ORGINAL ARTICLE

Social Anxiety Disorder and the Risk of Depression

A Prospective Community Study of Adolescents and Young Adults

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Background: Social anxiety disorder (SAD) (also known as "social phobia") is frequently comorbid with major depression, and in such cases, almost always precedes it. This has led to interest in SAD as a possible modifier of the risk and/or course of mood disorders.

Methods: Data come from a prospective, longitudinal epidemiologic study of adolescents and young adults (aged 14-24 years) in Munich, Germany. Respondent diagnoses (N=2548) at baseline and follow-up (34-50 months later) are considered. The influence of SAD at baseline on the risk, course, and characteristics of depressive disorders (ie, major depression or dysthymia) at follow-up is examined.

Results: The baseline prevalence of SAD was 7.2% (95% confidence interval [CI], 6.1%-8.4%). Social anxiety disorder in nondepressed persons at baseline was associated with an increased likelihood (odds ratio [OR]=3.5; 95% CI, 2.0-6.0) of depressive disorder onset during the follow-up period. Furthermore, comorbid SAD and depressive disorder at baseline was associated with a worse prognosis (compared with depressive disorder without comorbid SAD at baseline). This is exemplified by the greater likelihood of depressive disorder persistence or recurrence (OR=2.3; 95% CI, 1.2-4.6) and attempted suicide (OR=6.1; 95% CI, 1.2-32.2).

Conclusions: Social anxiety disorder during adolescence or young adulthood is an important predictor of subsequent depressive disorders. Moreover, the presence of comorbid SAD in adolescents who are already depressed is associated with a more malignant course and character of subsequent depressive illness. These findings may inform targeted intervention efforts.

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SOCIAL ANXIETY disorder (SAD) (also known as "social phobia") is a prevalent disorder with its onset almost universally in childhood or adolescence.[1-3] Recent estimates indicate that between 4% and 8% of adults in the general population suffer from SAD in a given year, with even higher rates when lifetime prevalence is considered.[4,5] In a community study of adolescents and young adults aged 14 to 24 years, from which the current report is derived, we found a lifetime prevalence of *DSM-IV* SAD of 9.5% in females and 4.9% in males.[4,6,7]

Another characteristic feature of the longitudinal course of SAD, in addition to its early onset, is its frequent co-occurrence with depressive illness.[6-12] Social anxiety disorder is reported to be the most commonly occurring comorbid anxiety disorder among patients with depressive disorders.[13] Furthermore, when comorbidity does occur, SAD almost always starts first, often many years prior to the onset of depression.[14,15] This consistent finding has spurred interest in the study of SAD as a possible risk factor for major depression.

A possible link between social anxiety and earlier onset of major depression has been reported in several studies.[16-19] In a longitudinal study, anxiety disorders in early adolescence predicted clinically significant depressive and anxiety disorders (especially SAD) in early adulthood.[20] Furthermore, the association between early-onset (eg, prepubertal) anxiety and depression in young adulthood is evident when looking at family patterns of transmission in depressive high-risk families.[21,22] These observations have sparked interest in the possibility that early identification of and intervention with socially anxious children or adolescents might reduce their risk for depressive disorders in later life.[6,19]

In this report, we examined data from the Early Developmental Stages of Psychopathology (EDSP) Study,[23] focusing on the longitudinal relationship between SAD and depressive disorders. We hypothesized that SAD at baseline would predict onset and severity of subsequent depressive disorders.

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SUBJECTS AND METHODS

SAMPLE

Data were collected as part of the EDSP study. The EDSP is a prospective longitudinal study designed to collect data on the prevalence, risk factors, comorbidity, and course of mental and substance use disorders in a representative sample, which consisted of 3021 subjects aged 14 to 24 years at baseline. The study consists of a baseline (T0) survey, 2 follow-up surveys (T1 and T2), and a family history component.

The baseline sample was drawn in 1994 from government registries in metropolitan Munich, Germany, of registrants expected to be aged 14 to 24 years at the time of the baseline interview in 1995. Because the study was designed as a longitudinal panel with special emphasis on early developmental stages of psychopathology, 14- to 15-year-old individuals were sampled at twice the probability of people aged 16 to 21 years, and 22- to 24-year-old people were sampled at half the probability of the 16- to 21-year-old people.

