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Within-Person Relationship between Attenuated Positive Symptoms and Suicidal Ideation among Individuals at Clinical High Risk for Psychosis

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ABSTRACT

Individuals at clinical high-risk for psychosis (CHR-P) are at increased risk for suicide. However, the relationship between attenuated positive symptoms and suicidal ideation are not well understood, particularly as they interact over time. The current study addressed this gap in the literature. We hypothesized that greater attenuated symptoms would be concurrently and prospectively associated with suicidal ideation. Further, we hypothesized that suspiciousness and perceptual abnormalities would have the strongest relationship with suicidal ideation. Within-person variation in symptoms and suicidal ideation were examined across 24 treatment sessions for individuals at CHR-P. Attenuated positive symptoms (unusual thought content, suspiciousness, grandiose ideas, perceptual abnormalities, and disorganized communication) and suicidal ideation were assessed at each session. Logistic mixed effect models examined concurrent and time-lagged relationships between symptoms and suicidal ideation among 36 individuals at CHR-P. Results indicated that suicidal ideation was more likely during weeks when participants reported more severe total attenuated positive symptoms. Further, suspiciousness was uniquely associated with suicidal ideation, both concurrently and at the following session. Post hoc models examined the reverse direction of this relationship, demonstrating that suicidal ideation also prospectively predicted suspiciousness at the following session. These results suggest that within-person attenuated symptoms, particularly suspiciousness, are associated with suicidal ideation among individuals at CHR-P. However, the bidirectional relationship between suspiciousness and suicidal ideation raises questions about causal nature of this relationship. Further research is needed to examine the dynamic interplay of suspiciousness and suicidal ideation.

KEYWORDS

Attenuated psychotic symptoms; psychosis risk; suicidal ideation; suicide risk; suspiciousness

Suicide is the third leading cause of death for adolescents and young adults in the United States, with over 6,000 deaths occurring in 2020 alone (Centers for Disease Control & Prevention, 2022). Young adults with psychotic disorders are at particularly high risk for suicide (Moe et al., 2022), with approximately 10% engaging in suicidal behavior during the few years after diagnosis (Bornheimer, 2019; Pelizza et al., 2021). Importantly, psychotic disorders are often preceded by a prodromal period characterized by attenuated positive

symptoms (Fusar-Poli et al., 2013) and a number of studies have demonstrated that this stage of illness is also characterized by heightened suicide risk (Taylor et al., 2015). Specifically, a meta-analysis showed that 66% of individuals at clinical high-risk for psychosis (CHR-P) endorse recent suicidal ideation and 11% report lifetime suicidal behavior (Taylor et al., 2015). These rates are notably higher than those observed in the general population, of which approximately 11.3% of young adults (18–25) endorse serious suicidal thoughts and 1.9% endorse in suicidal behavior (Centers for Disease Control & Prevention, 2022). Some studies have even shown that individuals at CHR-P have higher severity suicidal ideation and a greater history of suicidal behavior than individuals experiencing a first-episode of psychosis (Pelizza et al., 2020; Pelizza et al., 2020).

Despite this growing body of literature, very little is known about factors that contribute to suicide risk among individuals at CHR-P. Studies to date have shown that greater comorbidities (Haining et al., 2021; Taylor et al., 2015), poorer global and social functioning (Demjaha et al., 2012; Preti et al., 2009), and childhood trauma/adversity (Salokangas et al., 2019) are associated with increased suicide risk in this population. Surprisingly few studies have examined the relationship between attenuated positive symptoms and suicide risk among individuals at CHR-P, a notable gap in the literature given the well-established finding that positive symptoms are associated with suicidal ideation, attempts, and death among individuals with psychotic disorders (Huang et al., 2018). Relatedly, studies examining psychotic experiences in the general population have consistently found that suspiciousness and perceptual abnormalities are significantly associated with suicidal ideation (Capra et al., 2015; Hielscher et al., 2021a; Núñez et al., 2018, 2020; Wastler & Núñez, 2022). The few studies examining the relationship between attenuated positive symptoms and suicide risk among individuals at CHR-P have been mixed, with one study finding a significant relationship between suspiciousness and suicidal ideation (Bang et al., 2019) and other studies finding no relationship between attenuated symptoms and suicide risk (D'Angelo et al., 2017; Gill et al., 2015; Pelizza et al., 2020; Pelizza et al., 2019). One study even found that *lower* attenuated symptom severity was associated with suicidal ideation (Haining et al., 2021).

