Family Conflict, Perceived Criticism, and Aggression in Symptomatic Offspring of Parents With Mood Disorders: Results From a Clinical Trial of Family-Focused Therapy

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Objective: In offspring of parents with bipolar or major depressive disorder, we examined the longitudinal association between parents' and youths' ratings of family conflict and criticism and youths' levels of impulsive aggression during a 6-month randomized trial of family intervention.

Method: Following a diagnostic evaluation, we offered adolescents (aged 13-19 years) and parents with mood disorders a 12-session, 18-week protocol of family-focused therapy, with random assignment to mobile applications that enabled mood tracking or encouraged practice of mood management and family communication skills, also with mood tracking. At pretreatment, 9 weeks, 18 weeks (posttreatment), and 27 weeks, parents completed measures of adolescent aggression and irritability, and parents/adolescents completed measures of dyadic conflict and perceived criticism.

Results: Parent- and youth-rated dyadic conflict scores and perceived criticism ratings were concurrently associated with youths' composite aggression scores across the 4 timepoints. In lagged association analyses, parent-rated dyadic conflict scores in 1 9-week study interval predicted youths' aggression scores in subsequent 9-week intervals ($F_{1,109} = 7.36$, $p = .008$). In contrast, youths' aggression scores in 1 interval predicted youths' ratings of dyadic conflict in subsequent intervals ($F_{1,107} = 8.16$, $p = .005$). Levels of family conflict, perceived criticism, and youth aggression decreased over 6 months in both mobile app conditions.

Conclusion: In offspring of parents with mood disorders, levels of family conflict, criticism, and adolescent aggression are intercorrelated over time and suggest bidirectional, mutually influential processes within families. Aggression and its precipitants within family interactions should be a focus of interventions for youths with or at risk for mood disorders.

Plain language summary: The study's purpose was to determine whether aggression in teenagers (aged 13-19 years) who had a biological parent with a mood disorder (major depression or bipolar disorder) was related to family conflict and parent/offspring criticism over 6 months. Adolescents and their parents received 12 telehealth family-focused therapy (FFT) sessions over 4 months and had access to either of 2 randomly assigned mobile phone applications. One enabled them to track their moods and the other to practice behavioral skills, such as mood management strategies or effective family communication between sessions. Family conflict and teen aggression were correlated in each of the study's 9-week intervals, and parent-rated family conflict scores in one study interval predicted teens' aggression scores in the next interval. Levels of family conflict, perceived criticism, and adolescents' aggression decreased over 6 months in both FFT/mobile app conditions, suggesting that aggression within family interactions should be a significant focus of interventions for teens in the early stages of depression or bipolar disorder.

Clinical guidance
- In adolescent offspring of parents with mood disorders, levels of family conflict, adolescents' perceptions of criticism, and aggression are intercorrelated over time.
- A 12-session course of family-focused therapy may positively impact these family processes.
- Mobile applications that emphasize mood tracking and family communication skills may enhance telehealth-based family interventions by encouraging skill practice between sessions.

Clinical trial registration information: Technology Enhanced Family Treatment; https://clinicaltrials.gov/; NCT03913013.

Diversity & Inclusion Statement: We worked to ensure sex and gender balance in the recruitment of human participants. We worked to ensure race, ethnic, and/or other types of diversity in the recruitment of human participants. We worked to ensure that the study questionnaires were prepared in an inclusive way. One or more of the authors of this paper self-identifies as a member of one or more historically underrepresented racial and/or ethnic groups in science. One or more of the authors of this paper self-identifies as a member of one or more historically underrepresented sexual and/or gender groups in science. The author list of this paper includes contributors from the location and/or community where the research was conducted who participated in the data collection, design, analysis, and/or interpretation of the work.

Key words: Mobile apps; bipolar disorder; depression; expressed emotion; telehealth

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A ggression and its specific emotional and behavioral dimensions are important therapeutic targets in childhood psychiatric disorders, and have particular relevance to the prognosis and treatment of early-onset mood disorders.[1,2] Abrupt verbal expressions of anger, episodic irritability, temper tantrums, and physical

aggression are frequent among children and adolescents in the prodromal and early stages of bipolar or major depressive disorder.[3–6] Preschool and school-aged offspring of parents with bipolar and major depressive disorder have higher levels of externalizing behaviors (often manifested as aggression) than similarly-aged offspring of healthy parents.[5,7–14]

Developmental psychopathologists have long described bidirectional and recursive communication cycles associated with childhood aggressive behavior.[15,16] In these models, the child becomes hostile and provocative in reaction to simple parental requests. Parents who are readily angered by the intensity of the child's responses respond with harsh criticisms, aggravating the child further and creating a mutually reinforcing pattern.[16,17] Although coercive processes were originally described in relation to antisocial behavior, reciprocal patterns of negative interaction have also been described in families with parents with mood disorders and offspring with bipolar spectrum disorders.[18,19]

Negative cycles of communication are not limited to families of children or adolescents with psychiatric disorders. In adults with bipolar disorder, families in which caregivers (parents or spouses) are classified as high (rather than low) in expressed emotion (EE, defined as high levels of criticism, hostility, and/or emotional overinvolvement) have verbal interactions characterized by lengthy and uninterrupted cycles of criticism and countercriticism between caregivers and patients.[20,21] In turn, high levels of EE among caregivers are associated with greater mood symptom severity and relapse risk in youths and young adults with depression or bipolar disorder.[22–27]

In samples of adolescents with bipolar disorder, cross-sectional[28] and longitudinal associations[29] have been observed between youths' or parents' ratings of family conflict and adolescents' manic symptoms. Among children and adolescents with major depression, there is compelling evidence that impaired family functioning (eg, high levels of parent/child conflict, inconsistency in parenting, low cohesion) is prospectively associated with aggressive behavior, anger, and depression severity.[30–33] One study found that adolescents' ratings of parental EE were associated with their self-ratings of aggression and depression over a 4-year follow-up.[34] Elucidating the associations and direction of effects between familial conflict and aggression can help clarify treatment targets for youths with or at risk for mood disorders.