Individuals were contacted first by letter, and then by telephone to arrange a meeting. Most interviews took place in the respondents' homes or, in some instances, at another location preferred by the respondent. Approximately one third of the sample received a financial incentive (US $10-$20) to participate. Participants provided informed consent; parental consent was provided for respondents aged 18 years and younger.

The demographic distribution of the sampled population and the respondents has been reported elsewhere.[23,24] Briefly, among the sampled subjects, a total of 3021 interviews were completed, resulting in a response rate of 70.8%. At baseline, refusal to participate in the survey (18.2%) was by far the most frequent reason for nonresponse, followed by a reported lack of time (3.3%), failure to contact anyone in the identified household (3.1%), and failure to contact the sampled individual in the household (3.0%).

The first follow-up survey was conducted only for subjects aged 14 to 17 years at baseline, whereas the second follow-up survey was conducted for all subjects. At the first follow-up survey 14 to 25 months after baseline (mean interval, 20 months; SD, 3 months), a total of 1228 interviews were completed, resulting in a response rate of 88%. From the 3021 subjects of the baseline survey, a total of 2548 interviews were completed at the second follow-up survey 34 to 50 months after baseline (mean duration, 42 months; SD, 2 months), resulting in a response rate of 84%. A more detailed description of the study is presented elsewhere.[24]

For those probands aged 14 to 17 years at baseline, the follow-up status is assessed from the aggregation of information obtained from the first and second follow-up interviews. For the probands older than 17 years at baseline, the follow-up status is assessed from the the second set of follow-up questions, which refer to the time between baseline and the second follow-up.

DIAGNOSTIC ASSESSMENT

The survey staff throughout the entire study period (including the family history component of the study) consisted of 57 clinical interviewers, most of whom were clinical psychologists with extensive experience in diagnostic interviewing, including the Munich-Composite International Diagnostic Interview (M-CIDI).[25,26] At baseline, 25 professional health research interviewers recruited from a survey company were also involved. Formal training with the M-CIDI took place for 2 weeks, followed by at least 10 closely monitored practice interviews and additional 1-day booster sessions throughout the study.

The M-CIDI allows for the assessment of symptoms, syndromes, and diagnoses of 48 mental disorders, along with information about onset, duration, severity, and psychosocial impairment. Diagnostic findings reported in this article were obtained by using the M-CIDI/*DSM-IV* diagnostic algorithms. Test-retest reliability and validity for the full M-CIDI have been reported elsewhere,[26-28] along with descriptions of the M-CIDI format and coding conventions.

Social anxiety disorder is defined here as one meeting *DSM-IV* criteria per the M-CIDI diagnostic algorithm.[6] *Depressive disorder* is defined as one meeting *DSM-IV* criteria for one or more episodes of major depression or dysthymia. One-week test-retest reliability of these diagnostic categories was acceptable (all κ values, > 0.64),[26] as was their validity (κ values range, 0.54 for dysthymia to 0.96 for single depressive episodes). Descriptors of the course of depression (eg, number of depressive episodes), which was also

RESULTS

CHARACTERISTICS OF THE SAMPLE AT BASELINE AND THE SECOND FOLLOW-UP PERIOD

Sociodemographic characteristics of the sample at baseline are summarized in **Table 1**. A total of 3021 cases were available at baseline, with data from the second follow-up available for 2548 cases.

PREVALENCE RATES AT BASELINE

Baseline prevalence rates (lifetime and past 12 months) of SAD and depressive disorder are presented in **Table 2**; 27.3% of cases with lifetime social phobia were of the generalized subtype. These disorders are categorized into 3 mutually exclusive combinations (ie, SAD without depressive disorder, depressive disorder without SAD, depressive disorder with SAD) to permit comparison of their longitudinal outcomes at follow-up. Depressive disorders (OR=1.9; 95% CI, 1.5-2.5) and SAD (OR=2.0; 95% CI, 1.4-2.9) were more common in women than men; associations were therefore adjusted for sex.

