Research Article

IRRITABILITY IN CHILD AND ADOLESCENT ANXIETY DISORDERS

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Background: *Our objective was to compare self- and parent-reported irritability in youths with anxiety disorders, healthy youths, and those with mood disorders characterized by irritability. Irritability is a common but relatively understudied psychiatric symptom in child and adolescent anxiety disorders. In anxious youths, little is known about the severity of irritability, its impact on functioning, or the effect of informant source on reports of irritability.* **Methods:** *We compared parent- and self-report forms of the Affective Reactivity Index (ARI), a validated measure of irritability, in youths ages 8–17 years with no psychopathology (healthy comparison, HC; n = 38), anxiety disorders (ANX; n = 42), bipolar disorder (BD; n = 35), or severe mood dysregulation (SMD; n = 61; a phenotype characterized by chronic, severely impairing irritability).* **Results:** *Irritability was significantly higher in ANX than HC youths by both parent and self-report (partial η^2 = 0.24 and 0.22, respectively, P's < 0.001). Informant effects differed among ANX, BD, and SMD. Overall, parent-reported irritability was higher in BD with comorbid anxiety disorders and SMD with or without comorbid anxiety disorders than ANX (P's < 0.007), but self-reported irritability was not significantly different among the three patient groups.* **Discussion:** *By both parent and self-report, youths with anxiety disorders exhibit significantly more irritability and associated impairment than healthy subjects. Self-reported irritability in youths with anxiety disorders is comparable to that observed in youths with severe mood disorders, although parental reports of irritability differ among the disorders. Future research should examine the pathophysiology of anxiety-associated irritability, as well as its prognostic and treatment implications. Depression and Anxiety 31:566–573, 2014.* © 2013 Wiley Periodicals, Inc.

Key words: *irritable mood; anxiety disorders; trait anger*

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INTRODUCTION

Irritability is defined as a tendency toward negative affective states, usually anger, coupled with a propensity to exhibit temper outbursts.[1–3] It is a symptom or associated feature of several anxiety disorders in DSM-IV.[4,5] Studies suggest that clinically significant irritability is

endorsed commonly in youths with anxiety disorders, particularly for generalized anxiety disorder, where irritability is a criterion for the condition.[6–9] For example, in the largest of these, 65% of 650 youths presenting for treatment with any DSM-IV anxiety disorder were judged to have clinically significant irritability.[6] These studies assessed the presence or absence of irritability in child and adolescent anxiety disorders using a single item from an omnibus measure of anxiety symptoms, the Anxiety Disorders Interview Schedule for Children and Parents.[10] Consequently, though these data suggest that irritability is often endorsed in treatment-seeking anxious youths, remarkably little else is known about this symptom through systematic research.

Two properties of irritability in anxious youths are relevant to both diagnosis and treatment planning: its severity and its impact on functioning. Therefore, as a first step, it is important to compare the degree of irritability and associated impairment in youths with anxiety disorders to those without psychopathology (healthy comparison group; HC); to our knowledge, no prior work documents this comparison. In addition, because multiple informants should be considered in the assessment of child psychopathology,[11] it is important to ascertain whether informant source affects reports of irritability in the context of anxiety or other disorders. Here, we address these questions by (1) comparing parent and self-reports of irritability and associated impairment among youths with anxiety versus healthy subjects, and (2) comparing severity of irritability as well as informant effects in youths with anxiety versus those with severe mood disorders characterized by irritability, i.e., bipolar disorder (BD) and severe mood dysregulation (SMD). SMD is not a DSM-IV defined disorder but is a psychiatric syndrome in children defined for research purposes and characterized by severe, impairing, nonepisodic irritability.[12, 13]

In addition to the few studies of irritability in treatment-seeking anxious children noted above, several other lines of evidence suggest links between irritability and child and adolescent anxiety disorders. First, a limited epidemiological literature links irritability to youth anxiety in the general population.[14, 15] Second, adults with anxiety disorders, who typically also manifest anxiety as children,[16] exhibit more irritability than healthy comparison subjects.[2] Finally, high levels of irritability during childhood predict elevated risk for anxiety and depressive disorders in adulthood.[17, 18]

