

## Psychotic-Like Experiences in Major Depression and Anxiety Disorders: A Population-Based Survey in Young Adults

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**Objective:** Population-based surveys have confirmed that psychotic-like experiences are prevalent in the community. However, it is unclear if these experiences are associated with common mental disorders. The aim of this study was to examine the prevalence of psychotic-like experiences in those with affective and anxiety disorders. **Methods:** Subjects were drawn from the Mater-University of Queensland Study of Pregnancy. Delusion-like experiences were assessed with the Peters Delusional Inventory (PDI). The Composite International Diagnostic Interview (CIDI) was used to identify individuals with *Diagnostic and Statistical Manual of Mental Disorders* (Fourth Edition) lifetime diagnoses of major depression, anxiety disorder, substance use/dependence, and psychotic disorders. The influence of affective and anxiety disorders on PDI and CIDI psychosis-related items' scores were assessed with logistic regression, with adjustments for age, sex, and the presence of the other comorbid psychiatric diagnoses. **Results:** Having either a lifetime diagnosis of major depressive disorder or an anxiety disorder was associated with significantly higher PDI total scores (highest vs lowest quartile adjusted odds ratios [ORs] and 95% confidence intervals [CIs] = 4.43, 3.09–6.36; 3.08, 2.26–4.20, respectively). The odds of endorsing any CIDI hallucination or delusion item was increased in those with a major depressive or anxiety disorder. The presence of current anxiety

disorder symptoms was significantly associated with PDI score (OR = 5.81, 95% CI = 3.68–9.16). **Conclusion:** While psychotic-like experiences are usually associated with psychotic disorders, individuals with depression and anxiety are also more likely to report these symptoms compared with well individuals. Psychotic-like experiences are associated with a range of common mental disorders.

**Key words:** psychotic-like experience/depression/anxiety/epidemiology/birth cohort

### Introduction

Community-based surveys have found that many otherwise well individuals endorse items related to psychotic-like experiences. In a recently published systematic review of 35 population-based cohorts, van Os et al<sup>1</sup> reported a median prevalence of psychotic-like experiences of 5.3%. It has been argued that understanding the demographic and clinical correlates of individuals who report psychotic-like experiences may provide insights into pathways that lead to clinical psychotic disorders.<sup>2</sup> Some commentators have suggested that psychotic-like experiences exist on a continuum of severity within the community (from isolated psychotic-like experience to full clinical diagnosis of a psychotic disorder). However, it is also feasible that psychotic-like experiences represent a nonspecific reflection of a wider spectrum of mental disorders apart from psychotic disorders.

There is consistent evidence linking psychotic-like experiences with (a) trauma and posttraumatic stress disorder (PTSD)<sup>3–6</sup> and (b) substance use and/or dependence.<sup>4,7–10</sup> However, there is also evidence to suggest that psychotic-like experiences are associated with the symptoms related to depression and anxiety.<sup>11,12</sup> For example, the presence of a depressed mood was associated with psychotic-like experiences in a large Dutch community survey ( $n = 7076$ ),<sup>7</sup> while a United Kingdom-based survey ( $n = 8580$ ) found that both symptoms of anxiety and depression were associated with psychotic-like experiences.<sup>4</sup> Instruments specifically designed to assess psychotic-like experiences, such as the Peters Delusional

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Inventory (PDI) or the Community Assessment of Psychic Experiences, have also suggested that psychotic-like experiences are associated with depressive or anxiety-related symptoms.<sup>13–17</sup>

While there is evidence linking psychotic-like experiences and depressive or anxiety symptoms, we are not aware of studies that examined the association between psychotic-like experiences and the diagnoses of major depression or anxiety disorders. We had the opportunity to examine these issues in a large population-based cohort. We hypothesized that a diagnosis of (a) a major depression or (b) an anxiety disorder would be associated with higher endorsement of psychotic-like experiences.

## Methods

The Mater-University Study of Pregnancy (MUSP) and its outcomes is a prospective study of 7223 women and their offspring who received antenatal care at a major public hospital in Brisbane, Australia, between 1981 and 1984. The cohort, which has been followed up at various ages (including 5, 14, and 21 y), has been used to assess the precursors of a broad range of physical and mental health outcomes. Of the original sample of 7223 infants born between 1981 and 1983, follow-up responses were obtained for 3801 offspring (53%) after 21 years. Full details of the MUSP study design, sampling strategy, attrition, and follow-up sample characteristics are available elsewhere.<sup>18–20</sup> Only cross-sectional information collected at the 21-year follow-up was used in this study.

Of the 3801 cohort members contacted at the 21-year follow-up, 2441 were assessed by trained clinician-interviewers (eg, nurses, psychologists), using both the Composite International Diagnostic Interview (CIDI) computerized version<sup>21</sup> and the PDI.<sup>22,23</sup> Based on CIDI-derived *Diagnostic and Statistical Manual of Mental Disorders* (Fourth Edition) (*DSM-IV*) criteria, we identified subjects who had lifetime diagnoses of (a) a major depression disorder; (b) an anxiety disorder, including panic disorder with or without agoraphobia, phobias including simple phobias and social phobia, generalized anxiety disorder, and PTSD; (c) alcohol abuse and/or dependence; and (d) illicit substance misuse incorporating abuse and dependence to opiates, cannabis, sedatives, cocaine, amphetamines, hallucinogens, inhalants, and phencyclidine. Subjects with CIDI-based *DSM-IV* diagnoses of a psychotic disorder were excluded from the analyses.<sup>24</sup> Because previous studies have identified a specific association between PTSD and psychotic-like experiences,<sup>6</sup> we undertook an additional analysis examining the association between psychotic-like experiences and the broad group of anxiety disorders excluding those with a lifetime diagnosis of PTSD.

