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## Psychotic Symptoms and Suicidal Ideation in Child and Adolescent Bipolar I Disorder

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### Abstract

**Objectives:** The purpose of this study was to explore associations between specific types of hallucinations and delusions and suicidal ideation in a sample of children and adolescents with bipolar I disorder.

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Conflicts of Interest

Dr. Joiner is a paid consultant to Antares Pharma. The other authors report no biomedical financial interests or potential conflicts of interest.

**Methods:** Participants (N =379) were children and adolescents aged 6-15 years (M = 10.2, SD = 2.7) with DSM-IV diagnoses of bipolar I disorder, mixed or manic phase. The study sample was 53.8% female and primarily White (73.6% White, 17.9% Black, and 8.5% Other). Presence and nature of psychotic symptoms, suicidal ideation, and functioning level were assessed through clinician-administered measures. A series of logistic regressions was performed to assess the contribution of each sub-type of psychotic symptom to the presence of suicidal ideation above and beyond age, sex, socio-economic status, age at bipolar disorder onset, and global level of functioning.

**Results:** Hallucinations overall, delusions of guilt, and number of different psychotic symptom types were uniquely associated with increased odds of suicidal ideation after accounting for covariates. Other forms of delusions (e.g. grandiose) and specific types of hallucinations (e.g., auditory) were not significantly uniquely associated with the presence of suicidal ideation.

**Conclusions:** Findings of this study suggest the presence of hallucinations as a whole, delusions of guilt specifically, and having multiple concurrent types of psychotic symptoms are associated with the presence of suicidal ideation in children and adolescents with bipolar I disorder. Psychotic symptom sub-types, as opposed to psychosis as a whole, are an under-examined, potentially important, area for consideration regarding suicidal ideation in pediatric bipolar I disorder.

### Keywords

suicidal ideation; bipolar disorder; hallucinations; delusions; psychotic symptoms; child; adolescent

## Introduction

The risk of suicide for adults with a diagnosis of bipolar I disorder is approximately 15 times higher than that of the general population.<sup>1</sup> In particular, early onset bipolar disorder has been consistently linked to poor outcomes, such as suicidal ideation and suicide attempts, in both youth (proximal to onset) and adults (later in the course of illness).<sup>1,2</sup> Similarly, it has been suggested that the combination of increased severity, long illness course and burden, and behavioral disinhibition associated with youth bipolar disorders increase risk for suicide-related outcomes in children and adolescents with these diagnoses.<sup>3</sup> In a review of pediatric bipolar disorder, the weighted mean prevalence of lifetime suicide attempts was 21.3%, lifetime suicidal ideation was 57.4%, and current suicidal ideation was 50.4% for children and adolescents with bipolar disorders.<sup>2</sup> Some individual studies have found rates of lifetime suicidal ideation as high as 75–76% in samples of children and adolescents with bipolar I disorder.<sup>3,4</sup> Various factors have been associated with suicidal thoughts and behaviors in children and adolescents with bipolar disorder. Mood episode severity, persistence of mood episodes, mixed mood episodes, earlier onset, female gender, substance use disorders, psychosis, history of non-suicidal self-injury, suicidal ideation and suicide attempts, history of abuse, low quality of life, and low family functioning have each been associated with suicide attempts in pediatric bipolar disorder.<sup>2–5</sup> Additionally, Caucasian race, mixed mood episodes, severity of mood pathology, earlier age of onset, and psychosis have been associated with suicidal ideation.<sup>2–5</sup>

Of the array of factors associated with clinical severity and risk of suicidal thoughts and behaviors in bipolar disorders, psychotic symptoms are relatively understudied. Bipolar disorders are purposefully placed within the Diagnostic Statistical Manual-5<sup>th</sup> edition (DSM-5) between schizophrenia spectrum disorders and depressive disorders, as they may contain both mood-related and psychotic features, and thus, in a sense, bridge these two broader classifications.<sup>1</sup> Psychosis, including the occurrence of hallucinations or delusions, affects more than half of adults diagnosed with bipolar disorder.<sup>6</sup> The weighted mean prevalence of psychotic symptoms in youth with bipolar disorder is 28.3%, though incidence ranges from 16 to 87.5% across studies.<sup>2,7</sup> Pediatric samples with high representation of mixed mood episodes and rapid cycling mood also demonstrate particularly high rates of psychotic symptoms.<sup>8</sup>

Given the high rates of suicidal thoughts and behaviors found among both individuals with bipolar disorders and those with psychotic disorders (i.e. schizophrenia spectrum and delusional depression), prior research has investigated the link between psychotic symptoms and suicide-related outcomes. Numerous studies have found an association between delusions and hallucinations and suicide attempts and/or death by suicide in adult individuals with schizophrenia, bipolar disorder, or delusional depression.<sup>9–14</sup> In contrast, other research has found no such link.<sup>15–17</sup> Past work thus suggests that the relationship between hallucinations and delusions and suicide-related outcomes in adults is unclear.