Thus, we used the Affective Reactivity Index (ARI) to measure the severity of irritability and its associated impairment in youths with anxiety disorders because it is a validated, dimensional measure of irritability and contains an item that assesses irritability-associated impairment.[3] First, we compared levels of irritability and its associated impairment in treatment-seeking youths with anxiety disorders versus healthy subjects. In a secondary analysis, we compared irritability in youths with anxiety disorders to irritability in youths with SMD or BD. Given the controversy about the diagnosis of BD in irritable children,[12] several studies on irritability

in clinical samples compare youths with SMD to those with BD. In the present study, both groups serve as benchmarks of clinically significant irritability. Youths with SMD are selected for clinically significant, impairing irritability.[13] Recent work has shown that they have highest levels of ARI-measured irritability relative to several clinical and nonclinical groups.[3] While those with BD are not selected for chronic irritability, prior work has shown they also have abnormally high levels of ARI-measured irritability,[3] which is consistent with clinical observations of abnormal irritability in child and adolescent BD.[19] Furthermore, when assessing irritability in clinical populations, clinicians, and researchers should consider both parent and self-report, because parent and self-report of behavioral and emotional symptoms often differ in both general and clinical populations.[20] We hypothesized that we would find higher levels of parent- or self-reported irritability and more irritability-associated impairment in patients with anxiety disorders than in healthy controls. Consistent with this hypothesis, we also expected to find an association between anxiety symptom severity and irritability. In an exploratory, secondary analysis, we tested for differing levels of both parent and self-reported irritability and its associated impairment among patients with anxiety disorders, SMD, and BD.

METHOD

PARTICIPANTS

The primary analyses included youths with anxiety disorders (ANX; $n = 42$; ages 8–17 years) and those without psychopathology (healthy comparison group; HC; $n = 38$; ages 8–17 years; Table 1). ANX and HC participants were self or clinician referred and recruited through advertisement primarily from the Washington, D.C. metropolitan area. Data from these groups were gathered between 2010 and 2012. Psychiatric diagnoses were made by master's- or doctoral-level clinicians trained to reliability ($\kappa > 0.7$) using the Schedule for Affective Disorders and Schizophrenia for School-Age Children-Present and Lifetime Version (KSADS-PL)[21] and confirmed with a senior psychiatrist. Those in the anxiety disorder group met criteria for generalized anxiety disorder (GAD), separation anxiety disorder (SAD), and/or social phobia (SoPh). Other inclusion criteria for patients were clinically important anxiety on the Pediatric Anxiety Rating Scale (score≥10),[22] impairment on the Children's Global Assessment Scale (score<60),[23] and desire for weekly treatment. To exclude mood disorder-related irritability, patients with a history of bipolar I, bipolar II, or major depressive disorder were excluded. Other exclusion criteria for anxiety patients were current Tourette's syndrome, obsessive-compulsive disorder, posttraumatic stress disorder, conduct disorder, or suicidal ideation. These exclusion criteria related to the main goal of the anxiety-disorder research program, which examines pathophysiology. Pathophysiology of these excluded conditions is thought to differ from that in the included anxiety disorders. For similar reasons, participants were excluded for lifetime history of exposure to extreme trauma, psychosis, and autism spectrum disorder. Healthy volunteers were included if they were free of any KSADS-PL diagnoses. Exclusion criteria for both patients and healthy volunteers were history of severe trauma, chronic or active medical condition, psychoactive substance use within last 2 months, history of head trauma, current psychotropic medication use, and