Importantly, this literature has been limited by the use of cross-sectional designs, which preclude inferences about directionality and causal relationships between attenuated positive symptoms and suicide risk among individuals at CHR-P (Breitborde et al., 2010; Kraemer et al., 2000). This is particularly relevant in the context of attenuated symptoms and suicidal ideation, as prior research has shown that both attenuated positive symptoms (Michel et al., 2018) and suicidal ideation (Kleiman et al., 2017; Wastler et al., 2023) fluctuate over short periods of time. Thus, studies assessing lifetime or even past month suicidal ideation, might not be sensitive enough to capture the dynamic nature of these constructs. Longitudinal research with repeated assessment of within-person effects is a critical avenue to determine whether acute changes in attenuated symptoms are associated with acute changes in suicidal ideation.

Therefore, the purpose of the current study was to examine the within-person relationship between attenuated positive symptoms and suicidal ideation among individuals at CHR-P. Attenuated positive symptoms (unusual thought content, suspiciousness, grandiose ideas, perceptual abnormalities, and disorganized communication) and suicidal ideation were assessed at each session for 24 sessions of step-based care for CHR-

P (Breitborde et al., 2020; Nelson et al., 2018). Logistic mixed effects models examined concurrent and time-lagged within-person relationships between symptoms and suicidal ideation. Given the broader literature demonstrating that positive symptoms are associated with suicide risk among individuals with psychotic disorders (Huang et al., 2018), we hypothesized that greater total attenuated positive symptoms would be associated with suicidal ideation both concurrently and at the next session. Based on prior research (Bang et al., 2019; Capra et al., 2015; Núñez et al., 2018; Wastler & Núñez, 2022), we also hypothesized that suspiciousness and perceptual abnormalities would be associated with concurrent and next session suicidal ideation.

MATERIALS AND METHODS

Participants and Procedures

Thirty-six individuals at CHR-P were recruited from The Ohio State University Early Psychosis Intervention Center (EPICENTER). Eligibility criteria for the program includes 1) meeting criteria for clinical high-risk syndrome assessed using the Structured Interview for Psychosis-Risk Syndromes (SIPS) (McGlashan et al., 2010), 2) ages 12–25, and 3) no evidence of a primary intellectual disability. EPICENTER enrolls individuals with any of the three psychosis-risk syndromes (Attenuated Positive Symptom Syndrome, Brief Intermittent Psychotic Syndrome, and Genetic Risk and Deterioration Syndrome) as well as individuals across any of the four status specifiers (progression, persistence, partial remission, and full remission). A retrospective chart review was used to obtain data collected as part of standard clinical care for individuals who enrolled in EPICENTER's CHR-P program from December 2018 to September 2021. Demographics, diagnosis, history of suicidal ideation, and history of suicide attempts were obtained from the baseline (intake) visit, whereas attenuated positive symptoms and suicidal ideation were obtained at each psychotherapy visit. See Breitborde et al. (2020) for details regarding the EPICENTER CHR-P treatment program.

Measures

History of suicidal ideation and attempts were assessed using the following items. 1) Over the past 2 weeks, have you had thoughts of killing yourself; 2) A multiple select item assessing current suicidal ideation (response options: denied by patient; patient admits to thoughts but denies active plan or intent; chronic thoughts with no previous attempts; history of multiple suicide attempts; unable to contract to no self-harm); and 3) Have you ever attempted to kill yourself? Additionally, we examined open-text sections of the intake note for further indications of historical suicidal ideation and/or attempts. This information was used to create binary variables indicating the history of suicidal ideation and attempts. Suicidal ideation was documented at each session using the item, “*Over the past 2 weeks, have you had thoughts of killing yourself?*” Binary responses were coded to indicate the presence or absence of suicidal ideation. Attenuated positive symptoms were assessed using the positive subscale of the SIPS (McGlashan et al., 2010), which is a five-item clinician rated scale that assesses unusual thought content/delusional ideas (P1), suspiciousness/persecutory ideas (P2), grandiose

ideas (P3), perceptual abnormalities/hallucinations (P4), and disorganized communication (P5). Items were rated on a 0 to 6 scale, with scores of 3–5 representing attenuated symptoms and scores of 6 representing frank symptoms of psychosis.