This may, in part, be explained by the holistic approach the majority of studies use to assess hallucinations and delusions, combining types and sub-types of psychotic symptoms. Several studies have analyzed these components separately, yielding potentially more valid results. For instance, in one study, positive symptoms overall did not significantly relate to presence or severity of suicidal ideation, but auditory hallucinations and delusions of guilt were independently and significantly related to the presence and severity of suicidal thoughts.<sup>18</sup> Other studies have produced similar results, suggesting that specific types of positive symptoms, most often delusions of guilt, delusions of persecution, and auditory hallucinations, may be particularly related to suicidal thoughts and behaviors in adults with mood disorders.<sup>19–21</sup>

In comparison to mixed findings in adult samples, the relationship between psychotic symptoms and suicide-related outcomes among children and adolescents is more consistently supported.<sup>22–28</sup> Children and adolescents with psychotic symptoms have high rates of suicide attempts, ranging from 12% to 38%.<sup>22,29</sup> Research suggests suicidal ideation, suicide attempts, and death by suicide are more common in early-onset than adult-onset psychotic disorders, as well as being more common earlier in the illness, regardless of age of onset.<sup>30–32</sup> Children and adolescents diagnosed with a psychotic disorder are also more likely to experience suicidal ideation, suicide plans, and suicide attempts than their peers without psychosis.<sup>22</sup>

As in adult samples, little research has investigated unique contributions of specific subtypes of psychotic symptoms to suicide-related outcomes. A study specifically investigating auditory verbal hallucinations and their relationship to suicidal behaviors in Japanese school-aged children found that auditory verbal hallucinations were significantly related to

increased odds of positive suicide attempt history in those with suicidal ideation.<sup>24</sup> Another study found associations between visual hallucinations and subsequent suicide attempts, both retrospectively reported, in early adolescence (age 10–14).<sup>33</sup> Experiencing a greater number of psychotic symptoms has also been associated with suicidal ideation and self-injurious behaviors in psychotic adolescents.<sup>27</sup>

Despite evidence of a relationship between individual psychotic symptoms and suicide-related outcomes among children and adolescents with psychotic disorders broadly, this area is still relatively underexamined in children and adolescents with bipolar disorder specifically. Furthermore, as prior research has suggested, studies investigating the relationship between sub-types of psychotic symptoms and suicide-related outcomes may yield more specific and valid findings. Such knowledge could serve to clarify the relationship between individual psychotic symptoms and suicide-related outcomes in pediatric bipolar disorder, with potential implications for clinical assessment and management of risk. Thus, the purpose of the current study was to explore associations between individual subtypes of hallucinations and delusions and suicidal ideation, controlling for demographic variables, age at onset of bipolar disorder, and general levels of overall functioning, in a sample of children and adolescents with bipolar I disorder.

## Methods

### Participants

Participants were outpatient children and adolescents aged 6–15 years old ( $M = 10.2$ ,  $SD = 2.7$  years) with DSM-IV diagnoses of bipolar I disorder, mixed ( $n = 373$ ; 98.4%) or manic ( $n = 6$ ; 1.6%) phase, who participated in the baseline assessment of the Treatment of Early Age Mania (TEAM) study.<sup>34</sup> The study sample was 53.8% female and primarily White (73.6% White, 17.9% Black, and 8.5% Other). Average age at onset of bipolar disorder was 5.3 years ( $SD = 2.6$ ), and the majority of participants were experiencing rapid cycling mood at the time of assessment (99.7%). Additional details on sample characteristics and recruitment procedures can be found in the original TEAM study publication.<sup>34</sup> All participants who met eligibility criteria, completed the baseline assessment, and were assigned to a randomized medication group were included in the current analyses ( $N = 379$ ).

