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Early Life Somatic Complaints: Longitudinal Associations with Maternal and Child Psychopathology

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Abstract

Objective—Somatic complaints, often associated with concurrent and future internalizing symptoms and disorders in adult samples, were examined longitudinally from preschool to school-age in a sample of children at increased familial risk for psychopathology. The behavioral correlates and sex differences of somatic complaints were examined, as well as the persistence of these complaints across early childhood.

Method—A longitudinal sample of 185 mothers completed a lab visit when children were preschool-aged and an online follow-up when children were school-aged. Mothers were assessed for psychopathology, and mothers and secondary caregivers reported on children's somatic complaints, anxiety, and depression at both time points.

Results—A high rate of child somatic complaints was noted in this sample, with similar rates in males and females. Regression analyses revealed that somatic complaints at preschool predicted somatic complaints, anxiety, and depression at school-age, and sex did not moderate these relationships. Overall, maternal psychopathology predicted somatic complaints, but findings were inconsistent across reporters, time points, and types of maternal psychopathology. Evidence for maternal reporting bias was mixed.

Conclusion—The association between preschool-aged somatic complaints and school-aged internalizing symptoms suggests the potential utility of early detection of, and treatment for, somatic complaints, particularly for young children at increased familial risk for developing internalizing disorders. Pediatric primary care is an ideal setting for these early intervention efforts.

Key Terms

somatic complaints; internalizing symptoms; maternal psychopathology; developmental

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Somatic complaints refer to physical symptoms (e.g., headaches, abdominal pain, dizziness, etc.) with no identifiable organic cause.^{1,2} In addition to contributing to significant functional impairment among those affected, somatic complaints lead to an overuse of the medical system that results in unnecessary and expensive consultation and treatment. Importantly, these symptoms are highly prevalent in childhood, affecting 10–30% of youth in the United States and accounting for 2–4% of pediatrician visits.^{1,2} Childhood somatic complaints are particularly concerning, as they have been associated with a maladaptive developmental trajectory characterized by difficult temperaments, emotional and behavioral problems, excessive school absences, and increased risk for internalizing disorders (e.g., anxiety, depression) in adulthood.^{3–6} Thus, early-life somatic complaints are a serious public health concern for pediatric primary care providers.

Previous longitudinal studies have assessed childhood somatic complaints among school-age children and adolescents but have failed to examine the continuity and behavioral correlates of somatic complaints among preschool-aged children. Conflicting findings also exist regarding the temporal emergence of sex differences in somatic complaints—although many studies report no differences before puberty, some identify a greater prevalence in females across childhood.^{1–3} Furthermore, it is unclear whether patterns of high comorbidity between somatic complaints, anxiety, and depression seen in adulthood are present in early childhood.^{2,4,7–12} Previous studies have also suggested a relationship between maternal psychopathology and child somatic complaints; however, the directionality of this relationship remains unknown. Maternal anxiety has been identified as a risk factor for somatic complaints, but findings have been mixed for maternal depression.^{13–15} Since it is mothers who often present concern of their children's physical complaints to pediatricians, it is important to study the role of maternal mental health in the emergence of somatic complaints in children. However, it is possible that noted correlations with maternal psychopathology may be due to shared method variance and/or maternal reporting bias.^{14,16} To address the gaps in the literature, the present study examined the development of somatic complaints in a community cohort at high risk for mental illness, consisting of 185 children, from preschool to school-age. We hypothesized that preschool somatic complaints would predict school-age somatic complaints and increases in anxiety and depression across time points, particularly among females. We also hypothesized that there would be some evidence of reporting bias for mothers with high levels of depressive symptoms, but that this bias would not fully explain associations between maternal psychopathology and child somatic complaints.

Methods

Participants

This study was part of larger study of mother-child dyads ($N=219$) who were initially assessed when children were between the ages of 2.5 and 5 years old. Most of these mothers ($N=178$) were recruited from the [Institution] Women's Mental Health Program (WMHP), a treatment referral and research program for women suffering from mental illness. An additional 41 women were recruited from the community. Secondary caregivers (e.g.,

fathers, grandmothers, etc.) were also contacted through mothers for their reports of child behavior.