TABLE 1. Participant characteristics

	HC[a] $n = 38$	ANX $n = 42$	SMD $n = 61$	BD $n = 35$	Test statistic	P
Sex						
% female	39.5%	57.1%	36.1%	48.6%	$\chi^2 = 5.10$	0.165
Age (years)						
Mean (SD)	13.5 (2.3)	10.9 (2.4)	12.6 (2.3)	15.2 (2.3)	$F(3,172) = 23.1$	<0.001[b]
IQ						
Mean (SD)	116.5 (12.3)	109.3 (13.9)	106.9 (13.8)	103.7 (15.6)	$F(3,172) = 5.8$	0.001[c]
SES[d]						
Mean (SD)	38.2 (17.5)	34.2 (13.2)	40.8 (19.8)	43.6 (19.9)	$F(3,141) = 1.6$	0.200
Race/Ethnicity[e] n (%)					χ^2	P
Hispanic/Latino	0	6 (14%)	1 (2%)	1 (3%)	12.2	0.007
Asian	0	2 (5%)	4 (7%)	0	4.8	0.188
Black/African American	3 (8%)	3 (7%)	0	2 (6%)	4.5	0.212
White	31 (82%)	25 (60%)	49 (83%)	31 (89%)	11.9	0.008
Other	4 (11%)	6 (14%)	5 (9%)	1 (3%)	3.1	0.376
KSADS diagnoses n (%)					χ^2	P
Any anxiety		n/a	30 (49%)	26 (74%)	5.8	0.016[f]
SAD		20 (48%)	14 (23%)	12 (34%)	6.8	0.033
GAD		29 (69%)	22 (36%)	21 (60%)	12.0	0.002
SoPh		24 (57%)	13 (21%)	10 (29%)	14.8	0.001
ADHD		4 (10%)	51 (84%)	29 (83%)	66.8	<0.001
ODD		1 (2%)	44 (72%)	13 (37%)	50.1	<0.001

[a]HC, healthy control; ANX, anxiety disorders; SMD, severe mood dysregulation; BD, bipolar disorder.

[b]Post hoc comparisons showed that ANX<SMD<BD, ANX<HC = BD, and HC = SMD.

[c]Post hoc comparisons showed that BD = SMD<HC and ANX = All.

[d]SES refers to socioeconomic status measured by the Hollingshead 2 factor index.[31] SES data were not available for 31 participants.

[e]Self-identified race/ethnicity categories and labels are consistent with current U.S. federal guidelines.[32] Hispanic/Latino is defined as an ethnicity that may be of any race, others are divided by racial categories presented. No participant identified as Native Hawaiian/Other Pacific Islander or American Indian/Alaskan Native. "Other" refers to participants who identified as two or more races or other. Race/ethnicity data were not available for two individuals in the SMD group.

[f]Proportions of "any anxiety" were tested between the BD and SMD groups only, all other KSADS diagnoses were tested between ANX, BD, and SMD groups.

[g]High rates of ADHD and ODD are expected in the SMD and BD groups because of their characteristic irritability.

FSIQ < 70. Intelligence was measured using the Wechsler Abbreviated Scale of Intelligence (WASI).[24]

ARI data from 61 youths with severe mood dysregulation (SMD) and 35 youths with bipolar disorder (BD) were included in the secondary analysis, along with data from the 42 anxious youths. Ages ranged from 8–17 years in all groups. The selection process, participant description, and ARI data for youths with BD and SMD were reported previously.[3] Briefly, self or clinician referred SMD and BD participants were recruited nationally via advertisement. Their travel and lodging was arranged for them. Reliable ($\kappa > 0.9$) masters or doctoral level clinicians administered a KSADS-PL that was modified to detect SMD, and final diagnoses were assigned in a consensus conference chaired by a senior psychiatrist. Data used in this study from the SMD and BD groups were gathered between 2010 and 2012.