### Procedures

The TEAM study was an 8-week randomized, controlled trial comparing effects of three medications for the treatment of mania (risperidone, lithium carbonate, and divalproex sodium).<sup>34</sup> Participants were recruited from one of five medical centers from 2003–2008. Study eligibility criteria included: [1] current DSM-IV diagnosis of bipolar I disorder for at least 4 consecutive weeks before the baseline assessment, experiencing a mixed or manic episode at baseline; [2] poor overall functioning (a score of 60 or less at baseline), as assessed by the Children's Global Assessment Scale (CGAS)<sup>35</sup>; and [3] good physical health. Study exclusion criteria included: [1] IQ less than 70; [2] lifetime history of schizophrenia, pervasive developmental disorder, and/or any major medical or neurological disease; [3] substance dependence or alcohol or drug abuse within 4 weeks preceding the baseline assessment; [4] being currently pregnant, nursing, or sexually active and not using

contraceptives; [5] imminent suicide risk (i.e. risk requiring immediate hospitalization), and/or [6] lifetime use of the medications being investigated in the study or their pharmacological equivalents. Further details of methodology and procedures may be found in the published version of the original study.<sup>34</sup> Informed consent was obtained from participants' adult caretakers and assent was obtained from participants prior to administration of study measures or medications. All procedures were approved by the human studies committees at each site.

## Measures

**Washington University in St. Louis Kiddie Schedule for Affective Disorders and Schizophrenia (WASH-U-KSADS).**<sup>36</sup>—The WASH-U-KSADS is a semi-structured clinical interview that assesses for the presence of current and lifetime DSM-IV psychiatric disorders. It is administered by trained research assistants to caretakers and children separately. The WASH-U-KSADS was utilized to make diagnostic determinations regarding current and lifetime bipolar I disorder. The WASH-U-KSADS was administered by trained research nurses, and all interviews were recorded and assessed by a second independent investigator. Ratings were conferred upon final agreement by both raters. For purposes of the present analyses, the WASH-U-KSADS was also utilized to assess for current presence and type of hallucinations (i.e. visual, auditory, tactile, olfactory) and delusions (i.e. reference, being controlled, mind reading, guilt/sin, persecutory, somatic, nihilistic, grandiose), with a rating of “3” or higher denoting presence of psychotic symptoms. All participants and caregivers were queried about these symptoms regardless of presentation. Research has documented the reliability of the WASH-U-KSADS.<sup>36</sup>

**Children's Depression Rating Scaled-Revised (CDRS-R).**<sup>37</sup>—The CDRS-R is a clinician administered and rated assessment of current symptoms of depression. For purposes of this study, item 13 was utilized to assess current suicidal ideation. Item 13 is coded on a 1 to 7 scale, with higher ratings indicating more severe suicidal ideation. The rating scale is as follows: 1 = “Understands the word suicide, but does not apply the term to himself/herself”; 2 = “Sharp denial of suicidal thoughts”; 3 = “Has thoughts about suicide, or of hurting himself/herself [if he/she does not understand the concept of suicide], usually when angry”; 4 = No anchor provided; 5 = “Has recurrent thoughts of suicide”; 6 = No anchor provided; 7 = “Has made a suicide attempt within the last month or is actively suicidal.” As this item is ordinal, with relatively arbitrary distinctions between ratings, use as a continuous measure of severity of suicidal ideation is not advisable. As such, the item was utilized as a categorical indicator of suicidal ideation, with responses dichotomized so that scores less than or equal to 2 indicate absence of suicidal ideation, while scores greater than or equal to 3 indicate presence of suicidal ideation. This handling of the variable is consistent with its use and interpretation in past research.<sup>38,39</sup> All participants were asked about suicidal ideation, regardless of presentation. The CDRS-R has demonstrated reliability and validity,<sup>40,41</sup> and item 13 has demonstrated convergent validity.<sup>41</sup>

**Children's Global Assessment Scale (CGAS).**<sup>35</sup>—The CGAS is a clinician-administered measure of global functioning, based on ratings of functioning in home, school, and social domains. The CGAS yields an overall score between 1 and 100 that

indicates severity of impairment, with lower scores indicating greater impairment in functioning. Scores of 60 or less signify clinical impairment and were an inclusion criterion for the TEAM study. CGAS scores in this study sample ranged from 15 to 55 ( $M = 39.01$ ,  $SD = 6.37$ ). The CGAS has demonstrated strong psychometric properties in previous research.<sup>42</sup>