Mothers recruited from the WMHP did not differ from community controls on any demographic variables relevant to the current study, with the exception of number of children in the home (i.e., controls had more children in the household than participants recruited from WMHP, $p = 0.046$). Mothers in the preschool sample were predominantly Caucasian (82.6%), married (81.7%), and well-educated (40.2% completed graduate/professional school). The majority of mothers (59.4%) were undergoing mental health treatment (e.g., psychological and psychiatric services) at the time of study enrollment.

Approximately 85% of these mothers ($N=185$; 151 WMHP, 34 controls) completed follow-up measures when children were of school age (5 to 11 years old). Secondary caregivers (e.g., grandparent, babysitter, father) were also recruited to provide follow-up information. To be included in this final sample, a child's mother must have completed the school-age behavioral questionnaire. Secondary caregiver reports were also used whenever possible and were obtained for 85.9% of children at preschool, 74.6% at school-age, and 60.0% at both time points.

The mothers lost to follow-up were less educated than retained participants ($p=.015$). Children lost to follow-up did not significantly differ from retained participants on initial measures of somatic complaints, anxiety/depression, maternal age, maternal depression scores, or race/ethnicity (see Table 1 for a complete listing of the demographic characteristics of the final sample).

This study was approved by the Institutional Review Board of [Institution] University. Mothers and secondary caregivers provided consent for their participation in the study, and mothers also provided consent for re-contact. Mothers and secondary caregivers were financially compensated for their involvement in both study phases.

Procedure

During the preschool phase of the study, mothers visited the laboratory and completed interviews and questionnaires about their mental health history and current depressive symptoms, as well as their children's behaviors. Secondary caregivers also provided reports of children's behaviors.

In the school-age phase of the study, data were collected via REDCap, a secure online database. Mothers and secondary caregivers received emails that included a direct hyperlink to the online measures. Participants were instructed to click on the link, read consent information thoroughly, and complete the online questionnaires if they agreed to study details. Participants were not required to complete every questionnaire in one sitting, and were re-contacted if measures were left incomplete for longer than two weeks.

Measures

Somatic Complaints—Mothers and secondary caregivers completed the 100-item Achenbach Child Behavior Checklist (CBCL) for 1.5–5 years during the preschool phase of

the study.¹⁷ The CBCL is a reliable and valid measure of children's behavior that instructs respondents to indicate the extent to which items generally describe the child's behavior over the past two months using a three-point scale as follows: 0 ("not true"), 1 ("somewhat or sometimes true"), or 2 ("very true or often true"). The Somatic Complaints syndrome scale includes items such as: "headaches (without medical cause)," "constipated (when not sick)," and "vomiting, throwing up (without medical cause)." Cronbach's alphas for the Somatic Complaints syndrome scale at preschool for maternal and secondary caregiver reports were .48 and .40, respectively. This low internal consistency will be further discussed.

Children's somatic complaints were measured again at follow-up using the 113-item CBCL for 6–18 years.¹⁸ On the school-age CBCL raters are asked to evaluate a child's behavior over the past six months. In addition, a DSM-oriented Somatic Problems scale is available at this age, and was chosen for this study rather than the syndrome scale, as all items on the DSM-oriented scale state clearly that the somatic complaint is absent a medical cause. Cronbach's alphas for the DSM-oriented Somatic Problems scales at school-age for maternal and secondary caregiver reports were .84 and .76, respectively. Raw subscale scores were used for analyses of somatic complaints at both time points.

Anxiety/Depression—The Anxious/Depressed syndrome scale of the CBCL was used to assess children's internalizing symptoms in the preschool and school-aged periods. Examples of items that load onto this subscale include "nervous, highstrung, or tense" and "feels worthless or inferior." Cronbach's alphas for the 8-item preschool subscale for maternal and secondary caregiver reports were .63 and .69, respectively. For the 13-item school-age subscale, Cronbach's alpha was .82 for both reporters.

