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Brief report

Prospective associations between social anxiety and depression in youth: The moderating role of maternal major depressive disorder

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ABSTRACT

Introduction: Although social anxiety symptoms and exposure to maternal major depressive disorder (MDD) have each been conceptualized as key contributors to the development of depression symptoms in youth, these risk factors have not been integrated into a single model of risk. The current study evaluated a two-hit model of risk to determine whether the impact of social anxiety on prospective changes in youth depressive symptoms is stronger among youth exposed to maternal MDD than among those of never-depressed mothers.

Methods: Participants were youth (aged 8–14 at baseline, 50.4% girls, 80.9% Caucasian) and their biological mothers recruited from the community in the United States. Of the mothers, 129 had a history of MDD during their youth's lifetime and 117 had no lifetime history of MDD. At the initial assessment, mothers completed diagnostic interviews and youth completed self-report measures of social anxiety and depressive symptoms. Participants were reassessed every 6 months for 2 years during which youth again completed the symptom measures.

Results: Results of hierarchical linear modeling revealed that levels of social anxiety predicted prospective increases in depressive symptoms among offspring of mothers with a history of MDD, but not among those of never-depressed mothers. Depressive symptoms did not predict prospective changes in social anxiety (alone or in interaction with maternal MDD).

Conclusions: These results provide preliminary evidence for an integrated model of risk such that social anxiety symptoms may be a particularly strong risk factor for the subsequent development of depression symptoms among youth with exposure to maternal MDD.

1. Introduction

Social anxiety and depression are highly comorbid in youth, with evidence suggesting that social anxiety typically precedes and contributes vulnerability to the subsequent development of depression (Cummings, Caporino, & Kendall, 2014). The prevalence of co-occurring social anxiety and depression symptoms increases dramatically around the onset of adolescence as interpersonal factors become increasingly important (Epkins & Heckler, 2011). Notably, however, not all youth with social anxiety develop subsequent depression, which highlights the role of moderators that may exacerbate susceptibility to depression in socially anxious youth.

A separate body of research has established the heightened risk for depression in youth of mothers with a history of major depressive disorder (MDD; Goodman, 2007). Relative to offspring of mothers with no history of depression, those exposed to maternal MDD have nearly five times the odds of developing depression themselves by age 16 (Murray et al., 2011). Thus far, however, research on the intergenerational transmission of depression has proceeded independently of research on the sequential comorbidity

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between social anxiety and depression and no studies have sought to test an integrated model of risk.

In line with a two-hit model of risk, socially anxious youth with pre-existing vulnerability to depression based on exposure to maternal MDD may be particularly vulnerable to developing depression during early adolescence when overall rates of depression increase (Rudolph & Flynn, 2014). The goal of the current study, therefore, was to test the following two hypotheses in a two-year multi-wave study of youth across late childhood and adolescence: (i) social anxiety would predict prospective changes in youth depressive symptoms, and (ii) this impact would be stronger among offspring exposed to maternal MDD than among those of never-depressed mothers, consistent with two-hit model of risk.

2. Method

2.1. Participants

Participants included 246 biological mother-child dyads recruited from the community. Of the mothers, 129 met criteria for DSM-IV MDD during their youth's life and 117 had no lifetime diagnosis of any DSM–IV mood disorder and no current Axis I diagnosis. Exclusion criteria for all participants included symptoms of schizophrenia, substance dependence within the last 6 months, or a history of bipolar disorder. The average age of mothers at baseline was 40.33 years (SD = 6.82, Range = 24–55) and 87.4% were Caucasian. For youth, the average age at baseline was 11.39 (SD = 1.94, Range = 8–14), 50.4% were girls, and 80.9% were Caucasian.

2.2. Measures

The Structured Clinical Interview for DSM–IV Axis I Disorders (SCID-I; First, Spitzer, Gibbon, & Williams, 2002) was administered to mothers by trained interviewers at the baseline assessment to determine lifetime histories of psychopathology. A subset of 20 SCID interviews was coded by a second interviewer to assess inter-rater reliability, which was excellent for diagnoses of MDD (κ = 1.0).