### Data Analytic Strategy

Descriptive statistics were first computed to identify the proportions of participants who reported delusions, hallucinations, and suicidal ideation. A series of logistic regressions was then conducted to examine the unique and joint contributions of psychotic symptoms to suicidal ideation, above and beyond current age, sex, socio-economic status, and age at onset of bipolar disorder, and before and after covarying global assessment of functioning (CGAS). Accounting for functioning level, demographic variables that have been associated with suicidal ideation, and an indicator of bipolar disorder severity (age of onset) removes potential confounds in which psychotic symptoms may simply be associated with suicidal ideation due to their occurrence in individuals with overall more severe psychopathology. Other potential covariates that have been related to suicidal ideation and/or bipolar disorder severity in past work (i.e. episode duration; mood symptom severity, number of mood episodes; rapid cycling bipolar disorder; mood congruency of psychotic symptoms; comorbid disorders; race) were not included in our models because they were unrelated to both psychotic symptoms and suicidal ideation in the current study sample. The presence of suicidal ideation (yes/no) was entered as the outcome variable in all models. In the first logistic regression, the presence of any delusions (yes/no) and the presence of any hallucinations (yes/no) were entered to examine their effects on suicidal ideation. Then, a follow-up logistic regression examined the effect of each type of delusion (e.g. reference, being controlled, etc.) on suicidal ideation, controlling for presence of hallucinations. Next, another follow-up logistic regression examined the effects of various types of hallucinations (visual, auditory, tactile, olfactory) on suicidal ideation, controlling for presence of delusions. Finally, the number of different hallucination and delusion types experienced by a participant overall (e.g., one, two, three, etc. of visual, auditory, tactile, etc. and reference, being controlled, etc.) was examined in relation to suicidal ideation, again utilizing logistic regression. Current age, sex, socioeconomic status, and age at onset of bipolar disorder were included as covariates in Step 1 for all models. CGAS was entered as an additional covariate in Step 2 of all analyses to examine sensitivity of the effects of psychotic symptoms on suicidal ideation, that is, whether such effects are independent of the effects of general severity of psychopathology. As an additional exploratory aim, we conducted additional analyses in which we repeated analyses with the sample split by (1) sex and (2) pubertal status in order to assess whether the pattern of results differed across these groups.

### Results

Of the 379 participants, 309 (81.5%) screened positively for delusions, and 158 (41.7%) screened positively for hallucinations. Additionally, 216 participants (57.0%) screened positively for suicidal ideation. The distributions (number and percentage) of participants

experiencing each type of delusion, each type of hallucination, and overall number of types of psychotic symptoms endorsed are presented in Table 1.

A logistic regression was then computed to examine whether the presence of delusions and hallucinations was associated with suicidal ideation, above and beyond the effects of demographic and clinical variables. The overall model explained 15.8% (Nagelkerke  $R^2$ ) of the variance in suicidal ideation. In Step 1, hallucinations (OR = 2.35, 95% CI = 1.49–3.69,  $p < .001$ ), but not delusions (OR = 1.28, 95% CI = 0.73–2.22,  $p = .389$ ) or demographic and clinical covariates (ORs = 0.73–1.01,  $ps = .141-.938$ ), were associated with the presence of suicidal ideation. These effects remained after covarying CGAS in Step 2 (OR = 0.905, 95% CI = 0.87–0.94,  $p < .001$ ), such that hallucinations (OR = 2.06, 95% CI = 1.29–3.29,  $p = .003$ ), but not delusions (OR = 0.97, 95% CI = 0.54–1.73,  $p = .917$ ) or demographic and clinical covariates (ORs = 0.77–1.04,  $ps = .234-.736$ ), were related to the presence of suicidal ideation.