LIKELIHOOD OF DEPRESSION AT FOLLOW-UP

Rates of depression during the period between baseline and the second follow-up are presented in **Table 3**. Persons with SAD but no depression (current or previous) at baseline were significantly more likely (OR=3.5; 95% CI, 2.0-6.0) than persons with no mental disorder to have experienced a depressive disorder during the follow-up period. This effect, however, could be detected only for

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derived from the M-CIDI, refer to the time between baseline and follow-up. Severity descriptors (eg, number of depressive symptoms) refer to the self-identified worst episode of depression during this interval. The variable "total duration of depression" was estimated in weeks by multiplying the number of depressive episodes by the duration of the longest depressive episode. The variable "suicidal ideas" refers to the number of endorsed items from a total of 4 possibilities: (1) frequent thoughts of death, (2) desire for death, (3) suicidal thoughts, and (4) concrete suicidal plans or attempts.

STATISTICAL ANALYSES

Data were weighted to consider different sampling probabilities as well as systematic nonresponse at baseline. The Stata Software[29] package was used to compute robust confidence intervals (eg, by applying the Huber-White sandwich matrix in the case of regression models)[30] required when basing analyses on weighted sample sizes. Logistic regressions with odds ratios (OR) were used to describe associations with onset and stability of depressive disorders, recognizing confounding variables such as subjects' age, sex, or substance abuse or dependence.[31] We also conducted most analyses omitting the subjects (n=600) who suffered from alcohol abuse or illicit drug abuse or dependence at any time point. The results of these analyses did not differ meaningfully from those in which the full sample was included; we have therefore elected to report only results for the full sample. The quantitative outcomes of severity of depressive disorder considered here (eg, number of depressive episodes) constitute count variables with a strongly positively skewed distribution. For this, negative binomial regressions were used with multiplicative effects described by so-called incidence rate ratios (IRR) (ie, the factor by which the mean differs from the one in the comparison group). Negative binomial regressions allow for extra-Poisson variation or overdispersion that is likely to be owing to unobserved heterogeneity in the outcome between subjects as well as correlated events that are counted (eg, symptoms),[32] and 95% confidence intervals (CI) are used throughout this article.

the older (ie, aged 18-24 years at baseline) (OR=5.3; 95% CI, 1.6-3.8), but not the younger (ie, aged 14-17 years at baseline) subsample (OR=0.6; 95% CI, 0.1-2.7).

A similar significant increase in odds (OR=3.8; 95% CI, 2.6-5.5) was seen for persons with depression but no SAD at baseline. Persons with depression and SAD (current or previous) at baseline were also at significantly amplified odds for subsequent depression (OR=8.7; 95% CI, 4.5-16.8) compared with persons with no mental disorder at baseline. In persons with depressive disorder at baseline, SAD (current or previous) at baseline approximately doubled the odds for subsequent (or persistent, as this might reflect a continuous episode from baseline to follow-up) depressive disorder (OR=2.3; 95% CI, 1.2-4.6).

Among persons with SAD, age at onset of social anxiety symptoms (not disorder, which was unavailable)[33] was

Table 1. Sociodemographic Characteristics of the Sample*

	Total Sample at Baseline (N = 3021)	Participants at Follow-up (N_w = 2547)†	
		Baseline	Follow-up
Age at baseline, y			
14-17	921 (30.48)	767 (30.11)	767 (30.11)
18-24	2100 (69.52)	1780 (69.89)	1780 (69.89)
Age at follow-up, y			
17-21	. . .	861 (33.82)	861 (33.82)
22-24	. . .	1685 (66.18)	1685 (66.18)
Sex			
Male	1493 (49.41)	1262 (49.57)	1262 (49.57)
Female	1528 (50.59)	1284 (50.43)	1284 (50.43)
Marital status			
Married	103 (3.40)	76 (3.00)	192 (7.53)
Single	2577 (85.30)	2200 (86.41)	1826 (71.71)
With partner	341 (11.30)	270 (10.60)	529 (20.76)
Highest educational level			
Elementary school	428 (14.15)	295 (11.59)	280 (10.98)
Middle school	732 (24.25)	609 (23.90)	865 (33.97)
High school or other	1861 (61.60)	1643 (64.51)	1402 (55.05)
Professional status			
Unemployed	34 (1.13)	14 (0.57)	30 (1.17)
Homemaker	49 (1.64)	37 (1.46)	83 (3.25)
Blue-collar worker	74 (2.44)	60 (2.35)	84 (3.31)
Professional or white collar	524 (17.35)	429 (16.87)	799 (31.36)
Self-employed or other	205 (6.76)	171 (6.65)	280 (10.98)
Intern/apprentice/ trainee	1043 (34.53)	892 (35.04)	945 (37.11)
Student	1092 (36.15)	944 (37.06)	326 (12.82)
Living situation			
With parents	1894 (62.71)	1623 (63.72)	1028 (40.38)
With others than parents	442 (14.62)	356 (13.97)	865 (33.95)
Alone	685 (22.67)	568 (22.31)	654 (25.67)