The Children's Depression Inventory (CDI; Kovacs, 1981) was administered to youth at each time point to assess symptoms of depression. The CDI is a 27-item self-report instrument that has demonstrated strong reliability and validity in previous research (Smucker, Craighead, Craighead, & Green, 1986) and good internal consistency in the current study (αs = 0.85–.89 across all time points).

Symptoms of social anxiety were assessed with the social anxiety subscale of the Multidimensional Anxiety Scale for Children (MASC-SA; March, Parker, Sullivan, Stallings, & Conners, 1997). This subscale is a 9-item self-report instrument that has demonstrated strong psychometric properties in previous research (March et al., 1997) and good internal consistency in the current study (αs = 0.80–.89 across all time points).

2.3. Procedure

Mothers were screened over the phone to determine eligibility. Upon arrival, mothers provided informed consent and youth provided assent. Following this, mothers were administered the SCID-I and youth completed questionnaires including the CDI and MASC-SA. Participants returned to the laboratory for follow-up assessments at 6, 12, 18, and 24 months post-baseline, during which youth again completed the CDI and MASC-SA. Families were compensated $275 for their participation. All procedures were approved by the University's Institutional Review Board.

3. Results

A preliminary inspection of the data revealed the presence of missing data due to attrition across the follow-up. Given this, we examined whether the data were missing at random to justify the use of data imputation methods (Schafer & Graham, 2002). Little's missing completely at random (MCAR) test (Little & Rubin, 1987) was nonsignificant, χ^2 (1489) = 1544.99, p = .15, supporting the imputation of missing values. Accordingly, we created expectation maximization estimates of missing data for use in all subsequent analyses (see Schafer & Graham, 2002). Descriptive statistics for study variables are presented in Table 1. Although CDI and MASC-SA scores were transformed (square root) for analyses, untransformed values are presented in the table. Correlations among study variables are presented in Table 2. As can be seen in the table, maternal MDD was related to youth depression scores at all time points yet only related to youth social anxiety at Time 1.

Next, we used hierarchical linear modeling (HLM; Raudenbush & Bryk, 2002; Raudenbush, Bryk, Cheong, & Congdon, 2019) to test the hypotheses that youths' levels of social anxiety at each time point would predict prospective changes in their depression symptoms and that this would be stronger in youth exposed to maternal MDD. More specifically, using CDI scores at time T as the outcome variable, CDI and MASC-SA scores at time T-1 were entered as Level 1 (within subject) predictors, allowing us to examine whether MASC-SA predicts changes in CDI between time T-1 and Time T. Maternal MDD was entered as a Level 2 (between subject) predictor. Although the main effect of MASC-SA on changes in CDI scores was nonsignificant, $t(244) = -1.04$, p = .30, $r_{effect\ size}$ = 0.07, the maternal MDD x MASC-SA interaction was significant, $t(244) = 2.27$, p = .02, $r_{effect\ size}$ = 0.14. Follow-up analyses revealed that social anxiety predicted prospective increases in depressive symptoms among offspring exposed to maternal MDD, $t(128) = 2.07$, p = .04, $r_{effect\ size}$ = 0.18, but not among those of never-depressed mothers, $t(116) = -1.42$, p = .16, $r_{effect\ size}$ = 0.13.

Exploratory analyses were then conducted to examine the specificity of the effects observed. First, we tested the reverse direction

Table 1
Means (and standard deviations) for study variables.

	MDD Mothers	Never Depressed Mothers
	(n = 129)	(n = 117)
T1 MASC-SA	9.24 (5.88)	7.67 (4.64)
T2 MASC-SA	8.44 (6.38)	7.75 (4.96)
T3 MASC-SA	7.88 (5.97)	7.23 (4.66)
T4 MASC-SA	7.98 (5.75)	7.40 (5.24)
T5 MASC-SA	7.07 (6.07)	7.93 (5.62)
T1 CDI	7.43 (5.93)	4.84 (5.36)
T2 CDI	6.67 (7.07)	3.70 (4.40)
T3 CDI	6.01 (5.48)	3.49 (4.17)
T4 CDI	5.28 (5.78)	2.86 (4.22)
T5 CDI	5.31 (5.65)	3.79 (5.49)

Note. T1-T5 = Time 1-Time 5; MASC-SA = Multidimensional Anxiety Scale for Children-Social Anxiety; CDI = Children's Depression Inventory.

Table 2
Correlations among study variables.