Next, we conducted a follow-up test to determine whether specific types of delusions were related to suicidal ideation. The overall model explained 18.8% (Nagelkerke  $R^2$ ) of variance in suicidal ideation. In Step 1, delusions of guilt or sin (OR = 2.64, 95% CI = 1.15–6.06,  $p = .023$ ) and the overall effect of hallucinations (OR = 1.89, 95% CI = 1.17–3.05,  $p = .009$ ), but not other types of delusions (ORs = 0.87–2.92,  $ps = .110-.929$ ) or other demographic and clinical covariates (ORs = 0.70–1.03,  $ps = .106-.768$ ), were associated with the presence of suicidal ideation. After accounting for CGAS (OR = 0.91, 95% CI = 0.87–0.95,  $p < .001$ ) in Step 2, delusions of guilt or sin (OR = 2.41, 95% CI = 1.01–5.71,  $p = .046$ ) and the overall effect of hallucinations (OR = 1.77, 95% CI = 1.08–2.91,  $p = .023$ ) retained significance, and effects of all other delusion types (ORs = 0.78–2.15,  $ps = .244-.927$ ) and of other demographic and clinical covariates (ORs = 1.00–1.03,  $ps = .524-.995$ ) remained non-significant.

Next, follow-up analyses aimed to clarify which types of hallucinations were related to suicidal ideation. The overall model explained 15.4% (Nagelkerke  $R^2$ ) of the variance in suicidal ideation. In both Step 1 and Step 2, no types of hallucinations (ORs = 0.61–1.97,  $ps = .081-.390$ ), or demographic and clinical covariates (ORs = 0.75–1.39,  $ps = .180-.832$ ), were uniquely associated with the presence of suicidal ideation. In Step 2, CGAS (OR = 0.90, 95% CI = 0.87–0.94,  $p < .001$ ) was the only variable which made a significant independent contribution to suicidal ideation.

Next, we examined whether the number of different types of psychotic symptoms experienced by participants predicted suicidal ideation, above and beyond the effects of demographic and clinical variables. The overall model explained 14.4% (Nagelkerke  $R^2$ ) of the variance in suicidal ideation. The number of types of psychotic symptoms experienced was associated with suicidal ideation, both before (OR = 1.43, 95% CI = 1.15–1.78,  $p = .001$ ) and after (OR = 1.30, 95% CI = 1.03–1.,  $p = .025$ ) covarying CGAS (OR = 0.90, 95% CI = 0.87–0.94,  $p < .001$ ). In contrast, demographic and clinical covariates were not significantly related to suicidal ideation before (ORs = 0.71–1.03,  $ps = .115-.969$ ) or after (ORs = 0.76–1.04,  $ps = .228-.714$ ) inclusion of CGAS.



Last, in additional exploratory analyses with the sample split by (1) sex and (2) pubertal status, results differed from analyses in the full sample in the following ways. For males only, visual hallucinations were positively related to suicidal ideation (OR = 2.70; 95% CI = 1.01–7.17,  $p = .047$ ). For pre-pubertal participants only, grandiose delusions were significantly related to reduced odds of suicidal ideation (OR = .48; 95% CI = .24-.96,  $p = .038$ ), and the number of types of psychotic symptoms experienced was unrelated to suicidal ideation. For pubertal participants only, overall hallucinations were unrelated to suicidal ideation.

## Discussion

The present study examined relationships between psychotic symptoms and suicidal ideation in a clinical outpatient sample of children and adolescents with bipolar I disorder. In this study sample, the overall presence of hallucinations; delusions of guilt or sin, specifically; and experiencing multiple types of psychotic symptoms were cross-sectionally associated with suicidal ideation above and beyond the effects of overall functioning and demographic and clinical variables. Study results are consistent with past findings indicating there is an association between psychotic symptoms and suicidal ideation in youth.<sup>22–28</sup> As in past research on adults with mood disorders, delusions of guilt were significantly and independently related to suicidal ideation.<sup>18–20</sup> Our results, however, somewhat contrasted with previous findings<sup>18–21,24,33</sup> in that we did not find significant relationships between auditory hallucinations, visual hallucinations, or persecutory delusions and suicidal ideation, once we accounted for overall level of functioning.