In adolescent offspring (ages 13-19 years) of parents with major depressive disorder or bipolar disorder, we examined the severity of parent/offspring conflict, the parents' and youths' perceptions of criticism expressed by the other member of the dyad, and impulsive expressions of irritability and aggression in youths. Following a diagnostic interview, youths and parents enrolled in a clinical trial of family-focused therapy (FFT) in conjunction with 1 of 2 types of adjunctive mobile health application, with follow-up over 6 months.[35] First, we hypothesized that when measured repeatedly, levels of family conflict (as rated by the youths and parents) would be prospectively associated with measures of youth aggression. Second, we hypothesized that higher levels of perceived criticism in the parent–offspring dyad would be prospectively associated with higher levels of aggression in the offspring over 6 months. Third, we predicted that levels of family conflict, perceived criticism, and youth aggression would decrease over the 6-month trial period, during which families received sessions of psychoeducation, communication skill training, and problem-solving skill training.

METHOD

Participants

The clinical trial, conducted at the University of California, Los Angeles Semel Institute between January 2020 and July 2022, has previously been described in detail.[35] In brief, participants were offered 12 sessions of FFT over 18 weeks, with final follow-up at 27 weeks. Through random allocation, participants were assigned to one of two mobile apps used to supplement FFT (see below). The majority of the trial was conducted during the COVID-19 pandemic, during which treatment and assessment sessions were provided through telehealth. Referrals to the study originated from pediatricians and mental health practitioners or from posted advertisements. We made every attempt to ensure race, ethnic, sex, and gender balance in the recruitment of participants.

After receiving a description of the study, parents and adolescents read and signed university institutional review board–approved consent and assent forms. Eligible youths met the following criteria: (1) age 13 years, 0 months to 19 years, 11 months; (2) current mood symptoms, as indicated by scores >11 on the Young Mania Rating Scale[36] covering the prior week or >29 on the Children's Depression Rating Scale, Revised[37] covering the prior 2 weeks; (3) a *DSM-5*[38] diagnosis of depressive spectrum (ie, major depression or other specified depressive) disorder or bipolar spectrum (bipolar I, II, or other specified) disorder; (4) evidence of mood instability or volatility, as indicated by a score ≥20 on the parent-rated 20-item Children's Affective Lability Scale (CALS)[39] or ≥6 on the Parent General Behavior Inventory for Mania, 10-item scale[40]; (5) the youths rated at least 1 parent as high (≥5 on a severity scale of 1-10) in criticism using the Perceived Criticism Measure (PCM)[41,42]; (6) participants had access to a smartphone, tablet, or desktop computer with Internet connection; and (7) 1 or both biological parents had a lifetime history of major depressive disorder or bipolar I or II disorder.

All youths lived with at least 1 biological or step-parent who was willing to consent to the study, attend treatment sessions, and complete research assessments. When there were 2 parents available, the one with whom the youth had the most contact was designated as the "primary" parent. Youths were ineligible if they had a DSM-5 pervasive developmental disorder or an active substance use disorder.

Diagnoses

Youth diagnoses were based on the MINI International Neuropsychiatric Interview, Child and Adolescent Version for DSM-5 (MINI-KID).[43] Two trained interviewers administered the MINI-KID to the adolescent and separately, a parent regarding the adolescent's behavior in the prior 2 weeks and lifetime, and made consensus diagnoses. All interviews were supervised by a licensed clinical psychologist who reviewed the MINI data and consensus diagnoses for each participant, and suggested additional interview questions when results were unclear. Parents' diagnoses were established in a similar manner with direct interviews using the MINI International Neuropsychiatric Interview for Adults (DSM-5).[44] When a parent met DSM-5 criteria for a mood disorder, diagnosticians rated whether the parent had current mood symptoms or was in full remission. In cases in which the affected parent was unavailable for interview, we established diagnoses based on reports from the other parent and any available medical records.

Treatment Protocols

Before beginning the FFT sessions, adolescents and parents were randomly allocated in a 1:1 ratio to the following: (1) 12 FFT sessions with a mobile app that sent reminders to youths and parents to track the youths' moods over the prior week (FFT-Track condition); or (2) 12 FFT sessions with the "MyCoachConnect" (MCC)[45] mobile app, which included mood tracking and between-session skill practice (FFT-MCC condition). Each week, the MCC app sent push notifications to the youth and parent(s) containing reviews of the prior session's content and reminders to practice FFT skills (eg, "use active listening with another family member"), and to record efforts on the app. Random allocation was done using a biased coin toss algorithm that balanced groups on the adolescent's mood diagnosis (bipolar spectrum vs depressive spectrum disorder).

Results from treatment-group comparisons were reported in an earlier paper.[35] Both app conditions were associated with significant improvements in the primary outcome, youths' depression symptoms over 6 months, with no between-group differences in this outcome. Additionally, youths with bipolar spectrum disorders in the skill-oriented app condition (FFT-MCC) showed more improvement in psychosocial functioning and anxiety over 6 months than youths in the mood-tracking app condition (FFT-Track).