BD patients met full DSM-IV criteria[4] for BD I or II, including a history of at least one episode lasting ≥4 days for hypomania, ≥7 days for mania, and including euphoria and/or grandiosity.[13] SMD patients had abnormal baseline mood (anger or sadness), hyper reactivity to negative emotional stimuli (e.g., explosive, developmentally inappropriate outbursts at least 3 times/week), and hyperarousal (≥3 of insomnia, intrusiveness, pressured speech, flight of ideas/racing thoughts, distractibility, psychomotor agitation).[13] SMD symptoms must begin before age 12, occur for ≥1 year without remission exceeding 2 months, and cause functional impairment in 2 settings. Patients with a history of euphoric mood or distinct (hypo)manic episodes last-

ing >1 day, or 6-month history of major depressive disorder, were excluded from the SMD group. The exclusion criteria for the SMD and BD groups were the same as for the anxiety disorders group except that the following were not exclusionary for SMD or BD: current psychotropic medication use, suicidal ideation, Tourette's disorder, and obsessive-compulsive disorder.

The study was approved by the NIMH Institutional Review Board. Written informed consent was obtained from parents and assent from children. Families were paid for participation.

MEASURES

The Affective Reactivity Index (ARI) is a parent- and self-rated measure validated for youths ages 6–17 years. It has excellent internal consistencies in several clinical and nonclinical groups (α's>0.88) and is adequately described by a one-factor solution in confirmatory factor analyses.[3] It contains six items specific for irritability, such as whether the youth is "is easily annoyed by others," "gets angry frequently," or "often loses his/her temper."[3] Items are rated on a three-level response scale ("not true," "somewhat true," and "certainly true," scored 0, 1, and 2, respectively). The total score is the sum of these six items, resulting in a possible score of 0–12, which we treated as a continuous measure. The ARI also contains one, general impairment item rated on the same three-level scale. The item asks the respondent whether irritability has caused them problems overall. We treated responses on this item as an ordinal measure of impairment due to irritability

and therefore used nonparametric tests (Mann–Whitney *U*, Kruskal–Wallis, and Spearman tests) whenever involving impairment. Respondents are prompted to consider their feelings and behavior for the prior 6 months. Parent and child forms are identical except for the substitution of "you" for "your child" in the child versus the parent form.

The Screen for Child Anxiety Related Disorders (SCARED) is a parent- and self-rated measure validated for those 8 and older.[25] It contains 41 items probing symptoms of anxiety disorders for 3 months prior to assessment. The items are rated on a three-level scale analogous to the ARI. We used total scores, which range from 0–82, as a continuous measure of anxiety disorder symptom severity.
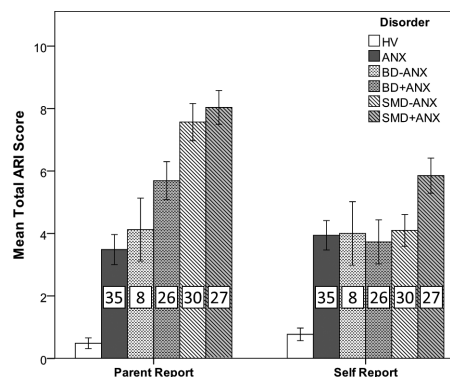
ANALYSES

All analyses were performed using SPSS, version 21 (IBM, Armonk, NY). Our primary analysis tested differences between self- and parent-rated ARI total scores in the HC and ANX groups. The secondary analysis tested differences in irritability among mental disorders (ANX, SMD, and BD) and by informant. Age and IQ may influence both the degree of irritability and its reporting. Since these variables differed among groups (Table 1), they were entered as covariates in all analyses, except in the nonparametric tests of impairment. Another concern is that sex may influence reporting of irritability. Because sex ratios did not differ between the groups, we report here analyses without sex as a covariate. However, since ANX had the highest proportion of females, additional analyses, not presented, confirmed that the addition of sex as a covariate did not change the findings presented here. Further, there were differences in self-identification as White or Hispanic/Latino in the ANX group relative to the other groups (Table 1). However, within the anxiety group, there were no differences in parent- or self-report total ARI score or impairment by White or Hispanic/Latino identification using t or Mann–Whitney *U* tests (all *P*'s > 0.19). Effect sizes were measured using partial η^2. In behavioural science, η^2 of 0.01, 0.06, and 0.14 may be considered the boundaries for small, medium, and large effects.[26] Probability values were adjusted with Bonferroni correction for all tests involving multiple comparisons.