Maternal Psychopathology—Maternal mental illness was initially assessed using the Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I), a semi-structured interview that assesses lifetime history of mental illness.¹⁹ Mothers' lifetime histories of general psychopathology (total number of lifetime Axis I diagnoses), anxiety disorders (e.g., panic disorder, GAD) and depressive disorders (e.g., dysthymia, major depressive disorder) were examined. Approximately 15% of interviews were double-coded by a licensed clinical psychologist. Reliability for Axis I diagnoses was high ($K = .87$).

Maternal depression was also assessed at both time points using the Beck Depression Inventory (BDI), a gold-standard self-report measure with high reliability and validity.²⁰ This questionnaire consists of 21 items measured on a 4-point scale, with higher scores reflecting more severe depressive symptomatology. Example items include "sadness," "loss of pleasure," and "irritability." SCID data allowed for an examination of the effects of lifetime maternal depression on child behavior; BDI allowed us to examine potential bias in maternal reporting at school-age.

Statistical Approach

Linear regression analyses were utilized to assess associations between preschool somatic complaints and somatic complaints, anxiety, and depression at school-age, as well as associations between maternal psychopathology and child somatic complaints at both time

points. To assess the continuity of somatic complaints, a persistent somatic complaints variable, which identified children whose somatic complaints were rated as above the median at both preschool (a score of 1 or higher) and school-age (a score of 2 or higher), was created for each reporter. Logistic regression analyses were used to examine associations between maternal psychopathology and persistent somatic complaints.

To examine the moderating effect of sex, sex and somatic complaint variables were centered around the mean, and interaction variables were created by multiplying these mean-centered terms. Next, linear regression models were used to assess the independent contribution of this interaction term (above and beyond main effects) to child anxiety and depression outcomes.

To assess maternal bias in reporting, a variable was created that represented the difference between maternal and secondary caregiver reports of child somatic complaints at school-age, and this index was then assessed in relation to maternal BDI scores at school-age. Due to skew and kurtosis, somatic complaints and anxiety/depression symptom scores at school-age were winsorized at 90% for analyses, resulting in maximum scores of 4 on the maternal and secondary caregiver somatic problems subscales, and 10 on the maternal and secondary caregiver anxious/depressed subscales.

Results

Sample Characteristics

Due to the recruitment sources, the prevalence of maternal psychopathology in this sample was high; 48% of mothers met lifetime criteria for an anxiety disorder and 44% for a depressive disorder. Over 82% met criteria for at least one DSM-IV diagnosis. Prevalence of child somatic complaints far exceeded levels previously reported in community samples. Across reports, over 60% of preschool and nearly 50% of school-aged children were reported to have experienced at least one somatic complaint (see Table 2). As highlighted in Table 3, correlations between child somatic complaints and child anxiety and depression were significant and positive for both reporters at both time points. Demographic factors including sex, maternal age, maternal education, and child age were tested as potential covariates. Child age was significantly associated with both maternal reports of anxiety and secondary caregiver reports of somatic complaints, and was thus controlled for in all analyses examining these outcomes. Notably, levels of somatic complaints at school-age did not differ by sex.

Hypothesis Testing

Somatic complaints at preschool predicted somatic complaints at school-age using both maternal ($F(1, 183)=22.823, R^2=.111, p<.001$) and secondary caregiver ($F(1, 108)=17.115, R^2=.126, p<.001$) reports. Preschool somatic complaints predicted school-age anxiety and depression symptoms over and above the effects of preschool anxiety and depression. Results were significant for both maternal ($F(1, 181)=10.242, R^2=.041, p=.002$) and secondary caregiver ($F(1, 108)=7.221, R^2=.059, p=.008$) reports.

In contrast to our hypothesis, results examining the moderating role of sex in the longitudinal relationship between somatic complaints and anxiety were not significant for either maternal ($F(1, 170)=.233, R^2=.001, p=.630$) or secondary caregiver ($F(1, 106)=.029, R^2<.001, p=.864$) reports.

With regard to the relationship between maternal mental health and child somatic complaints, results revealed that our measure of general maternal psychopathology significantly predicted maternal-reported preschool-age somatic complaints, whereas measures of maternal depression and anxiety did not. General maternal psychopathology (total number of lifetime DSM-IV Axis I diagnoses) and maternal anxiety significantly predicted maternal-reported somatic complaints at school-age follow-up. However, only maternal depression predicted the persistence of maternal reported childhood somatic complaints across time points. General maternal psychopathology, maternal anxiety, and maternal depression did not predict secondary caregiver reports of child somatic complaints at any time point (see Table 4 for a summary of these findings).