	1	2	3	4	5	6	7	8	9	10
1. Mom MDD	–									
2. T1 MASC-SA	.14*	–								
3. T2 MASC-SA	-.03	.57***	–							
4. T3 MASC-SA	.04	.53***	.70***	–						
5. T4 MASC-SA	.08	.56***	.60***	.67***	–					
6. T5 MASC-SA	-.03	.46***	.70***	.67***	.73***	–				
7. T1 CDI	.26***	.43***	.26***	.23***	.31***	.21**	–			
8. T2 CDI	.27***	.30***	.37***	.34***	.29***	.37***	.70***	–		
9. T3 CDI	.27***	.33***	.31***	.41***	.37***	.33***	.63***	.74***	–	
10. T4 CDI	.28***	.22**	.22**	.26***	.39***	.25***	.48***	.61***	.70***	–
11. T5 CDI	.27***	.27***	.25***	.27***	.34***	.43***	.46***	.62***	.66***	.69***

Note. MDD = lifetime major depressive disorder (yes = 1, no = 0); T1-T5 = Time 1-Time 5; MASC-SA = Multidimensional Anxiety Scale for Children-Social Anxiety; CDI = Children's Depression Inventory; *p < .05, **p < .01, ***p < .001.

of influence: CDI predicting prospective changes in MASC-SA. Neither the main effect of CDI nor the maternal MDD x CDI interaction significantly predicted changes in MASC-SA (lowest p = .23). Second, we examined whether any of the relations was moderated by youths' age or gender. None of these analyses was significant (lowest p = .39). Finally, we examined whether specific characteristics of mothers' MDD history moderated the impact between MASC-SA and changes in CDI (i.e., recurrent vs. single episode, child age at first exposure, proportion of child's life mother experienced MDD). None of these analyses was significant (lowest p = .15).

4. Discussion

The current findings partially supported our hypotheses. Specifically, symptoms of social anxiety predicted significant increases in depressive symptoms across the multi-wave follow-up among youth exposed to maternal MDD but not among youth of never-depressed mothers. Notably, the reverse direction of influence, with depressive symptoms predicting prospective changes in social anxiety (alone or in interaction with maternal MDD) was not significant, further supporting the temporal precedence of social anxiety over depression in youth (Cummings et al., 2014). Finally, neither age, nor gender, nor characteristics of maternal MDD moderated the results, suggesting generalizability across boys and girls aged 8–16 years with any degree of exposure to maternal MDD.

These results help to unite two areas of research that have typically been conducted independently of one another – research on the sequential comorbidity of social anxiety and depression (e.g., Cummings et al., 2014) and research on risk for the intergenerational transmission of depression (see Goodman, 2007) – by providing preliminary evidence for an integrated, two-hit model of risk. Specifically, the risk of social anxiety contributing to future increases in depression during late childhood and adolescence appears to be particularly strong among youth who are already at increased risk of depression based on exposure to maternal MDD.

This study displays several strengths including a relatively large sample size, the multi-wave prospective design, and the use of diagnostic interviews to assess maternal history of MDD. Despite these strengths, several limitations must be taken into consideration. First, we relied upon self-report assessments of social anxiety and depression symptoms. Future research should implement multi-method assessments of youths' symptoms. Second, children's depressive symptom levels were relatively low and additional research is needed to determine whether the results generalize to more impaired samples. Third, we cannot determine the underlying mechanisms through which social anxiety symptoms and exposure to maternal MDD operate to increase risk for depression in youth during late childhood and adolescence. It is possible that exposure to maternal MDD may exacerbate maladaptive ways in which

socially anxious youth interpret and cope with the social impairments (e.g., avoidance, loneliness) that have been proposed to predict subsequent depression within this critical developmental context (Epkins & Heckler, 2011). Understanding these mechanisms is an important area of future research.

In conclusion, these results provide a foundation for the more precise identification of youth at risk for depression during late childhood and adolescence through the integration of two important risk factors: social anxiety symptoms and exposure to maternal MDD. Future research should focus on identifying specific mechanisms through which exposure to maternal MDD may exacerbate the impact of social anxiety symptoms in order to inform more targeted interventions aimed at reducing depression risk in vulnerable youth.

Declaration of competing interest

None.

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