For the primary analysis, we tested whether ARI measures of irritability differed between patients with anxiety disorders and healthy subjects. In two analyses, we used univariate ANCOVA, in which the dependent variable was either total parent- or self-report ARI score and the predicting factor had two levels: HC and ANX. ANCOVA results were adjusted for unequal variance with the Brown–Forsythe method because the HC group total ARI score distributions had narrow dispersions and floor effects, with half of both parent- and self-report ARIs totaling zero. The corrected ANCOVA accommodated the distribution of the HC group while allowing us to covary for age and IQ. Within the ANX group, we used Pearson's correlations to assess associations between the severity of anxiety symptoms (SCARED scores) and irritability (total ARI scores).

In three separate regression analyses, each of which included available data from the ANX and HC groups, we tested the relationship between specific anxiety disorders (i.e., SAD, GAD, and SoPh) and parent-reported irritability, self-reported irritability, or the mean of parent- and self-reported irritability. Mean of parent- and self-reported irritability was used to approximate the clinical practice of considering both youth and parent report when determining the presence of psychiatric symptoms.[11] These three regression models each included the same independent variables: GAD (present or absent), SAD (present or absent), SoPh (present or absent), age (years), and intelligence (IQ). The three models differed by their dependent variable, which was self-reported total ARI score, parent-reported total ARI score, or the mean of parent and self-reported total ARI score.

In addition, we compared impairment due to irritability with a Mann–Whitney *U* test. In the ANX group, we used Pearson's cor-

Figure 1. Average total ARI scores by reporter for the diagnostic groupings used in the analyses. Error bars represent the standard error of the mean. A "±ANX" denotes the presence of a comorbid anxiety disorder that defines the ANX group, SAD, SoPH, or GAD. For the analysis of irritability in mental disorders (secondary analysis), the numbers in each bar represent the sample size for each group in the which both parent and self-report are present for each individual.

relations to assess associations between parent- and self-reported total ARI and SCARED scores. Within the ANX group, we used Spearman's correlations to assess associations between anxiety symptom severity (SCARED scores) and impairment due to irritability (responses to the ARI impairment item).

For the secondary analysis, we used a repeated measures ANCOVA to compare irritability in ANX, SMD, and BD, focusing on the effects of mental disorder and informant. This approach allows us to test the effects of informant on irritability and is valid because each member of the parent–child dyad reports on the child's behavior.[27] The dependent variable was total ARI score, the within subjects factor was informant with two levels, parent- and self-report. We also examined the impact of comorbid anxiety on irritability in the context of SMD and BD. To do so, we divided the SMD and BD groups by the presence or absence of anxiety disorder. Therefore, the between subjects factor, disorder, had five levels: ANX, SMD with comorbid anxiety disorders (SAD, GAD, or SoPh; SMD+ANX), SMD without comorbid anxiety disorders (SMD-ANX), BD without comorbid ANX (BD-ANX), and BD with comorbid ANX (BD+ANX). Thirty-five of 42 in the ANX group, 57 of 61 in the SMD group, and 34 of 35 in the BD group had both parent- and self-report forms available and were included in this analysis. The seven excluded individuals in the ANX group did not differ from the others in total ARI scores, age, sex, or intelligence. Finally, we used Kruskall–Wallis and post hoc Mann–Whitney *U* tests to compare the five groups (i.e., ANX, SMD±ANX, and BD±ANX) on impairment due to irritability.