Treatment sessions were conducted with the adolescent and primary biological parent (ie, the parent who had the most face-to-face contact with the youth) and a second parent whenever possible. In both treatment conditions, clinicians trained in FFT administered 12 weekly and biweekly sessions over 18 weeks. In the first module, psychoeducation, clinicians assisted the youth and family members in developing a personalized mood management plan: a list of warning signs of new episodes (eg, irritability, sleep disturbance), anticipated stressors (eg, beginning of the school year), coping strategies (eg, maintaining regular nightly routines), and obstacles to implementing these strategies. In the communication skills training module, adolescents and parents learned to express positive or negative feelings about specific behaviors of other members of the family, use active listening in dyadic conversations, make positively toned requests for changes in another's behavior, and communicate clearly. In the third module, problem solving, families learned to break down large problems (eg, "you are being disrespectful") into more focused problems, to generate and evaluate solutions, and to choose and implement specific solutions (eg, "alert each other to aggressive voice tones"). Families practiced skills in each module through in-session role playing and between-session homework assignments.

Clinicians were trained to administer FFT in workshops and were provided with weekly expert supervision throughout the trial. Clinicians continuously met fidelity criteria on the Therapist Competence and Adherence Scales.[35] The FFT clinician's manual is available at https://www.semel.ucla.edu/champ/downloads-clinicians.

Self-Report and Clinical Outcome Assessments

At baseline, 9 weeks (mid-treatment), 18 weeks (Posttreatment), and 27 weeks (follow-up), parents completed the CALS, a measure of the adolescent's level of mood instability in the prior 3 months. CALS items describe impulsive and often inexplicable changes in mood or behavior. The questionnaire consists of 20 items rated on 1 (never or rarely occurs) to 5 (occurs 1 or more times a day) scales of frequency, with subscores (based on a factor analytic solution[46]) measuring irritability ("suddenly loses his/her temper when you would not expect"; "appears very angry (yells, uses abusive language) in response to simple requests"), elevation/activation (eg, "has bursts of silliness for little or no reason"), and anxiety/depression (eg, "suddenly loses interest in what he/she is doing"). Only the irritability subscore was used in this study, as the relevant CALS items had strong face validity for the construct of impulsive aggression.

At baseline and every 9 weeks, parents completed the Modified Overt Aggression Scale (MOAS)[47] regarding the youth's behavior in the prior week. The MOAS consists of 4 items describing verbal aggression, aggression against property, physical aggression, and auto-aggression (self-directed aggression), each rated on severity scales of 0 to 4 scales. The 4 item scores are weighted and summed to calculate a total score. As was the case in the original MOAS study,[47] verbal aggression was more common (33 of 65 participants [50.8%]) than other forms of aggression. Auto-aggression (eg, "inflicts major injury on self") was rated as present ("1" or higher) in 17 youths (26.2%), property damage (eg, breaks objects, smashes windows, sets fires) in 14 youths (21.5%), and physical aggression (eg, "attacks others, resulting in minor or serious injury") in 10 youths (15.4%). Internal reliability of the MOAS in this sample was 0.63 (coefficient alpha).

Adolescents and parents filled out the 20-item Conflict Behavior Questionnaire (CBQ)[48] at baseline and at each 9-week follow-up visit, covering the degree of negative dyadic communication in the parent–offspring relationship. The scale items are rated "true/false" and cover argumentativeness (eg, "at least 3 times a week, we get angry at each other"), frustration in communication, empathy, and relationship quality (eg "I don't think we get along very well"). Internal reliability in this sample was 0.92 (alpha).

To assess criticism in the parent–offspring relationship, adolescents and parents completed parallel forms of the 4-item Perceived Criticism Measure (PCM). Each item is rated on a 1 (not at all) to 10 (extremely) subjective rating scale. For the parent, these items read "How critical do you think your child is of you?"; "How critical do you think you are of your child?"; "When your child criticizes you, how upset do you get?"; and "When you criticize your child, how upset does s/he get?" The youth version substituted "your parent/relative" for "your child", with a space specifying which parent they were to evaluate. Given the intercorrelation of the 4 self-rated PCM items among parents (mean $r = 0.42$) and youths (mean $r = 0.43$), we computed average PCM item scores for each individual and used these as predictors in the statistical models.

Independent evaluators, who were unaware of treatment assignments and had no role in the psychosocial treatments, interviewed each adolescent and at least 1 parent at baseline (prerandomization) and at 9, 18, and 27 weeks, and made 1-6 Psychiatric Status Ratings of depression severity and 1-8 ratings of hypo/mania severity for every week of the preceding interval, using the Adolescent Longitudinal Interval Follow-up Evaluation.[49] Mean weekly ratings for depression and hypo/mania were calculated for each interval. Interrater reliability (intraclass *r*) for weekly Psychiatric Status Ratings of depression and hypo/mania ranged from 0.88 to 0.99 across raters.

Data Analyses

This article reports secondary analyses from the randomized trial of FFT and mobile phone apps described above.[35] The hypotheses centered on the cross-sectional and longitudinal (baseline and 9-, 18-, and 27-week) associations between levels of family conflict (total parent and youth scores on the CBQ), perceived criticism (average of 4 PCM items at each interval), and youths' aggression, calculated from the parent-rated MOAS and the CALS irritability subscale. In sensitivity analyses, we examined whether family conflict or aggression scores varied by the sex at birth of the youth and primary parent, the youth's average levels of depression or hypo/mania (Psychiatric Status Ratings), whether the primary parent had bipolar or major depressive disorder, and whether this parent had active symptoms at the time of the baseline assessment.

The hypotheses were examined using linear and generalized linear mixed models (PROC MIXED, Statistical Analysis System [SAS] software, V 9.4).[50] Mixed models, calculated using all available youth and primary parent data, account for correlations induced by repeated measurements within subjects and produce unbiased estimates of missing data, assuming that observations are missing at random. Subjects were entered as a random intercept effect.