*Data are presented as number (percentage).
†N_w indicates weighted N value standardized to the baseline sample. Values have been rounded to the nearest whole number. Ellipses indicate not applicable.

Table 2. Baseline Lifetime and 12-Month Prevalence of Social Anxiety Disorder and Depressive Disorder in the EDSP*

	Baseline Prevalences (N = 2547)	
	Lifetime	12-Month
All social anxiety disorder	183 (7.17) [6.09-8.42]	135 (5.28) [4.35-6.39]
All depressive disorder	358 (14.04) [12.53-15.70]	183 (7.17) [6.11-8.40]
Social anxiety disorder without depressive disorder	119 (4.66) [3.82-5.67]	97 (3.80) [3.04-4.74]
Depressive disorder without social anxiety disorder	294 (11.53) [10.16-13.06]	145 (5.69) [4.77-6.78]
Depressive disorder with social anxiety disorder	64 (2.51) [1.86-3.37]	38 (1.48) [0.99-2.19]

*Data are presented as weighted number (weighted percentage) [95% confidence interval]. Depressive disorder indicates a major depressive episode or dysthymia; EDSP, Early Developmental Stages of Psychopathology Study.

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found to predict neither depressive disorder onset (OR=1.1; 95% CI, 0.9-1.2) nor persistence or recurrence (OR=1.0; 95% CI, 0.9-1.1).

OTHER ANXIETY DISORDERS

Specificity of the effects attributable to SAD (vis-á-vis other anxiety disorders) in predicting onset and recurrence or persistence of depressive disorder was not high. Other anxiety disorders (specific phobias and generalized anxiety disorder in particular) at baseline were also associated with similarly increased odds (data not shown). We therefore examined the possibility that the associations we had linked to SAD might be due to comorbidity with other anxiety disorders. Analyses were repeated where SAD groups were stratified for the presence or absence of at least one other comorbid anxiety disorder at baseline. The association with the onset of depressive disorder was somewhat higher in cases with SAD plus another comorbid anxiety disorder (OR=6.0; 95% CI, 2.6-13.3) than in cases with SAD alone (OR=2.4; 95% CI, 1.2-4.9), though not significantly so. No appreciable difference in association was found for the persistence or recurrence of depressive disorder in cases with SAD alone (OR=7.7; 95% CI, 2.5-23.7) compared with SAD plus another comorbid anxiety disorder (OR=9.2; 95% CI, 4.2-19.9).

CLINICAL CHARACTERISTICS AND COURSE OF DEPRESSIVE DISORDER AT FOLLOW-UP

Several clinical characteristics and descriptors of the course of depressive illness during the follow-up period were compared between groups (**Table 4**). Compared with persons with no mental disorder at baseline, there were few significant differences in these parameters for persons with either a depressive disorder alone or SAD alone at baseline. The sole exception was a small but statistically significant increase in the severity of depression (as indi-

Table 3. Depressive Disorder Status at Follow-up by Baseline Diagnostic Status*

	Depressive Disorder Status at Follow-up (N = 2547)			
Baseline Diagnostic Status	**No Depressive Disorder, No. (%)**	**Depressive Disorder, No. (%)**	**OR (95% CI)†**	***P***
No mental disorder‡	1164 (91.89)	103 (8.11)	. . .	. . .
Social anxiety disorder without depressive disorder	90 (76.21)	28 (23.79)	3.5 (2.0-6.0)	<.001
Depressive disorder without social anxiety disorder	220 (74.89)	74 (25.11)	3.8 (2.6-5.5)	<.001
Depressive disorder with social anxiety disorder	36 (56.07)	28 (43.93)	8.7 (4.5-16.8)	<.001
Depressive disorder with social anxiety disorder vs depressive disorder without social anxiety disorder	. . .	. . .	**2.3 (1.2-4.6)**	**.02**

*Number and percentage of individuals were weighted. Depressive disorder indicates a major depressive episode or dysthymia; OR, odds ratio; CI, confidence interval; and ellipses, not applicable.