RESULTS

IRRITABILITY IN YOUTHS WITH ANXIETY DISORDERS VERSUS HEALTHY SUBJECTS

Parent report of irritability was greater for ANX than HC (mean (SD) total ARI score: ANX = 3.4 (2.9), HC = 0.49 (1.0); $F(1,52.4) = 14.2$, $P < 0.001$; Fig. 1). Likewise, self-report of irritability was greater for ANX than for HC (mean (SD) total ARI score: ANX = 3.9 (2.8), HC = 0.89 (1.4); $F(1,64.3) = 14.6$, $P < 0.001$; Fig. 1). The magnitude of the effect for the HC-ANX

TABLE 2. The relationship between specific anxiety disorders and irritability

Model fits				
Model[a]	n	Adjusted R^2	F	P
Self-report	79	0.18	3.89	0.002
Parent-Report	71	0.30	6.05	<0.001
Mean	70	0.39	8.46	<0.001

Parameter estimates[b]				
Disorder[a]	Model	b	SE	P
GAD	Self-report	1.72	0.70	0.017
	Parent-report	0.96	0.66	0.149
	Mean	1.39	0.53	0.011
SoPh	Self-report	0.80	0.67	0.237
	Parent-report	2.14	0.63	0.001
	Mean	1.40	0.51	0.008
SAD	Self-report	0.24	0.80	0.765
	Parent-report	1.51	0.76	0.051
	Mean	1.31	0.61	0.034

[a]All regression models include the independent variables generalized anxiety disorder (GAD), Social phobia (SoPh), and separation anxiety disorder (SAD), age and IQ. Age and IQ were not significant predictors in any model. Models differ by their dependent variable: self-report total ARI score, parent-report total ARI score, and average of parent and self-report total ARI score.

[b]Since disorders are entered into the model as "present or absent," parameter estimates (b) may be interpreted as the average increase in total ARI score associated with that disorder.

comparison was similarly large for both parent and self-report (partial $\eta^2 = 0.24$ and 0.22, respectively). In regression analyses including all three diagnoses (Table 2), GAD but neither SoPH nor SAD predicted self-reported irritability ($b = 1.72$, $P = 0.017$) while SoPh and SAD but not GAD predicted parent-reported irritability (SoPh: $b = 2.14$, $P = 0.001$ and SAD: $b = 1.51$, $P = 0.051$). All three diagnoses predicted the mean of parent- and self-reported irritability (GAD: $b = 1.39$, $P = 0.011$; SoPh: $b = 1.40$, $P = 0.008$; SAD: $b = 1.31$, $P = 0.034$).

In the HC group, all 35 parents and 35 of 38 youths rated the item asking whether irritability causes problems as "not true." However, in the ANX group, 18 of 36 parents and 19 of 41 youths rated this item as "somewhat true" or "certainly true." These reporting patterns differ between the HC and ANX groups for parent-reported impairment ($U = 315$, $P < 0.001$) and self-reported impairment ($U = 469$, $P < 0.001$). Within the ANX group, mean ARI score was associated with the level of reported impairment. For parent report, mean total ARI significantly increases by parent impairment rating: 1.7 for "not true," 4.3 for "somewhat true," and 7.0 for "certainly true" ($F(2,33) = 13.9$, $P < 0.001$). For self-report, there is a similar pattern: 2.5 for "not true," 5.0 for "somewhat true," and 6.3 for "certainly true" ($F(2,38) = 9.0$, $P < 0.001$).

In patients with anxiety disorders, there was a significant correlation between self-report ARI and self-report SCARED total scores ($r = 0.32$, $P = 0.045$), but not between parent reports of these measures ($r = 0.13$, $P = 0.45$). There was a significant correlation between self-reported impairment due to irritability and self-report SCARED total scores ($\rho = 0.36$, $P = 0.021$), but not between parent reports of these measures ($\rho = 0.15$, $P = 0.37$).