The CALS Irritability and MOAS total scores were highly intercorrelated at baseline ($r[63] = 0.42$, $p = .0007$) and at each 9-week assessment interval, with *r* values ranging from 0.44 to 0.59 [all *p* values $< .0005$]. Weaker associations were observed at baseline between MOAS total scores and CALS anxiety/depression ($r[63] = 0.20$, $p = .11$) and CALS elevation/activation scores ($r[63] = 0.14$, $p = .28$). To reduce the number of dependent variables, we reduced standardized MOAS and CALS irritability total scores to a single composite score based on a principal components analysis (PROC Factor in SAS 9.4) and used this composite aggression score as the dependent variable in the primary analytic models. At baseline, total scores on both scales loaded on the composite factor at 0.72, with a final communality estimate of 1.45. Mean composite aggression scores at baseline (standardized) were 0.39 ± 1.14, with normal ranges for skewness (1.03) and kurtosis (0.61).

We examined the longitudinal relationships between parent- or youth-rated dyadic conflict scores (CBQ) and composite (MOAS and CALS irritability) aggression scores at baseline, 9 weeks, 18 weeks, and 27 weeks. Parent- and adolescent-rated CBQ scores were considered separately in these predictive analyses. Secondary mixed models were conducted using parent- or youth-rated perceived criticism (PCM)

TABLE 1 Demographic and Clinical Characteristics of Participants

Variable	FFT-MCC (n = 32)		FFT-Track (n = 33)		Total (N = 65)	
Age, mean ± SD	15.6 ± 1.7		15.9 ± 1.5		15.8 ± 1.6	
Biological sex, female participants, n (%)	24	(75.0)	23	(69.7)	47	(72.3)
Transgender participants, n (%)	3	(9.4)	2	(6.1)	5	(7.7)
Diagnosis						
Depressive spectrum disorder, n (%)	26	(81.3)	27	(81.8)	53	(81.5)
Major depressive disorder, single episode	21	(65.6)	20	(62.5)	41	(63.1)
Major depressive disorder, recurrent	5	(15.6)	4	(12.1)	9	(13.8)
Other specified depressive disorder	0	(0)	3	(9.1)	3	(4.6)
Bipolar spectrum disorder, n (%)	6	(18.8)	6	(18.2)	12	(18.5)
Bipolar I disorder	0	(0)	3	(9.1)	3	(4.6)
Bipolar II disorder	3	(9.4)	0	(0)	3	(4.6)
Other specified bipolar disorder	3	(9.4)	3	(9.1)	6	(9.2)
Attention-deficit/hyperactivity disorder, n (%)	16	(50.0)	12	(36.4)	28	(43.1)
Anxiety disorder, any, n (%)	25	(78.1)	21	(63.6)	46	(70.8)
Oppositional defiant or conduct disorder, n (%)	0	(0)	2	(6.1)	2	(3.1)
Race, n (%)						
Black/African American	0	(0)	3	(9.1)	3	(4.6)
Asian	1	(3.1)	2	(6.1)	3	(4.6)
Native American	1	(3.1)	0	(0)	1	(1.5)
White	23	(71.9)	23	(69.7)	46	(70.8)
More than 1 race	7	(21.9)	5	(15.2)	12	(18.5)
Ethnicity, Hispanic, n (%)	6	(18.8)	12	(36.4)	18	(27.7)
Psychiatric Status Rating of Depression (1-6), 18 weeks before intake, mean ± SD	4.5 ± 0.7		4.4 ± 0.9		4.4 ± 0.8	
Psychiatric Status Rating of Hypo/mania (1-8), 18 weeks before intake, mean ± SD,	1.4 ± 0.7		1.5 ± 0.9		1.4 ± 0.8	
Children's Global Assessment Scale, 2 weeks	41.8 ± 8.5		44.0 ± 9.7		42.2 ± 9.5	
Baseline medication regimens, n (%)						
No medications	12	(37.5)	15	(45.5)	27	(41.5)
Antidepressants	16	(50.0)	11	(33.3)	27	(41.5)
Antipsychotics	5	(15.6)	6	(18.2)	11	(16.9)
Mood stabilizers	4	(12.5)	2	(6.1)	6	(9.2)
Anxiolytics	1	(3.1)	0	(0)	1	(1.5)
Psychostimulants	6	(18.8)	6	(18.2)	12	(18.5)
Parental diagnoses, n (%)						
Mother with major depressive disorder	17	(53.1)	12	(36.4)	29	(44.6)
Father with major depressive disorder	7	(21.9)	9	(27.3)	16	(24.6)
Mother with bipolar disorder	2	(6.3)	2	(6.1)	4	(6.2)
Father with bipolar disorder	0	(0)	2	(6.1)	2	(3.1)
Both parents with major depressive disorder	3	(9.4)	3	(9.1)	6	(9.2)
1 parent with bipolar disorder	2	(6.3)	5	(15.2)	7	(10.8)
Both parents with bipolar disorder	1	(3.1)	0	(0)	1	(1.5)

Note: FFT = family-focused therapy; MCC = MyCoachConnect mobile application.

scores (examined separately) as predictors of composite aggression scores. Sensitivity analyses adjusted the mixed models to covary mobile app condition (FFT-MCC or FFT-Track) and demographic or clinical variables (eg, sex, age, youths' mood diagnosis, comorbid disorders, and parents' diagnoses), and to examine interactions between hypothesized predictor variables (eg, CBQ scores) and covariates.

Time-series models were used to examine the lagged associations between CBQ/PCM scores of the parent (or teen) and composite aggression scores of the teen, using data from successive 9-week intervals. We estimated concurrent associations and fit a mixed model in which parent or teen CBQ scores from 1 study interval (ie, time t-1) were used to predict teens' composite aggression scores in the

next study interval (time t). Next, we tested a mixed model with composite aggression scores at time t-1 as a predictor of parent or teen CBQ scores at time t. Similar models were conducted to evaluate the associations between parent PCM or teen PCM scores and composite aggression scores in lagged intervals. A final set of mixed models examined the effects of treatment group and time (study visit) on the trajectory of parent/teen CBQ and PCM scores and teens' composite aggression scores.