†Logistic regressions and odds ratios were adjusted for sex and age effects.

‡No mental disorder indicates an individual's having no diagnosis at baseline, not considering nicotine dependence. This is the reference group used for comparisons.

Table 4. Selected Description of Course of Depression During Follow-up Period by Baseline Diagnostic Status*

	Suicidality†		Suicidal Attempts‡			Depressive Symptoms§	
Baseline Diagnostic Status	**Mean (IRR) [95% CI]**	***P***	**No. (%)**	**OR (95% CI)**	***P***	**Mean (IRR) [95% CI]**	***P***
No mental disorder#	0.94	. . .	4 (4.18)	. . .	. . .	10.20	. . .
Social anxiety disorder without depressive disorder**	0.98 (1.1) [0.6-1.9]	<.82	3 (9.26)	2.6 (0.4-15.3)	<.29	12.14 (1.2) [1.0-1.5]	<.10
Depressive disorder without social anxiety disorder	0.96 (1.0) [0.7-1.5]	<.85	3 (4.57)	1.1 (0.3-4.9)	<.86	12.65 (1.2) [1.1-1.4]	<.003
Depressive disorder with social anxiety disorder	1.98 (2.2) [1.4-3.4]	<.001	6 (19.76)	7.0 (1.5-32.2)	<.02	14.55 (1.4) [1.2-1.7]	<.001
Depressive disorder with social anxiety disorder vs depressive disorder without social anxiety disorder	**(2.1) [1.3-3.4]**	**<.003**	. . .	**6.1 (1.2-32.2)**	**<.03**	**(1.2) [1.0-1.4]**	**<.13**

*Data for means, numbers, and percentages are weighted. IRR indicates incidence rate ratio (the factor by which the mean number of symptoms differs from the reference category: based on negative binomial regression and adjusted for the effect of sex when necessary); CI, confidence interval; OR, odds ratio; and ellipses, not applicable. N = 352.

†Indicates the number of suicide attempts endorsed (range, 0-4).

‡Indicates at least one suicide attempt vs no suicide attempt. The OR (from logistic regression) was adjusted for the effect of sex.

§Indicates number of symptoms during the worst episode (range, 0-35).

‖Indicates the number of episodes among follow-up major depressive episode cases (n = 299). The IRR for the truncated number (<1) of episodes was based on negative binomial regression and adjusted for age.

¶Indicates the duration among follow-up major depressive episode cases (n = 299). The upper limit of the duration was estimated by multiplying the number of episodes by the duration of the longest episode. The IRR for the truncated number (<2) of weeks was based on negative binomial regression and adjusted for age.

#Indicates an individual's having no diagnosis at baseline, not considering nicotine dependence. This is the reference group used for comparisons.

**Indicates a major depressive episode or dysthymia.

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cated by the number of depressive symptoms experienced during an episode) for persons with depression alone at baseline compared with persons not mentally ill at baseline (IRR, 1.2; 95% CI, 1.1-1.4).

A very different portrait of risk emerged, however, for persons who had both depressive disorder and SAD at baseline (Table 4). During the follow-up period, these persons were significantly more likely to experience (compared with persons with no mental disorder) more intense suicidal ideation (IRR, 2.2; 95% CI, 1.4-3.4), more depressive symptoms (IRR, 1.4; 95% CI, 1.2-1.7), and a longer duration of major depressive episode(s) (IRR, 3.2; 95% CI, 1.5-6.8). They also had much greater odds (OR = 7.0; 95% CI, 1.5-32.2) of having attempted suicide during the follow-up period. Similarly increased magnitudes of effects were seen for this comorbid group (ie, positive for both depressive disorder and SAD at baseline) in comparison with persons with depressive disorder alone at baseline (Table 4, bottom row).