Statistical Analyses

Statistical analyses were carried out using R version 4.2.1 (R Core Team, 2018). Descriptive statistics were used to examine participant demographics, attenuated positive symptoms, and suicidal ideation during the study period. Our primary analyses were a series of logistic mixed effects models (i.e., generalized linear mixed models with binomial family and logistic link) calculated with lme4 version v1.1-30 (Bates et al., 2015). In the four models, independent variables were: 1) total attenuated positive symptom scores; 2) lagged total attenuated positive symptom scores (i.e., scores at the previous therapy session); 3) specific attenuated positive symptom scores (P1 through P5); and 4) lagged specific attenuated positive symptom scores (P1 through P5 scores at the previous therapy session). The presence of suicidal ideation at each session was the dependent variable for all four models. Models also included age, gender identity, presence of a mood disorder diagnosis, history of suicidal ideation, and history of suicide attempts as covariates. As a test of robustness, all models were repeated without covariates. Effects of symptoms on suicidal ideation did not differ in models with vs. without covariates; therefore, only models with covariates are reported. Total and specific attenuated symptom scores were disaggregated into within- and between-person components by person-mean centering at level 1 (within-person) and reintroducing each participant's mean score as a level 2 predictor (between-person). Models were fitted as random intercept models due to convergence issues in random slope models (Singer & Willett, 2003; Wang & Maxwell, 2015). Hypothesis testing of fixed effects was conducted using *t*-tests with Satterthwaite's method of estimating degrees of freedom.

To shed light on issues of causality and directionality, we also conducted post hoc bidirectional analyses to examine the time-lagged relationship between attenuated symptoms and suicidal ideation. Specifically, establishing a timeline and examining the directionality of the relationship between these variables is an essential step toward determining whether attenuated symptoms are proxy versus causal risk factors (Kazdin, 2007; Kraemer et al., 2000). For these models, suicidal ideation was the independent variable and attenuated symptoms served as the dependent variable. Suicidal ideation was separated into within- and between-person components following the same procedure as continuous variables (Wang & Maxwell, 2015). Models predicting symptom scores were calculated as standard linear mixed effects models. Bi-directional models were only conducted if the original time-lagged model (i.e., attenuated symptoms (T) predicting suicidal ideation ($T + 1$)) was significant at the $p < 0.05$ level.

RESULTS

Participant Characteristics

Demographic characteristics are summarized in Table 1. Our sample was 50.0% woman, 72.2% Caucasian, and 97.2% non-Hispanic/Latinx. Most participants endorsed a history

TABLE 1. Participant characteristics.

Participant characteristics	n (%)
Age (M ± SD)	19.42 ± 2.48
Gender identity	
Woman	18 (50.0%)
Man	15 (41.7%)
Non-binary	3 (8.3%)
Race	
Caucasian	26 (72.2%)
African American or Black	7 (19.4%)
Asian American	3 (8.3%)
Ethnicity	
Non-Hispanic/Latinx	35 (97.2%)
History of suicidal ideation	24 (66.7%)
History of suicide attempt (s)	8 (22.2%)

of suicidal ideation (66.7%); approximately one quarter (22.2%) of the sample endorsed a history of suicide attempts. Participants attended a median of 22 sessions during the study period, with 30 participants (83.3%) attending 6 or more sessions, and 11 participants (30.5%) attending all 24 sessions. Analyses included a total of 602 participant sessions. The amount of time in treatment also varied across participants (range= 30–393days), with the average amount of time in treatment being 170.33 ± 97.35 days (median = 171 days). The average time between sessions was 10.74 ± 13.82 days. Suicidal ideation was reported in 147 out of 602 sessions (24.4%). As shown in Table 2, nearly all instances of suicidal ideation (141 out of 147 instances [95.9%]) were reported by participants who endorsed a prior history of suicidal ideation at baseline (intake). Participants' person-mean level of attenuated positive symptoms across sessions were as follows: total attenuated positive symptoms = 1.39 ± 0.57 ; unusual thought content (P1) = 2.02 ± 0.92 ; suspiciousness (P2) = 1.60 ± 0.83 ; grandiosity (P3) = 0.32 ± 0.26 ; perceptual abnormalities (P4) = 1.99 ± 0.90 ; disorganized communication (P5) = 0.77 ± 0.40 .

