (*very much worse*). Treatment response (CGI-I = 1 or 2), as measured by the CGI-I, has been found to be significantly correlated with measures of anxiety, depression, impairment, and quality of life (Zaider et al., 2003).

Children's Global Assessment Scale (CGAS; Shaffer et al., 1983) and Global Assessment of Functioning (GAF; Endicott et al., 1976)

The IE-rated CGAS (youth < 18 years) and GAF (adults ≥ 18 years) were used to assess the youth's functional impairment along a single-item scale of 1 to 100. Higher scores indicated higher levels of functioning. The CGAS and GAF have been found to have a high interrater reliability, retest reliability, and discriminant validity between level of impairment for children and adults with a wide range of diagnoses (Endicott et al., 1976).

Brief Symptom Inventory (BSI; Derogatis & Melisaratos, 1983)

To assess caregiver psychopathology, caregivers rated their level of distress in the past week on 53 items on a scale of 0 (*not at all*) to 4 (*extremely*). Items were averaged to create the Global Severity Index, with higher scores indicating higher levels of psychological psychopathology. Cronbach's alpha in the CAMS sample at baseline was 0.95. The BSI has been found to have good retest reliability over two weeks, and good convergent validity with other broad measures of psychopathology (Boulet & Boss, 1991; Derogatis & Melisaratos, 1983).

Brief Family Assessment Measure-III (BFAM; Skinner et al., 1995)

To assess family dysfunction, caregivers rated 14 items on a scale from 0 (*strongly agree*) to 3 (*strongly disagree*). Summed items create a total score; higher scores indicate higher levels of family dysfunction. If more than one caregiver completed the BFAM, the mother's score was used given that mothers completed the majority of measures. Family member mental illness was associated with lower levels of family functioning on the BFAM, demonstrating discriminant validity (Jacob, 1995). Cronbach's alpha in the CAMS sample at baseline was 0.84.

Family Burden Assessment Scale (FBAS; Reinhard et al., 1994)

To assess caregiver-reported burden associated with having a child with a mental illness, caregivers rated 21 items describing ways that child anxiety can disrupt family life, emotions, and routines, on a scale of 1 (*not at all*) to 5 (*very much*). Summed items create a total score; higher scores indicate higher levels of family burden. The construct validity of the FBAS has been supported; caregivers of a child with a mental illness had higher levels of caregiver strain than those without a child with a mental illness, and this level of strain decreased following treatment (Reinhard et al., 1994). Cronbach's alpha in the CAMS sample at baseline was 0.91.

Hollingshead Index (Hollingshead, 1975)

Caregiver SES at CAMS baseline was measured using the 5-point, two-factor Hollingshead Index (Hollingshead, 1975); higher scores indicate higher levels of SES.

Appendix A Additional References

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Appendix B

Data Transparency

This paper is a secondary analysis of the CAMS and CAMELS studies. A bibliography of journal articles that use the CAMS and CAMELS data is available at <https://report.nih.gov>.

Ginsburg et al. (2018) examined how the baseline values of the same focal variables as this paper (CGI-S, CGAS, BSI, BFAM, FBAS) predicted anxiety disorder status during CAMELS. Swan et al. (2018) examined how CAMS treatment responder status was associated with overall functioning and life satisfaction in CAMELS. This paper is the first to examine how change in youth and family functioning (CGI-S, CGAS, BSI, BFAM, FBAS) during CAMS is associated with long-term anxiety severity and global functioning in CAMELS.