IRRITABILITY IN EMOTIONAL DISORDERS: EFFECT OF DISORDER AND INFORMANT

In predicting ARI score, there was an interaction between informant (i.e., parent or self-report), and disorder ($F(4,119) = 5.54$, $P \leq 0.001$, partial $\eta^2 = 0.157$; Fig. 1). This interaction was driven by lower parent report of irritability in the ANX group than in the BD+ANX and SMD±ANX groups (P's ≤ 0.002), while self-report of irritability did not differ among the five diagnostic groups. Considering this interaction another way, parent versus self-report differed in the BD+ANX and SMD±ANX groups (P's ≤ 0.007, with parent report being higher than self-report) but not in the BD-ANX or ANX groups. Within the BD or SMD groups, neither parent- nor self-reported irritability differed between those with comorbid anxiety and those without comorbid anxiety disorders (P's ≥ 0.237, uncorrected for multiple comparisons to facilitate the detection of a difference).

There was also a main effect of disorder ($F(4,119) = 8.99$, $P < 0.001$, partial $\eta^2 = 0.232$; Fig. 1), with higher scores in the SMD±ANX groups than in the ANX group (P's < 0.001). The main effect of informant was nonsignificant ($P = 0.387$; partial $\eta^2 = 0.006$).

Impairment due to irritability differed among ANX, BD±ANX, and SMD±ANX by both parent report (Kruskal–Wallis $\chi^2 = 40.06$, $P < 0.001$) and self-report (Kruskal–Wallis $\chi^2 = 9.61$, $P = 0.048$). Parent-reported impairment was lower in ANX than in SMD±ANX, and lower in ANX than in BD+ANX (P's < 0.004). Self-reported impairment was rated lower in ANX than SMD+ANX ($P = 0.032$).

DISCUSSION

We compared parent- and self-reported irritability and its associated impairment in treatment-seeking youths with anxiety disorders, first to healthy subjects and then to youths with severe mood disorders characterized by irritability. We expected to find higher levels of irritability and its associated impairment in those with anxiety disorders relative to healthy subjects, and to find different patterns of parent and self-reported irritability between anxiety and mood disorders. Our results support both of these hypotheses. Relative to youths without psychopathology, both parent and self-report of irritability was high for youths with anxiety disorders. However, relative to their parents' ratings, youths with severe mood disorders rated their own irritability lower, whereas youths with anxiety disorders and their parents did not differ in their assessment of the child's irritability.

Our finding of markedly greater irritability in youths with anxiety disorders relative to healthy youths is consistent with the limited available data from epidemiologic, adult psychopathological, and personality studies. Clinical researchers have observed that clinically significant irritability is commonly present in child and adolescent anxiety disorders.[6–9] We confirmed this observation with a valid measure of irritability, the ARI, applied independently of diagnostic assessment of anxiety disorder. The degree of ARI-measured irritability in youths with anxiety disorders is likely clinically significant, given its large effect size versus healthy youths, its association with impairment, and its similarity to the degree of irritability in mood disorders characterized by irritability. Given the correlations that we observed between ARI and SCARED scores, highly anxious youths may be particularly likely to exhibit irritability. Clearly, clinicians should determine whether youths with anxiety disorders are experiencing impairing irritability. Conversely, to the extent that irritability is frequently a presenting complaint for youths with anxiety disorders, clinicians and researchers may need to assess irritable youths for the presence of anxiety disorders.

Concerning treatment planning, irritability may be an important target symptom for both pharmacologic and psychosocial intervention, as about half of anxious youths and their parents identified irritability as a problematic symptom. Moreover, a number of anxious individuals had irritability ratings that were as high as irritability ratings in the SMD group, a group defined by clinically significant and impairing irritability. Of note, serotonergic antidepressants are often indicated for the treatment of pediatric anxiety, but such treatment may be withheld if the child is misdiagnosed as having bipolar disorder on the basis of severe irritability, even in the absence of manic episodes.[12] Therefore, careful diagnostic assessment is essential in this setting.