Total Attenuated Positive Symptoms and Suicidal Ideation

Table 3 summarizes results from the logistic mixed effect models examining the concurrent and time lagged relationship between total attenuated positive symptoms and suicidal ideation. Total positive symptoms (at the within-person level, but not the between-person level) were concurrently associated with the presence of suicidal ideation (odds ratio [OR]=1.46, $p = .038$). In the lagged model, total attenuated positive symptoms at session T were not prospectively associated with ideation at session $T + 1$, (OR = 1.28, $p = .172$). In both models, very wide confidence intervals were observed for categorical baseline predictors (history of suicidal ideation, history of suicide attempts, and gender identity) likely due to the relatively small level 2 sample size in each category. Nevertheless, pre-treatment history of suicidal ideation was strongly associated with suicidal ideation during treatment in both the concurrent and time lagged models. This finding reflects the extremely low prevalence of suicidal ideation among participants without a history of ideation (6 instances out of 204 sessions; 2.9%); see Table 2 for details.

TABLE 2. Instances of suicidal ideation (SI) during treatment.

	SI during treatment	No SI during treatment
History of SI	141 (23.4%)	257 (42.7%)
No History SI	6 (1.0%)	198 (32.9%)

TABLE 3. Concurrent and time lagged relationship between total attenuated positive symptoms and suicidal ideation.

	Concurrent model		Time lagged model	
	OR	95% CI	OR	95% CI
<i>Symptoms</i>				
Positive symptom (within)	1.46*	[1.02, 2.09]	1.28	[0.90, 1.83]
Positive symptoms (between)	2.40	[0.91, 6.04]	2.41	[0.94, 6.15]
<i>Baseline covariates</i>				
Age	0.79	[0.53, 1.19]	0.79	[0.53, 1.19]
Gender man vs woman	4.23	[0.58, 31.02]	4.19	[0.58, 30.29]
Gender non-binary vs woman	3.40	[0.12, 98.80]	3.48	[0.12, 98.05]
History of suicidal ideation	128.2***	[7.61, 2159.32]	114.74**	[7.00, 1882.08]
History of suicide attempts	2.50	[0.26, 23.86]	2.38	[0.25, 22.29]
Mood disorder diagnosis	0.38	[0.06–2.33]	0.41	[0.07–2.50]

Note: * $p < .05$; ** $p < .01$; *** $p < .001$; † $p = .060$.

TABLE 4. Concurrent and time lagged relationship between specific attenuated positive symptoms and suicidal ideation.

	Concurrent model		Time lagged model	
	OR	95% CI	OR	95% CI
<i>Symptoms (within-person)</i>				
Unusual thought content (P1)	1.05	[0.81, 1.38]	0.87	[0.65, 1.14]
Suspiciousness (P2)	1.49*	[1.10, 2.02]	1.66**	[1.20, 2.30]
Grandiosity (P3)	1.62	[0.92, 2.83]	1.18	[0.70, 1.99]
Perceptual abnormalities (P4)	0.86	[0.67, 1.11]	0.89	[0.69, 1.16]
Disorganized communication (P5)	1.13	[0.75, 1.71]	1.27	[0.80, 2.02]
<i>Symptoms (between-person)</i>				
Unusual thought content (P1)	1.44	[0.45, 4.57]	1.51	[0.49, 4.70]
Suspiciousness (P2)	0.79	[0.28, 2.20]	0.76	[0.27, 2.10]
Grandiosity (P3)	0.36	[0.05, 2.50]	0.36	[0.05, 2.47]
Perceptual abnormalities (P4)	1.26	[0.47, 3.38]	1.31	[0.49, 3.49]
Disorganized communication (P5)	2.22	[0.84, 5.88]	2.15	[0.83, 5.54]
<i>Baseline covariates</i>				
Age	0.83	[0.53, 1.29]	0.83	[0.54, 1.29]
Gender man vs woman	7.81	[0.66, 93.07]	7.51	[0.66, 84.96]
Gender non-binary vs woman	4.72	[0.10, 224.43]	4.58	[0.10, 201.59]
History of suicidal ideation	126.21**	[6.73, 2368.02]	110.15**	[6.17, 1966.37]
History of suicide attempts	3.51	[0.32, 39.15]	3.09	[0.29, 33.02]
Mood disorder diagnosis	0.30	[0.04–2.21]	0.32	[0.05–2.29]

Note: * $p < .05$; ** $p < .01$; *** $p < .001$.