Although these findings highlight some discrepancies concerning maternal and secondary caregiver reports, the difference score between maternal and secondary caregiver reports of somatic problems demonstrated equal proportions (15%) of mothers and secondary caregivers reporting higher scores for the same child. In most cases (70%) mothers and secondary caregivers reported the same level of child somatic complaints. Correlation analyses revealed no significant association between current maternal depressive symptoms and reporter difference scores ($r=.110, p=.199$). Furthermore, maternal BDI scores were associated with child somatic complaints at school-age according to both maternal ($F(1, 183)=15.526, R^2=.078, p<.001$) and secondary caregiver ($F(1, 136)=8.947, R^2=.062, p=.003$) reports.

Discussion

The current study adds to a growing body of literature implicating childhood somatic complaints as a predictor of internalizing problems later in life. By longitudinally following a community cohort of mother-child dyads at high risk for mental illness over the course of children's preschool and early school-age years, we demonstrated that somatic complaints in preschool persist to school-age and predict increases in anxiety and depression symptoms across this developmental period. The high comorbidity and common characteristics (e.g., perfectionism, heightened stress sensitivity) of somatic complaints, anxiety, and depression have led some to question whether these conditions represent distinct disorders or instead represent a single phenotype, the manifestation of shared vulnerabilities.^{2,10–12,21,22} Our results corroborate the findings of a recent twin study suggesting a latent internalizing factor underlying these three phenotypes, and support the shared vulnerability hypothesis.¹⁰ In addition to informing the developmental science of internalizing disorders, this highlights the potential for early childhood somatic complaints to serve as an intervention target for childhood mood and anxiety disorders, particularly in children who are at increased familial risk for psychopathology.

We did not find sex differences in either the reported levels of somatic complaints or in their associations with later anxiety and depression. Although there is little consensus in the literature on the temporal emergence of sex differences, some studies have suggested that the increased prevalence of somatic complaints and internalizing disorders among females does not appear until adolescence.^{2,3} Future work following this sample into adolescence would be needed to replicate this proposed trajectory and better understand the unique developmental and psychosocial risk factors that contribute to the somatic complaint-internalizing problem relationship. However, these findings do suggest that clinical interventions should focus on both males and females with early childhood somatic complaints, as both sexes may be at increased mental health risk when they display somatic complaints during this period of development.

Inconsistent findings emerged when comparing maternal and secondary caregiver reports of child somatic complaints. Discrepancies between reporters were noted when examining the relationship between lifetime measures of maternal psychopathology and child somatic complaints. However, there was general agreement in findings across maternal and secondary caregiver reports of somatic complaint prevalence, associations with later anxiety and depression, and the continuity of these symptoms. Furthermore, concurrent maternal depressive symptoms were positively correlated with both maternal and secondary caregiver measures of school-age child somatic complaints. This challenges the traditional view that mothers with depression present distorted views of their children's behavioral problems, and indicates that noted associations between maternal psychopathology and child somatic complaints cannot be attributed solely to biased maternal reporting.¹⁶

The prevalence of somatic complaints in the children (46–67%; see Table 2) in this clinical-community sample far exceeded previously reported rates for community samples, especially in the preschool period, in which community prevalence rates are no more than 20%.^{2,23,24} This suggests that maternal psychopathology may heighten children's risk of developing somatic complaints at an early age. Interestingly, the number of maternal lifetime DSM-IV diagnoses was the only measure of maternal psychopathology that significantly predicted child somatic complaints at both preschool and school-age time points. Mental illnesses have traditionally been categorized along dimensions of internalizing, externalizing, or thought disorders, but a general psychopathology factor has received increasing attention in the literature. A general factor was recently found to explain psychiatric disorders of adulthood better than any single dimension, and this factor was recently confirmed to be moderately heritable and associated with intergenerational transmission of psychopathology.^{25,26} When taken with our finding that the combination of maternal disorders predicted greater cumulative risk for somatic complaints than individual conditions like maternal anxiety and depression, this work suggests that future research should examine the relationship between a latent factor of maternal psychopathology and childhood somatic complaints.