Power analyses were conducted prior to initiating the trial. For outcomes measured at 4 time points (eg, aggression, CBQ scores) in an estimated 60 study completers, we had 80% power to detect 2-way interactions (eg, treatment group by study visit) corresponding to an effect size of $f^2 = 0.03$, where $f^2 = 0.02$ is the Cohen threshold for a small effect.

RESULTS

Participants

A total of 65 youths and at least 1 parent agreed to participate in the trial and signed assent or consent forms (Figure S1, Consolidated Standards of Reporting Trials [CONSORT] diagram, available online). Youths were on average 15.8 ± 1.6 years of age. Of the 65 youths, 32 were randomly assigned to FFT-MCC and 33 to FFT-Track (Table 1). The majority (n = 53, 76.9%) entered with major depressive disorder or other specified depressive disorder, and 12 (18.5%) with bipolar spectrum (bipolar I, II, or other specified) disorder.

Based on the MINI (*DSM-5*) diagnostic interview, 36 of the 65 primary parents (28 of 38 mothers [73.7%; mean age 49.3 ± 6.8 years] and 8 of 27 fathers [29.6%; mean age 51.1 ± 7.1 years]) had mood disorders. Of the 28 primary parent mothers with mood disorders, 1 had bipolar I disorder and 2 had bipolar II disorder, all with current depressive symptoms; 1 had a current major depressive episode, and 24 had a past history of major depressive episodes. Of 10 primary parent mothers with no history of mood disorders, 2 reported that the youth's father had bipolar I or II disorder (both with current mood symptoms); 2 reported that the father had a current major depressive episode, and 6 reported that the father had past major depressive episodes. Of 8 primary parent fathers with mood disorders, 1 had current major depressive symptoms and 7 had a past history of depressive episodes. Finally, of 19 primary parent fathers with no history of mood disorders, 4 reported that the mother had bipolar I or II disorder (3 in current mood episodes and 1 with past episodes), 5 reported that the mother had current major depressive symptoms, and 10 reported that the mothers had past major depressive episodes (Table 1).

Posttreatment (18-week) assessments were completed with 58 youths, and follow-up (27-week) assessments were completed with 57 youths. Comparisons of 57 participants who completed the study with 8 enrollees who were randomly assigned but left the study early (Figure S1, available online) did not reveal any differences in age, sex, diagnosis, treatment allocation, or baseline MOAS or CALS scores.

Convergent Validity of Family Conflict and Aggression Scores

CBQ total scores as rated by the parent (n = 64) and teen (n = 63) were moderately correlated at baseline ($r[63] = 0.34, p = .006$). Mean parent PCM scores (mean = 5.63 ± 1.94 on scales of 1-10) and mean adolescent PCM scores (mean = 6.33 ± 2.03) were weakly correlated at baseline ($r[63] = 0.26, p = .04$). Parent-rated CBQ and PCM scores were related in the expected positive direction ($r[63] = 0.57, p < .0001$), as were adolescent-rated CBQ and PCM scores ($r[64] = 0.51, p < .0001$).

Youths with depressive spectrum and bipolar spectrum disorders did not differ at baseline on composite aggression scores ($F_{1,61} = 1.17, p = .28$). In univariate analyses, none of the baseline demographic variables (age, sex, ethnicity, race) or clinical variables (comorbid disorders [anxiety or attention-deficit/hyperactivity disorder]), mean Psychiatric Status Ratings of depression or hypo/mania) were associated with composite aggression scores.

Baseline Youth Aggression and Parent Attributes

Mothers and fathers did not differ on baseline CBQ ratings of their dyadic relationship with the teen ($F_{1,61} = 0.01, p = .91$) or on any of the PCM items (for all, $p > .10$). At baseline, mothers rated their offspring as marginally more aggressive than did fathers ($F_{1,61} = 3.73, p = .06$). Offspring of parents with bipolar spectrum disorder did not differ from offspring of parents with major depressive disorder on parent- or adolescent-rated CBQ or PCM scores, or on the offspring's composite aggression scores. In addition, ratings on these scales did not differ by whether the primary parent was or was not diagnosed with a lifetime mood disorder, or whether the primary parent had active mood symptoms or was in remission at the time of study intake.

Baseline Conflict Behavior and Perceived Criticism as Predictors of Youth Aggression Over 6 Months

Parent-rated CBQ scores at baseline were positively related to composite aggression scores in youths across points of follow-up (0, 9, 18, and 27 weeks) ($F_{1,167} = 21.13, p < .0001$). The effect of study visit (time) was significant, indicating an overall drop in youths' aggression scores from baseline to follow-up ($F_{1,167} = 24.40, p < .0001$). Adolescent-rated CBQ scores at baseline were also associated with youths' composite aggression scores at follow-up ($F_{1,169} = 4.99, p = .03$).

FIGURE 1 Parent- and Youth-Rated Family Conflict Behavior and Youths' Composite Aggression Scores Over 27 Weeks (N = 63)
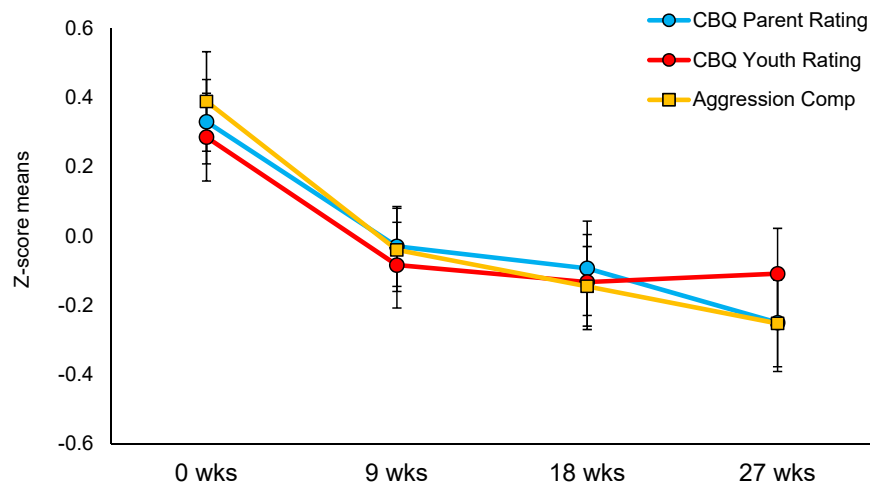
Note: Bars indicate standard errors of the means. CBQ Parent Rating = parent's rating on Conflict Behavior Questionnaire; CBQ Youth Rating = youth's rating on Conflict Behavior Questionnaire; Aggression Comp = composite measure of youth's aggression from the parent-rated Modified Overt Aggression Scale and the Children's Affective Lability Scale, Irritability subscore.