Specific Attenuated Positive Symptoms and Suicidal Ideation

Table 4 summarizes results from the logistic mixed effect models examining the concurrent and time lagged relationship between specific attenuated positive symptoms and suicidal ideation. Results indicate that suspiciousness (at the within-person level, but not the between-person level) was uniquely associated with the presence of suicidal ideation above and beyond the effect of relevant covariates and other attenuated positive symptoms. This effect was observed for concurrent suspiciousness (OR = 1.49, $p = .011$) and for lagged suspiciousness (OR = 1.66, $p = .002$). In other words, within-

person suspiciousness (session T) significantly predicted suicidal ideation at the same session (session T) and the following session (session $T + 1$). Unusual thought content, grandiosity, perceptual abnormalities, and disorganized communication were not significantly associated with suicidal ideation in the concurrent or time-lagged models. Consistent with the total symptom model, wide confidence intervals were observed for categorical baseline predictors; nonetheless, the effect of prior suicidal ideation was significant across both models. See Figure 1 for odds ratio comparison for each attenuated positive symptom.

Given the significant time-lagged relationship between suspiciousness and suicidal ideation, we also examined the bidirectional relationship between these two variables. Results indicate that, at the within-person level, suicidal ideation (T) was significantly associated with suspiciousness at the next session ($T + 1$) (OR= 1.49, $p= .006$).

DISCUSSION

The current study is the first longitudinal, within-person examination of the relationship between attenuated positive symptoms and suicidal ideation among individuals at CHR-P. Approximately 66% of our sample had a history of suicidal ideation and 22% had a history of suicidal behavior at baseline, rates that are consistent with a prior meta-analysis (Taylor et al., 2015). Results indicated that greater total attenuated positive symptoms were concurrently associated with suicidal ideation even when accounting for relevant covariates (history of suicidal ideation, history of suicide attempts, mood disorder diagnosis, age, and gender identity). Further investigation into the relationship between specific attenuated symptoms and suicidal ideation indicated that suspiciousness was the only attenuated symptom associated with suicidal ideation; both concurrent and time lagged models supported this relationship, even with relevant covariates in the model. Results were significant at the within-person level (i.e., session to session), but not the between-person level (i.e., across participants), suggesting that the relationship between attenuated symptoms and suicidal ideation is driven by time-variant processes within individuals rather than time-invariant processes between individuals. Importantly, however, the bidirectional model was also supported, such that within-person level suicidal ideation was significantly associated with greater suspiciousness at the next session.

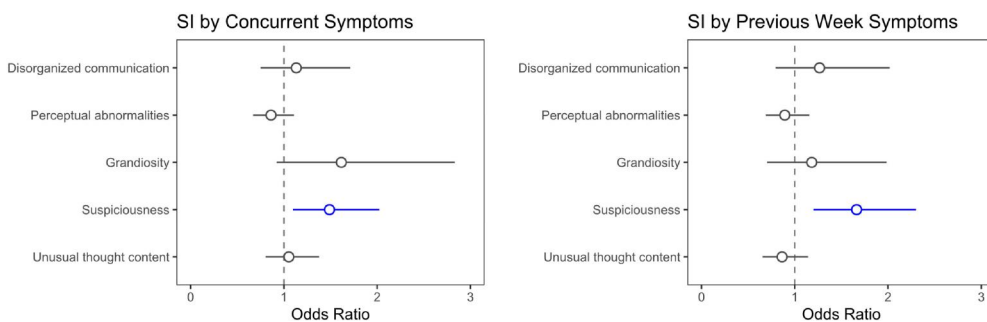


FIGURE 1. Odds ratio for specific attenuated positive symptoms (Within-Person effects).