That said, it is notable that maternal depression significantly predicted persistent somatic complaints, but not complaints at preschool or school-age independently, while maternal anxiety predicted childhood somatic complaints at school-age only. Although these findings need to be evaluated in light of the small sample size of children with persistent somatic

complaints ($N=46$), they nevertheless suggest there is a link between maternal psychopathology and early childhood anxiety, depression, and somatic complaints. Future studies should work to more clearly delineate these complex relationships.

As indicated above, there are several factors that limit the generalizability of these findings, the first of which is the sociodemographic homogeneity of our sample. These mothers and their children were predominately Caucasian, came from high socioeconomic status backgrounds, and were able to gain ready access to mental health services. Given that sociocultural factors can bias expressions and perceptions of somatic complaints, future research should examine associations between child somatic complaints and maternal and child psychopathology within a more diverse population.²⁷

Although the use of secondary caregiver reports was a strength in the current study, there are some additional methodological issues to consider with regard to these reports. For example, we had a smaller sample size of secondary caregivers, who sometimes varied across study time points (e.g. father at preschool, teacher at school-age). Additionally, we computed bias by comparing maternal to secondary caregiver reports; ideally, maternal reporting bias due to psychopathology should be examined with more objective or standardized measures. For example, it has been suggested that reporter bias could be assessed by having depressed and control mothers rate multiple videotaped samples of their children's behaviors and that these ratings then be compared to those of trained observers.¹⁶ However, this alternative approach brings limitations of its own, including greater time and training efforts for mothers and researchers alike.

As the larger study for this project was not designed to assess associations between child somatic complaints and related psychopathology, we did not obtain potentially valuable information related to the physical health histories of these children. Given that no known studies have longitudinally examined the relationship between somatic complaints and medical diagnoses across early childhood, future studies should examine the prospective associations between early child somatic complaints, internalizing problems, and later diagnosed medical conditions. Additionally, although the somatic complaints are reported to have no known medical cause, it is unknown whether maternal psychopathology may have influenced medical care utilization and therefore the identification of underlying physical illnesses already present.

Finally, the CBCL is not an exemplary measure of somatic complaints. The internal consistencies for the maternal and secondary caregiver measures of preschool somatic complaints were low in our sample. Relatively low alphas for the somatic complaints scale have been noted in other studies.^{13,28} In addition, an international comparison study found that the somatic complaints subscale produced the lowest alpha of all the syndrome scales on the 1.5–5 CBCL.²⁹ This lower internal consistency in preschool, relative to later in childhood, might suggest that somatic complaints are more focused on a specific type of ache or pain earlier in development, and later transform into a more diffuse set of complaints that tend to co-occur. Future studies might explore this possible developmental progression; in the meantime, we acknowledge that the lower alpha noted for the preschool somatic

complaints scale in our study might have impaired our ability to make longitudinal predictions with these data.

Future work should perform similar analyses using a more targeted and empirically validated measure, such as the Children's Somatization Inventory.³⁰ This measure also allows for child reports, which is ideal for assessing internalizing symptoms. We argue, however, that since it is mothers who present concerns regarding their young children's physical complaints, studying their reports is quite useful.

Conclusions

The results of the current study suggest that preschool somatic complaints predict somatic complaints and increased anxiety and depression at school-age. Maternal psychopathology also predicted the incidence and persistence of childhood somatic complaints. These findings were not moderated by child sex and were generally consistent across maternal and secondary caregiver reports. This work demonstrates the importance of early detection of somatic complaints, and the need for evidence-based interventions for children with somatic complaints, particularly those at familial risk for developing internalizing disorders. Future research should follow children longitudinally from preschool into early adulthood to gain a more nuanced understanding of the emergence of somatic complaints across development and determine optimal periods of prevention and intervention. Pediatric primary care is an ideal setting to integrate such preventative efforts, as somatic complaints are often presented to general pediatricians long before parents may seek appropriate mental health care for their children. Currently, we know of no well-validated brief screening tools for somatic symptoms in early childhood that are practical for pediatricians to administer. Developing validated screening tools and evidence-based interventions are important directions for future work. In the meantime, primary care clinicians can include questions about somatic complaints (e.g., "Does your child complain about aches or pains?") as part of their routine developmental-behavioral surveillance during early childhood well-child visits and whenever parental concerns arise. Doing so may help prevent later internalizing disorders.