Parent-rated PCM ratings at baseline were associated with youths' aggression scores across points of follow-up ($F_{1,167} = 10.44$, $p = .002$). Teens' average PCM scores, however, were not associated with follow-up aggression scores.

Treatment group (FFT-MCC [skill-oriented app], FFT-Track app) was not associated with changes over the 4 study visits in parent- or youth-rated CBQ or PCM scores or youths' aggression scores. In addition, the associations between baseline parent- or teen-rated family conflict/criticism and teens' aggression scores at follow-up were unchanged when treatment group was included as an independent variable in mixed models.

Concurrent and Lagged Associations Between Reports of Parent/Offspring Conflict, Perceived Criticism, and Youth Aggression

Parents' and youths' CBQ scores, obtained at each study interval, were concurrently associated with composite aggression scores in the same intervals ($F_{1,167} = 49.98$, $p < .0001$; $F_{1,164} = 13.68$, $p = .0003$, respectively) (Figure 1). Parents' PCM scores ($F_{1,168} = 21.92$, $p < .0001$) and youths' PCM scores ($F_{1,164} = 6.49$, $p = .01$) were also related to concurrent aggression scores across timepoints (Figure 2). There were robust effects of time (study visit) on parents' and youths' CBQ scores (parents: $F_{1,167} = 15.80$, $p < .0001$; youths: $F_{1,168} = 7.13$, $p = .008$) and PCM scores (parents: $F_{1,170} = 23.48$, $p < .0001$; youths: $F_{1,168} = 7.41$, $p = .007$), indicating that perceptions of dyadic conflict and levels of criticism decreased over time. These associations remained significant when including treatment group as a covariate.

The cross-lagged analyses indicated that parent CBQ scores in 1 interval (eg, at week 9) predicted youths' composite aggression scores in the next interval (eg, at week 18) ($F_{1,109} = 7.36$, $p = .008$) (Figure 3). The lagged association between composite aggression scores and parents' subsequent CBQ scores was not significant ($F_{1,108} = 0.17$, $p = .68$). However, as indicated in Figure 3, composite aggression scores had temporal precedence over teens' CBQ scores ($F_{1,107} = 8.16$, $p = .005$), whereas teens' CBQ scores in the prior interval (time t–1) did not significantly predict their aggression scores in the next interval (time t) ($F_{1,110} = 3.34$, $p = .07$).

There were no significant lagged associations between parent PCM scores, youth PCM scores, and composite aggression scores in subsequent intervals. None of these results changed when mood diagnosis, age of the adolescent, comorbid disorders, depressive or hypo/mania symptoms, or treatment condition were included as covariates in the lagged models.

DISCUSSION

Within the context of a randomized clinical trial, we examined the cross-sectional and longitudinal associations between parent- and youth-rated dyadic conflict behavior, perceived criticism, and impulsive aggression over 6 months in symptomatic offspring of parents with depression or bipolar disorder. Parent- and youth-ratings of family conflict, as well as parent- and youth-ratings of perceived criticism, were concurrently associated with aggressive behavior in the teen across 4 study intervals. The findings from the time-

FIGURE 2 Parent- and Youth-Rated Perceived Criticism and Youths' Composite Aggression Scores Over 27 Weeks (N = 63)
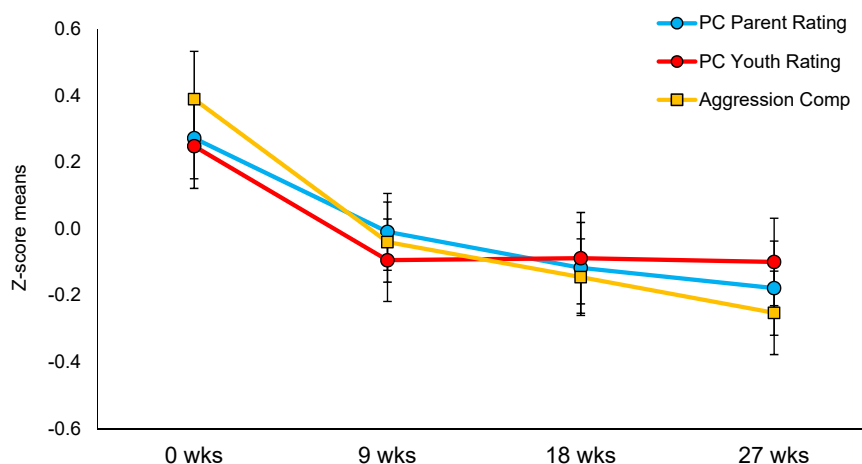
Note: Bars indicate standard errors of the means. PC Parent Rating = primary parent's rating on Perceived Criticism Measure; PC Youth Rating = youth's rating on Perceived Criticism Measure; Aggression Comp = composite measure of youth's aggression from the parent-rated Modified Overt Aggression Scale and the Children's Affective Lability Scale, Irritability subscore.

series analyses indicated that parent-rated dyadic conflict in 1 study interval preceded (and predicted) levels of adolescent composite aggression scores in the next interval, whereas adolescent aggression in 1 interval was not associated with parent-rated conflict in the next. The temporal sequence was reversed for youths: levels of aggression in 1 interval were associated with levels of teen-reported family conflict in the next.