Our findings are consistent with the broader literature demonstrating a relationship between positive symptoms and suicide risk among individuals diagnosed with psychotic disorders (Huang et al., 2018). Similarly, prior studies have demonstrated a relationship between suspiciousness and suicidal ideation across the psychosis continuum, including adolescents in the general population (Núñez et al., 2018; Wastler & Núñez, 2022) as well as individuals at CHR-P (Bang et al., 2019). However, our use of repeated assessment allowed us to examine the bidirectional relationship between attenuated symptoms and suicidal ideation in CHR-P for the first time. Our results supported a bidirectional relationship between suspiciousness and suicidal ideation, raising questions about the potential causal nature of this relationship. Few studies to date have examined the bidirectional relationship between psychosis and suicide risk, with two studies supporting a bidirectional relationship between psychotic experiences and suicidal behavior in the general population (Murphy et al., 2018, 2022) and one finding a unidirectional relationship with psychotic experiences predicting suicidal behavior (Hielscher et al., 2021b). The current study expands this literature by studying a CHR-P sample and by examining suicidal ideation as an outcome. Importantly, prior studies have suggested that the relationship between positive symptoms and suicidal ideation might be attributable to third variables such as general psychological distress (Honings et al., 2016). Our results are consistent with this possibility, suggesting that there are likely third variables influencing the relationship between suspiciousness and suicidal ideation. Specifically, when two variables are correlated, but the risk factor does not temporally precede the outcome, as evidenced by the bidirectional relationship in our study, it indicates that the variable might be a proxy risk factor, rather than a causal risk factor for suicide (Kraemer et al., 2000). Thus, it is possible that the relationship between attenuated symptoms and suicidal ideation is the result of another unknown variable that influences both ideation and symptoms. Importantly, however, because this study involved a retrospective chart review with limited variables in the dataset, we are unable to explicitly examine potential third variables. Additionally, we are unable to examine psychological distress as a potential third variable because attenuated positive symptoms, as assessed by the SIPS, requires associated distress and/or pre-occupation. More fine-grained analyses that fully separate the occurrence of an attenuated symptom from the distress associated with that symptom (Pratt et al., 2023) is needed to disentangle the relationship between distress, attenuated symptoms, and suicidal ideation.

Another way of thinking about this bidirectional relationship is that suspiciousness and suicidal ideation might share overlapping mechanisms, leading to the simultaneous emergence of both. Consistent with this notion, emotion regulation is a proposed mechanism for both psychotic symptoms (Ludwig et al., 2019; Nittel et al., 2018; Strauss et al., 2019) and suicidal ideation (Anestis et al., 2011; Bryan & Rozek, 2018; Linehan, 1993). Thus, it is possible that emotion regulation abnormalities might simultaneously lead to both attenuated symptoms and suicidal ideation among individuals at CHR-P, creating a spurious relationship between the two. Further, there is a large body of research showing a relationship between social isolation and suicide risk (McClelland et al., 2020; Van Orden et al., 2010) as well as social isolation and suspiciousness (Chau et al., 2019). Thus, it is also possible that social isolation might explain the relationship between suspiciousness and suicidal ideation. From this perspective, social isolation

might simultaneously lead to suspiciousness and suicidal ideation and the presence of suicidal ideation and suspiciousness might subsequently exacerbate social isolation, leading to cyclical bidirectional effects among the variables. Additional research that uses fine-grained approaches, such as ecological momentary assessment, are needed to disentangle the bidirectional relationship between attenuated symptoms, suicidal ideation, and other potential third variables such as psychological distress, social isolation, and emotion regulation.

Contrary to our hypotheses, the current study did not find a relationship between perceptual abnormalities and suicidal ideation. This finding is somewhat surprising given the broader literature demonstrating that perceptual abnormalities are associated with suicide risk in the general population (Capra et al., 2015; Hielscher et al., 2021a; Núñez et al., 2020; Wastler & Núñez, 2022) and among individuals with psychotic disorders (Bertelsen et al., 2007; Bornheimer, 2019; Madsen & Nordentoft, 2012). Importantly, however, the few studies looking at specific attenuated positive symptoms among individuals at CHR-P have *not* found a relationship between perceptual abnormalities and suicide risk (Bang et al., 2019; D'Angelo et al., 2017; Pelizza et al., 2020); thus, our findings are consistent with the existing CHR-P literature. Taken together, these findings suggest that although total positive symptoms are associated with suicide risk across the psychosis continuum, there might be more nuanced associations between specific positive symptoms and suicide risk at various stages of illness. Further, studies examining the relationship between suicide risk and psychotic experiences in the general population have found that auditory perceptual abnormalities have a strong relationship with suicide risk (Hielscher et al., 2021b; Núñez et al., 2018); therefore, it is possible that the relationship between perceptual abnormalities and suicide risk is specific to auditory experiences. Importantly, the SIPS perceptual abnormalities item (P4) encompasses auditory, visual, somatic, olfactory, and gustatory perceptual abnormalities. Thus, future research is needed to determine whether specific types of perceptual abnormalities are associated with suicidal ideation among individuals at CHR-P.