COMMENT

In this prospective study, we found that the presence of SAD in adolescence or early adulthood is a strong risk factor for the subsequent occurrence of depressive illness during young adulthood. Moreover, the combination of depression and SAD in adolescence markedly augments the risk for subsequent depressive disorder, over and above the risk conferred by either disorder alone. Thus, in addition to confirming the findings from retrospective reports that preexisting SAD increases the risk for "early-onset" depression,[16,17,19] our observations suggest that those persons with the combination of SAD and depression in adolescence or early adulthood are at the greatest risk for subsequent depression.

Individuals with this early form of comorbidity (ie, SAD plus depressive disorder) are not only at highest risk for subsequent depression, they also experience a more malignant course of depressive illness. This is manifested in more suicidal ideation and suicide attempts, and more depressive symptoms during episodes, as well as more frequent and/or more protracted depressive episodes. These findings are consistent with observations from other settings (eg, primary care) where the presence of SAD comorbidity predicts poorer depressive outcomes.[34] Remaining to be shown is whether or not these associations are unique to SAD or whether they are seen with other forms of anxiety disorder comorbidity. Our preliminary look at these data suggests that the association with SAD is not specific, but that it must be scrutinized more closely in future analyses. Regardless, the fact that SAD may be the most common form of anxiety disorder comorbidity seen in depressed patients[13] makes this a particularly salient observation.

It is important to emphasize that causal inferences cannot be drawn from these observational data. We may speculate, however, about the mechanism(s) by which preexisting SAD might increase the risk of subsequent depression. Certainly, common genetic risk factors may exist.[35,36] Investigators have theorized a role of social anxiety and avoidance in contributing to demoralization and social isolation,[8] all of which are known depressive risk factors. Socially anxious children are more likely than their less socially anxious peers to develop problems with self-esteem and lack friendships.[37] It is therefore reasonable to posit that a cause-and-effect relationship between social anxiety and depression exists at least in some cases, but this remains to be empirically proven.

Limitations of our study should be considered. Although we did not find selective attrition for persons with social phobia from baseline to second follow-up investigation in our sample, it is possible that persons most impaired by SAD did not participate in our study. It is also possible that our findings from this urban German sample, consisting of persons who are well educated with relatively high economic status, may not generalize to other populations. Diagnoses at baseline are retrospective and therefore subject to possible recall problems or biases, though these should be attenuated in this relatively young sample. Some of our findings (eg, increased suicide attempts in comorbid cases) rest on relatively few cases, and though statistically significant, should be interpreted with caution. Also, as mentioned earlier, it seems that the association with subsequent depressive disorder is not specific for SAD. It is also possible that depressive disorders are not the most common (or important) kinds of mental disorders predicted by SAD. We intend to conduct additional analyses to further explore these latter issues.

Our findings are consistent with other longitudinal studies showing anxiety disorders in youth to be a predictor of more serious depression in adulthood, particularly in those at risk for depression on the basis of family history.[22] Though we caution once again about imparting causality to our findings, they do support the proposal made by numerous investigators that early intervention with socially phobic youth be tested as a primary prevention of depressive illness.[6,12,15,19] Furthermore, our results suggest that the union of depression with SAD (and probably other anxiety disorders as well) in adolescence or early adult-

Depressive Episodes‖		Total Duration, wk¶	
Mean (IRR) [95% CI]	*P*	Mean (IRR) [95% CI]	*P*
2.81	. . .	15.87	. . .
4.47 (1.0) [0.4-2.4]	<.95	36.19 (1.7) [0.7-4.0]	<.21
2.88 (0.6) [0.3-1.4]	<.26	22.89 (1.1) [0.5-2.1]	<.82
4.43 (1.7) [0.5-5.4]	<.38	59.75 (3.2) [1.5-6.8]	<.003
(2.5) [0.8-8.2]	**<.13**	**(2.9) [1.3-6.5]**	**<.009**

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hood is a particularly sinister combination that heralds an increased risk for subsequent depressive episode(s) of increased severity, with amplified suicide risk. Given the substantial morbidity and mortality risks associated with adolescent-onset major depressive disorder,[38,39] serious efforts should be initiated to identify and test treatments for youth who fit this clinical profile (ie, early-onset anxiety and depressive disorders).

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