Verbal or physical displays of aggression—often interpreted by others as willfulness or oppositionality—are major reasons why parents seek psychiatric treatment for their child. Yet, youths often perceive family conflict as primarily due to the provocations of the parent or other family members, and their own verbal or physical aggression as legitimate responses to these provocations. Regardless of the direction of causality, recursive cycles of anger and family conflict may contribute to the youth's continued expression of irritability, aggression, and other indicators of mood disturbance. Future displays of youth aggression may, in turn, worsen parents' mood states and lead to further escalation of dyadic conflict and aggression.

Our results support those of other investigations of the bidirectional relationship between family functioning and childhood aggression. In an observational study of family interaction patterns in mothers with mood disorders, mothers and preadolescent offspring were significantly more critical and irritable in interactions with each other when the offspring had a disruptive behavior disorder, compared to mother/offspring pairs in which both members were healthy.[51] In a mother/child interaction task, Conrad and Hammen[52] described a "downward spiral of reciprocal

effects," whereby depressed mothers whose offspring were high in externalizing behavior expressed more negative comments toward the child compared to nondepressed mothers interacting with children with high externalizing behavior.

In a cross-sectional study of adolescents with depression, Sheeber *et al.*[30] observed that adolescents' negative affective responses were contingent on mothers' expressions of negative affect. When mothers engaged in problem-solving behaviors in response to the adolescents' aggressive behavior, the latter was shorter in duration. These findings, alongside our own, point to a place for family intervention in the treatment of aggression in youths with or at risk for mood disorders. Indeed, learning to curtail conflicts that would otherwise become lengthy and destructive are key goals of communication skill training in FFT. In one of our earliest studies of direct interactions in families with a member with bipolar disorder, the behavior that best distinguished low-EE from high-EE families was the caregiver's or patient's ability to limit negative, bidirectional exchanges to 3 or fewer "volleys."[21]

Results from between-group comparisons from this trial[35] revealed that youths in the skill-oriented app condition showed more improvement in psychosocial functioning over 6 months than youths in the mood-tracking app condition, particularly among those diagnosed with bipolar spectrum disorders.[35] In the secondary analyses presented here, youths in both app conditions showed decreases over time in parent- and youth-reported dyadic conflict, perceived criticism, and youths' aggressive behavior. Thus, the emotional climate of family environments and youths'

FIGURE 3 Concurrent and Lagged Associations Between Parent- and Child-Rated Family Conflict Behavior, Perceived Criticism, and Composite Aggression Scores (N = 63)
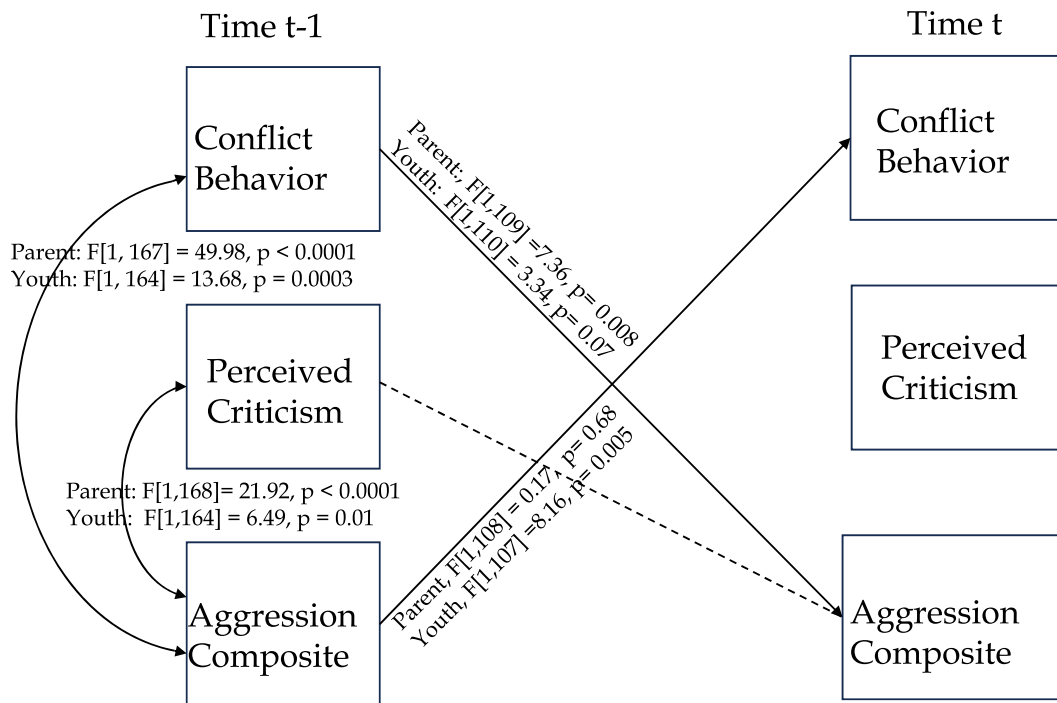
Note: The figure displays the significant univariate relationships between Conflict Behavior Questionnaire scores, Perceived Criticism Measure scores, and composite aggression scores (the latter calculated from the parent-rated Modified Overt Aggression Scale and the Children's Affective Lability Scale, Irritability subscore). Curved arrows indicate relationships between the measures at concurrent intervals (weeks 0, 9, 18, and 27). Straight arrows indicate significant lagged associations between predictor variables measured at interval t-1 (eg, 9 weeks) and outcome variables measured at interval t (eg, 18 weeks), estimated over consecutive intervals. Dotted line indicates the lack of a significant lagged association between parent or youth Perceived Criticism scores and composite aggression scores over consecutive intervals. Not pictured are the autocorrelations between scores on the same construct in successive intervals.

aggressive behavior appeared to improve over the trial period, during which all families received FFT. Many of the communication skill practices in FFT emphasize conflict negotiation, emotional self-regulation, and problem solving regarding recurrent interpersonal conflicts. Parents and youths are encouraged to examine the sequence of events that preceded and followed recent instances of verbal or physical aggression by the youth, including how the parent worded specific requests, how the youth responded to those requests, whether parents followed with critical comments, and how the youth responded. Then, parent/offspring pairs are encouraged to rehearse communication strategies that alter these sequences.