The current study also found that a history of suicidal ideation was strongly associated with ideation at later time points. Specifically, participants with a history of ideation were around a hundred times more likely to experience suicidal ideation at subsequent time points compared to those without a history of suicidal ideation. A deeper investigation into this finding revealed that suicidal ideation was almost never reported by participants who did not enter the program with a history of ideation. These findings have important clinical implications, suggesting that a comprehensive suicide risk assessment that includes lifetime risk is essential for identifying individuals who are likely to experience suicidal ideation in the future. Importantly, wide confidence intervals were observed for history of suicidal ideation in predicting ideation at later time points; thus, these findings should be interpreted with caution. Surprisingly, a history of suicide attempts was not associated with suicidal ideation in this study. One potential explanation for this finding is that prior suicide attempts might increase risk for future attempts, but not future ideation. Due to our small sample and short follow-up period, we were unable to examine suicide attempts as an outcome in this study. Future research is needed to identify risk factors for suicide attempts among individuals at CHR-P.

Strengths of the current study include our intensive within-person data collection in a real-world clinical setting, which allowed us to examine the bidirectional relationship between attenuated symptoms and suicidal ideation in CHR-P for the first time. Limitations are as follows. First, participants in this study were receiving treatment, which may have influenced the relationship between attenuated symptoms and suicidal ideation. Second, the current study did not have a comparison group, preventing us from comparing rates of suicidal ideation across stages of illness (e.g., CHR-P, first-episode, chronic) and hindering our ability to determine whether there are specific aspects of the CHR-P state that might uniquely contribute to or protect against suicide risk. Third, because the current study involved a retrospective chart review, we were unable to examine other relevant psychopathology or risk factors for suicide (e.g., depressive symptoms, substance use, trauma, negative symptoms, etc.) that were not collected weekly during treatment. Future studies could examine mood or negative symptoms as important mediators of the observed findings. Fourth, although suicidal ideation was documented using the item, “*over the past 2 weeks, have you had thoughts of killing yourself,*” it is possible that providers assessed for suicidal ideation using different language. Thus, responses to this item might include a broad range of suicide-related thoughts, including both passive and active ideation, even though the item is documented as “*thoughts of killing yourself.*” Relatedly, this item specifically captured ideation over the past two weeks, whereas the timeframe for assessing attenuated symptoms was “*since the last session.*” As this study used real-world data from an uncontrolled treatment trial, sessions did not consistently occur on a weekly basis. Thus, the timeframe for assessing attenuated symptoms varied depending on the timeframe between sessions, whereas the timeframe for assessing suicidal ideation was always the past two weeks. Therefore, it is likely that the timeframes for assessing attenuated symptoms and suicidal ideation were not fully aligned. Future studies that assess suicidal ideation and attenuated symptoms across the same timeframe are essential for lending additional support to our claims. Fifth, although the current study was the first to examine the longitudinal and bidirectional relationship between attenuated symptoms and suicidal ideation, these variables were still assessed retrospectively by providers at each session. As such, these assessments were still subject to potential recall and response bias. Additional research that utilizes ecological momentary assessment is needed to examine how these processes unfold in real time. Finally, the current study was limited by the small sample size and results should be interpreted with caution. Further replication with a larger sample is critical for better understanding the relationship between attenuated symptoms and suicidal ideation.

Notwithstanding these limitations, the current study demonstrated that within-person positive attenuated symptoms were associated with suicidal ideation among individuals at CHR-P. A deeper investigation revealed that suspiciousness had the strongest relationship with suicidal ideation, though this relationship was bidirectional. With further replication, these findings might have important clinical implications suggesting that interventions targeting suspiciousness might also reduce suicidal ideation and vice-versa. Additional research is needed to better understand the complex relationship between attenuated symptoms and suicidal ideation with the ultimate goal of developing targeted interventions for this high-risk population.

DISCLOSURE STATEMENT

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