Previous studies examining subtypes of psychotic symptoms have largely investigated such differences in adults with schizophrenia, so contrasting findings may be due to the focus on different age and diagnostic groups. Alternately, it may be that these types of psychotic symptoms are associated with suicidal ideation only under specific circumstances. For example, research indicates that, among those who experience psychotic symptoms, the valence and quality of individuals' perception of such experiences influences psychopathology-related impairment and distress, such that those who accept and have positive interactions with voices report lower levels of distress and impairment than those who are frightened or antagonized by voices.<sup>43–45</sup> If this were taken into account, the pattern of results in the current study may have differed. For example, auditory hallucinations overall were not significantly related to suicidal ideation in this sample, after accounting for overall functioning. Perhaps violent or frightening auditory hallucinations could be related to suicidal ideation, whereas benign voices or sounds may not be. Similar arguments could be made for persecutory delusions, so this may be an area worthy of more in-depth examination in future studies. Though we were unable to evaluate participants' appraisal of their psychotic symptoms, the finding that grandiose delusions were associated with reduced odds of suicidal ideation, and that number of psychotic symptoms was unrelated to suicidal ideation, in pre-pubertal participants is interesting to consider in this context. It may be that those with grandiose delusions experience less distress from psychotic symptoms, even when experiencing multiple forms of psychosis, and that this leads to less suicidal ideation than among those experiencing only non-grandiose psychotic symptoms. We cannot definitively say why grandiosity appeared to be somewhat protective for pre-pubertal

participants and was less so for pubertal participants. It may be that early grandiosity is relatively unalloyed in comparison to grandiosity occurring later in development, at which time it may occur alongside or be related to the stressors of adolescence, negative social or educational consequences, or other factors. Future work may wish to examine age effects and grandiosity in greater detail. Next, in the current sample, 98.4% of participants were experiencing a current mixed episode, limiting our ability to evaluate the role of mood episode subtype. Future studies examining differences in psychotic symptom subtypes, distress, and suicidal ideation among youth with mixed, depressive, and manic episodes are needed.

Previous work has linked a greater number of psychotic symptoms to suicidal ideation and self-injurious behaviors in psychotic adolescents.<sup>27</sup> The current study is the first to associate suicidal ideation in youth bipolar disorder to the number of types of psychotic symptoms experienced. Results of this study may be best viewed as a starting point for future investigations in this area. Importantly, this association was significant above and beyond global functioning, so it is unlikely that this is simply a product of overall more severe psychopathology. It may be that multiple forms of psychotic symptoms are more frightening or disturbing to children and adolescents than is a single type, three types are more frightening or disturbing than two, etc. Regardless of the specific types of symptoms they are experiencing, it may be increasingly difficult to cope as multiple senses are disconnected from reality. Again, research on this topic is lacking, making it an area worthy of future attention.

Developing a more precise understanding of factors associated with suicidal thoughts and behaviors is essential to enhancing suicide prevention efforts and clinical risk assessment and management; therefore, the current findings associating delusions of guilt or sin and experiencing multiple types of positive psychotic symptoms with suicidal ideation are promising. When assessing psychotic symptoms, presence of these may indicate a suicide risk assessment and ongoing monitoring is warranted, as study results suggest these symptoms are likely to co-occur with elevated suicidal ideation. Due to the lack of comparable studies, replication of these findings is needed.

### Limitations and Future Directions

This study revealed new, potentially important, information regarding suicidal ideation in youth with bipolar I disorder. The high proportion of individuals reporting psychotic symptoms, representation of diverse subtypes of hallucinations and delusions, use of well-validated measures, and recruitment of a clinical sample are strengths of the current study, but it is not without limitations.

First, the design was cross-sectional, precluding any conclusions about temporality and causality. Though the original TEAM study was longitudinal, the nature of the study (a clinical trial with three active medication groups, in which study medications may have affected both psychotic symptoms and suicidal ideation) made it inadvisable to utilize multiple time points for the current study. We hypothesize that psychotic symptoms contribute to suicidal ideation, but this cannot be confirmed without prospective examination.

Second, though this study utilized five medical centers, representing geographic diversity, and had a nearly 50% gender split, the sample was primarily White and treatment-seeking and therefore may not be representative of the child and adolescent bipolar I population as a whole. Further, the unusually high rates of psychotic symptoms and suicidal ideation, as well as the homogenous severity of participants (i.e. predominantly mixed mood episodes, very early onset, rapid cycling) indicate this study sample may be especially severe, and so not representative. Some, however, have suggested there is a prepubertal and early adolescent subtype of bipolar disorder that is characterized by mixed mood episodes, very high rates of psychotic symptoms, and rapid cycling mood.<sup>8</sup> Characteristics of our study sample were relatively consistent with this picture (60.2% of participants in the cited study, and up to 87.5% in others, exhibited psychotic symptoms.<sup>7,8</sup> Still, it is possible that psychotic symptoms were over-diagnosed in this sample, despite the use of a validated interview administered by highly trained research staff and evidence that psychotic symptoms may be especially prevalent in samples such as ours. Rates of suicidal ideation in the current study (57.0%) were in line with those in previous work investigating youth bipolar samples (mean prevalence 50.4%).<sup>2</sup>