The longitudinal associations between parent- or adolescent-rated family conflict/criticism and youth aggression were unchanged when treatment group (FFT-MCC or FFT-Track) was included as an independent variable in the mixed models. The skill-oriented and tracking apps, however, were not designed to alter aggression in the adolescent. Treatments with greater differential effects on

aggression may require parent training focused on contingency management,[53] motivational interviewing, creation of an anger hierarchy, gradual exposure, or other behavior modification strategies[54,55] that are not a focus of FFT. Nevertheless, our results suggest that understanding the temporal relations among negatively valenced symptoms and behaviors (eg, sequences of parent/offspring conflict leading to youth aggression) is critical to the design of interventions that target these processes.[56]

Several study limitations are acknowledged. The CBQ and PCM questionnaires do not yield the detailed picture of family relationships that is given by instruments such as the Camberwell Family Interview[57] for rating EE, or the displays of negative verbal or nonverbal behavior that emerge from coding family interactions.[58] However, the CBQ and PCM are easier to administer and score in community practice and offer the dual perspectives of parents and youths. Youths in this study were selected in part because their parents reported high levels of criticism and conflict, and because the youths showed evidence of mood instability

(even though aggression was not in itself an eligibility criterion). We cannot be certain that the findings would generalize to families for whom conflict and criticism occur at lower levels, or to children with more extreme displays of verbal or physical aggression. Furthermore, the sample was relatively homogeneous in race (29.2% were persons of color) and ethnicity (27.7% were of Hispanic origin). Future studies should examine whether the observed temporal relations between family processes and youth aggression generalize to more diverse samples.

The question could be raised as to whether the CALS irritability subscale and the MOAS capture the same underlying construct. Items on the CALS irritability subscale indicate sudden outbursts of anger (eg, "suddenly loses his/her temper when you would not expect"), whereas the parent-rated MOAS covers 4 dimensions of aggression (verbal, physical, self-directed, or property destruction). Nonetheless, the CALS irritability and MOAS scales were highly correlated across timepoints, and a principal components analysis indicated that 1 latent variable accounted for the majority of the variance in total scores on the 2 scales. Furthermore, MOAS scores were not correlated with other dimensions of mood instability as measured by the CALS (ie, elevation/activation, anxiety/depression) or with concurrent levels of depression or hypo/mania on the Psychiatric Rating Scale. Thus, it is reasonable to conclude that the 2 instruments were measuring a similar construct.

The measures of irritability and aggression were specific to the adolescent's behavior as reported by 1 biological parent, and the examination of family conflict was limited to a self-report measure of the primary parent/offspring dyad. We did not examine the behavior of the other biological parent, in part because many of the adolescents did not have regular contact with this other parent. However, interparental conflict is a correlate of self-reported aggression in adolescents.[59] In addition, it is unclear whether these same behaviors of youths would occur in peer, school, or other interpersonal contexts.

Although we examined family conflict from both the youth's and the parent's viewpoints, we did not examine youths' reports of their physical or verbal aggression, as has been done in some studies (reviewed in McClellan *et al.*[60]) or how youths would have explained their behavior. Youths may view their verbal aggression as a form of self-preservation in the context of hostile parent/offspring interactions.

In prior studies of youths with bipolar disorder or at familial risk for bipolar disorder, we have observed that adolescents whose parents are rated high in expressed emotion show greater improvements in depressive symptoms in FFT than adolescents with parents rated low in EE.[61] We have also observed that reductions in youth-reported family conflict mediate the effects of FFT compared to briefer psychoeducation on hypo/mania, depression and suicidal ideation over periods of 2 to 4 years.[29,62,63] The present study did not include a non-FFT comparison group or a sample sufficient to test treatment components or family mechanisms underlying change, which limits our ability to attribute changes in aggression or family conflict to the effects of the family intervention. In addition, 58% of the participants (38 of 65) received psychiatric medications during the trial (most frequently antidepressants and/or psychostimulants), which may have influenced the trajectory of aggressive behaviors.[35]

This study adds to the growing body of literature on youths who are at risk for bipolar or recurrent depressive disorders,[19,46,61,64,65] and suggests that parent/offspring conflict and criticism are intertwined with levels of impulsive aggression in vulnerable youths. Aggression is a transdiagnostic factor that has been shown to interfere with pharmacological treatment response and adherence.[1] Interventions that focus on alleviating youths' expression of aggressive impulses, perhaps through emphasizing effective family communication and conflict resolution, may enhance the protective effects of family environments in the onset or progression of mood disorders.

CRediT authorship contribution statement

David J. Miklowitz: Writing – review & editing, Writing – original draft, Validation, Supervision, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Megan Ichinose:** Writing – review & editing, Investigation, Data curation, Conceptualization. **Marc Weintraub:** Writing – review & editing, Methodology, Investigation, Data curation. **John A. Merranko:** Writing – review & editing, Methodology, Formal analysis, Conceptualization. **Manpreet K. Singh:** Writing – review & editing, Methodology, Formal analysis, Conceptualization.

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