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Table 1**Demographic Characteristics**

Child Sex	
Male (N)	95
Female (N)	90
Child Age in Years: mean (SD)	7.16 (1.20)
Child Ethnicity	
Caucasian %	81.1%
African American %	9.7%
Hispanic %	2.7%
Asian %	1.6%
Other %	3.8%
Missing %	1.1%
Mother's Age in Years: mean (SD)	40.9 (4.9)
Mother's Education	
High School or Equivalent	7.1%
Two-Year Degree	6.0%
Bachelor's Degree	40.4%
Master's Degree	29.5%
Professional Degree	6.6%
Doctoral Degree	10.4%
Mother's Employment Status	
Unemployed/Not Working	28.7%
Employed Part-Time	24.9%
Employed Full-Time	45.3%
Retired	1.1%

Table 2

Somatic Complaints Raw Scores

	N	Min	Max	Mean	SD	Frequency of 1+ Somatic Complaint
Preschool						
Maternal	185	0	9	1.69	1.78	67.0%
Secondary Caregiver	159	0	7	1.33	1.53	60.4%
School-Age						
Maternal	185	0	12	.70	1.80	49.2%
Secondary Caregiver	138	0	16	1.19	2.06	46.4%

Table 3

Maternal- and Secondary Caregiver-Reported Correlations between Children's Somatic Complaints and Symptoms of Anxiety/Depression

Variable	1	2	3	4	5	6	7	8
1. Maternal-Reported Somatic PS	-	.344**	.276**	.128	.358**	.385**	.047	.138
2. Maternal-Reported Anx/Dep PS		-	.102	.386**	.342**	.499**	.201*	.278**
3. Sec. Caregiver-Reported Somatic PS			-	.379**	.151	.178*	.273**	.215*
4. Sec. Caregiver-Reported Anx/Dep PS				-	.119	.244**	.257**	.218*
5. Maternal-Reported Somatic SA					-	.570**	.514**	.236**
6. Maternal-Reported Anx/Dep SA						-	.326**	.494**
7. Sec. Caregiver-Reported Somatic SA							-	.455**
8. Sec. Caregiver-Reported Anx/Dep SA								-

*

p<0.05

**

p<0.01

Variables represent maternal and secondary (Sec.) caregiver reports of children's somatic complaints and anxiety/depression at preschool (PS) and school-age (SA).

Table 4

Summary of Maternal Psychopathology and Child Somatic Complaints

	<i>df</i>	<i>F Change</i>	<i>R² Change</i>	<i>p</i>
Number of Maternal Lifetime Diagnoses				
Mom-Report PS	215	6.725	.030	.010
SC-Report PS	107	.450	.004	.504
Mom-Report SA	181	7.632	.040	.006
SC-Report SA	106	3.064	.026	.083
Maternal Anxiety				
Mom-Report PS	215	1.317	.006	.252
SC-Report PS	107	1.462	.013	.229
Mom-Report SA	181	9.008	.047	.003
SC-Report SA	106	2.980	.025	.087
Maternal Depression				
Mom-Report PS	215	.485	.002	.487
SC-Report PS	107	1.717	.016	.193
Mom-Report SA	181	1.625	.009	.204
SC-Report SA	106	.489	.004	.486
Persistent Reported Somatic Complaints	<i>df</i>	<i>Wald</i>	<i>Exp (B)</i>	<i>p</i>
# Diagnoses-Mom Report	1	2.272	1.145	.132
# Diagnoses- SC Report	1	.295	1.094	.587
Anxiety- Mom Report	1	.410	1.244	.522
Anxiety- SC Report	1	.434	1.432	.510
Depression- Mom Report	1	5.076	2.184	.024
Depression- SC Report	1	.192	1.268	.661

PS, preschool; SA, school-age; SC, secondary caregiver

Bolded values indicate significance $p < .05$