Information was not gathered regarding specific content of hallucinations and delusions experienced by participants, or their perception of these symptoms (e.g. level of distress, interaction with images or voices, coping skills used, etc.). Future studies may benefit from gathering information regarding qualitative content of, subjective distress related to, and appraisal of hallucinations and delusions when examining this area, in order to better assess the validity of diagnoses, as well as to investigate how such qualitative information relates to suicidal ideation. Additionally, a CGAS score of 60 or less was an inclusion criterion for this study, leading to a range of 15–55, where the full scale ranges from 1 to 100.<sup>42</sup> It would be informative to examine associations between psychotic symptoms and suicidal ideation in individuals with higher and lower levels of functioning, as the pattern of results may be different if range of functioning was not restricted. Some research indicates insight is associated with suicidal ideation and higher numbers of suicide attempts in adults with psychotic disorders,<sup>31,32</sup> though it is unclear whether this extends to pediatric samples. Insight may be greater at higher levels of functioning, and this may influence appraisal and distress related to psychotic symptoms. We were also unable to assess differences in psychotic symptoms and suicidal ideation by manic versus mixed episode-type, due to the homogeneity of the sample (98.4% mixed mood episode), therefore future studies may wish to incorporate episode type as a moderator.

Finally, this was a secondary data analyses, limiting us to measures included in the original study, for example, a brief measure of suicidal ideation. This study measure was not designed to be used as a continuous measure of severity, so we utilized it as a dichotomous variable reflective of presence/absence of suicidal ideation, a method of categorization that has been demonstrated to represent increased suicide risk in past work.<sup>38,39</sup> Though a designation of “7” on CDRS-R item 13 indicates “Has made a suicide attempt within the last month or is actively suicidal,” this item conflates suicidal thoughts and suicidal behaviors, and so cannot be assumed reflective of suicidal behaviors. As such, we were unable to examine suicide attempts as a dependent variable. Exclusion of participants at imminent risk for suicide also limited our ability to make conjectures about suicidal behaviors. Additional

work is needed to determine whether the associations found in this study would translate to an imminent risk sample or to suicidal behaviors. More information could be gathered using a comprehensive measure of both suicidal ideation and suicidal behaviors in a sample without a risk exclusion, possibly producing more precise and clinically meaningful results. Of note though, few studies of suicide-related outcomes in child and adolescent bipolar have utilized assessments of suicidal thoughts or behaviors that are validated for use in youth samples.<sup>2</sup> Though the CDRS-R is not a comprehensive assessment of suicidal thoughts and behaviors, it is appropriate for use in pediatric samples,<sup>41</sup> lending some merit to its use in the current study.

## Conclusions

This study is the first to our knowledge to investigate associations between sub-types of psychotic symptoms and suicidal ideation in children and adolescents with bipolar I disorder. Results suggest delusions of guilt and experiencing multiple types of psychotic symptoms are uniquely associated with suicidal ideation in this group. Future studies should assess relationships between positive psychotic symptoms and suicidal ideation longitudinally, evaluate content and appraisal of positive psychotic symptoms in greater detail, utilize samples with increased ranges of functioning and of suicide risk, and include more comprehensive measures of suicidal thoughts and behaviors. These findings merit further study, as results suggest specific clinical features of psychotic symptoms are an under-examined, yet potentially important, area for consideration regarding suicidal ideation in child and adolescent bipolar I disorder.

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**Table 1**

Distribution of Psychotic Symptoms Across the Study Sample

	<i>n</i>	Valid %
<b>Delusion Types</b>		
Reference	38	10.0%
Being Controlled	22	5.8%
Mind Being Read	19	5.0%
Guilt or Sin	41	10.8%
Persecutory	58	15.3%
Somatic	15	4.0%
Nihilistic	18	4.7%
Grandiose	281	74.1%
<b>Hallucination Types</b>		
Auditory	121	31.9%
Visual	75	19.8%
Tactile	49	12.9%
Olfactory	30	7.9%
<b>Number of Types of Psychotic Symptoms</b>		
None	62	16.4%
One	125	33.0%
Two	66	17.4%
Three	55	14.5%
Four	40	10.6%
Five	11	2.9%
Six or More	20	5.3%