We found that GAD, SoPh, and SAD were each associated with increased self- or parent-reported irritability and that all three diagnoses were associated with the combined report of irritability from the two informants. When both parent and self-report are considered, the association of similar levels of irritability with all three anxiety disorders suggests that irritability is not uniquely associated with any one of them. This finding is consistent with a recent large study ($n = 650$) that found that the presence of clinically significant irritability is (1) prevalent in 65% of youths who have at least one DSM-IV anxiety disorder and (2) has a low specificity (0.49) for GAD relative to other anxiety disorders.[6] Thus, evidence does not suggest that, among child and adolescent anxiety disorders, GAD is uniquely associated with irritability.

By parent report only, irritability was greater in both groups with mood disorders than in youths with anxiety disorders. Those with SMD were selected based on parent reports of irritability, so high parent-reported ARI scores are expected in this group. However, there was no specific selection for irritability in bipolar youths, who were screened instead for a history of discrete manic episodes; nonetheless, parent report of irritability was higher in the group with bipolar and comorbid anxiety disorders than in the group with anxiety disorders only.

Despite these differences in parent-reported irritability, mean self-reported irritability was similar among patients with anxiety or mood disorders. That is, the informant effect of higher parent- than self-reported irritability was present in SMD patients, with or without comorbid anxiety, and in BD patients with comorbid anxiety, but not in patients with anxiety disorders alone. Speculatively, these data may reflect impairments youths with SMD and BD have in their ability to label emotions. Indeed, children with SMD and medicated BD have deficits labeling emotional prosody,[28] and youths with SMD or BD are more impaired in face-emotion labeling than both healthy subjects and those with anxiety disorders.[29] It is possible that the deficit that youths with SMD exhibit in labeling the emotions of others may extend to self-monitoring, and therefore self-reporting, of mood. However, this suggestion remains speculative because we did not assess face-emotion labeling ability in the subjects in this study. It is also possible that the higher mean parent than self-report of irritability in SMD and BD but not in ANX is due to between group differences in parental mood, personality, or other characteristics. However, it is important to note that the inclusion criteria for SMD require the presence of irritability outside the home, as documented by collateral information such as school records of accommodations, disciplinary action, etc.

This study has some pertinent limitations. First, we are limited by the use of parent and self-report to measure irritability. There are a number of characteristics of parents, youths, and symptoms themselves that may influence the report of any symptom in pediatric anxiety disorders.[11, 30] For example, social desirability bias may result in under-reporting by both parents and youths. This might be most salient in the case of anxious youths, who are acutely aware of others' evaluations of them.[11] More negative affect in parents of youths with anxiety disorders relative to other groups might affect their ratings of their children's irritability.[11] Parent and self-reports of irritability may be related to other traits, such as neuroticism and negative affectivity, that we did not measure in our patient groups.[1] While we cannot account for such sources of reporter bias in our sample, our results are consistent with the prior literature.

Second, we excluded subjects with a history of major depressive disorder from the anxiety disorders group. In fact, no depressive disorders of any sort were present in the anxiety disorders group, with the exception of one participant who had an adjustment disorder with depressed mood. Therefore, we could not meaningfully examine associations between depressive symptoms and irritability in subjects with anxiety disorders; future research should focus on this. Third, our inability to detect differences in comparisons involving the patients

with bipolar disorder but without anxiety disorders may be due to small sample size ($n = 8$). Fourth, in analyses that included the HC group as well as affected youth, the distribution of ARI scores in the HC group did not allow us to test for an interaction between informant and the presence of an anxiety disorder. Fifth, the impairment measure was limited to a single item on the ARI, coadministered with the irritability items. As such, the measure of impairment was not specific to any domain. Thus, the impairment findings require replication, preferably with an independent, more comprehensive measure. Finally, the ARI is simple and brief and not designed as an in-depth assessment of the phenomenology of irritability.

In summary, we found high levels of irritability and its associated impairment in child and adolescent anxiety disorders, reported by both parents and youths themselves. Irritability between anxiety and mood disorders differed by parent report but not by self-report. Future research should focus on the clinical significance of irritability within anxiety disorders, especially as a predictor of course and outcomes.

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