The PDI, which was based on the Present State Examination,<sup>25</sup> has good psychometric properties for the measurement of delusion-like experiences in both clinical and community populations.<sup>22,23</sup> In the current study, we used the 21-item PDI version (without the secondary probe items). The PDI explores a wide range of beliefs (eg, “Do you ever feel as if you are possessed by someone or something else?”; “Do you ever feel as if all things in magazines or on TV were written especially for you?”; “Do you ever think that people can communicate telepathically?”; “Have your thoughts ever been so vivid that you were worried other people would hear them?”).

## Statistical Analysis

In order to examine the association between the key *DSM-IV* psychiatric diagnoses and PDI quartile scores, we used logistic regression. PDI total scores tend to be skewed, and in keeping with our previous analyses, we divided this score into quartiles.<sup>26</sup> In model 1, we examined the odds ratios (ORs) for PDI quartiles for each of the psychiatric conditions under examination when adjusted for gender and age at testing (the follow-up survey was completed over several years; thus, not all subjects were aged 21 y at interview). However, comorbidity is frequently found between mood, anxiety, and substance abuse disorders<sup>27</sup>; thus, we examined a second model where we also adjusted for the presence of the other psychiatric diagnoses under investigation (ie, estimates for the association between depression and PDI scores were adjusted for sex, age, and the presence of anxiety disorders, alcohol abuse/dependence, and illicit substance abuse/dependence).

As a secondary outcome measure, we also examined endorsement of CIDI psychosis items. The cohort was divided into (a) those who reported none of the CIDI hallucination items (2296, 90.6%) vs those who reported one or more hallucinations (238, 9.4%) and (b) those who endorsed none of the CIDI delusion items (2260, 89.2%) vs one or more delusion item (274, 10.8%).

Because psychotic-like experiences have been associated with PTSD,<sup>6</sup> we repeated the analyses for anxiety disorders when this particular diagnosis was excluded. Finally, we included an analysis in order to compare (a) those with lifetime anxiety or depressive disorders and who reported current anxiety- or depression-related symptoms (defined as symptoms during the last month) vs (b) the remaining subjects with a lifetime diagnosis of these disorders. We predicted that those with current anxiety- or depression-related symptoms would be more likely to endorse psychotic-like experience compared with those without current symptoms.

Analyses were performed using SAS 9.1 (SAS Institute, Cary, NC). Written informed consent was obtained from all subjects, and the study was approved by the University of Queensland Ethics Committee.

**Table 1.** Prevalence of Lifetime CIDI Diagnoses and Relationship Between Diagnoses and PDI Total Scores

CIDI Diagnosis	Category (Total) %	PDI Lowest Quartile, <i>n</i> (%)	PDI Second Quartile, <i>n</i> (%), OR (95% CI)	PDI Third Quartile, <i>n</i> (%), OR (95% CI)	PDI Highest Quartile, <i>n</i> (%), OR (95% CI)
Major depressive disorder	Absent (2039) 80.2	598 (91.3)	482 (84.3)	507 (78.4)	350 (65.2)
	Present (502) 19.8	53 (8.1)	90 (15.7)	140 (21.6)	187 (34.8)
	Model 1	Reference	<b>2.02 (1.40–2.90)</b>	<b>3.02 (2.15–4.25)</b>	<b>6.07 (4.33–8.50)</b>
	Model 2		<b>1.93 (1.33–2.80)</b>	<b>2.48 (1.75–3.52)</b>	<b>4.04 (2.84–5.74)</b>
Anxiety disorders	Absent (1818) 75.2	598 (91.3)	472 (82.5)	475 (73.4)	308 (57.3)
	Present (590) 24.5	53 (8.1)	100 (17.5)	172 (26.6)	230 (42.8)
	Model 1	Reference	<b>1.27 (0.93–1.75)</b>	<b>2.24 (1.68–3.00)</b>	<b>4.94 (3.70–6.61)</b>
	Model 2		<b>1.11 (0.80–1.54)</b>	<b>1.76 (1.30–2.37)</b>	<b>3.27 (2.41–4.45)</b>

*Note:* Significant results are shown in bold face. Total may vary due to missing data. CIDI, Composite International Diagnostic Interview; PDI, Peters Delusional Inventory; OR, odds ratio; CI, confidence interval. Model 1—adjusted for age and gender; model 2—adjusted for age, gender, and the presence of major depressive disorders, anxiety disorders, alcohol abuse/dependence, and illicit substance abuse/dependence diagnoses.

## Results

Of the 2441 participants who completed the PDI and CIDI, 36 were excluded due to the presence of a CIDI-derived psychotic disorder. In total, 51.6% of the participants were male. The modal age of participants was 20 years, but ages ranged from 18 to 23 years at the time of data collection. The mean (SD; modal, range) of the PDI total was 5.03 (3.56; 4, 0–18). The quartile splits for the PDI were 0–2, 3–4, 5–7, and 8–18.

The prevalence of lifetime major depression was 19.4%, and the prevalence of lifetime diagnosis of any anxiety disorders was 24.2% (see table 1). The percentage of participants with alcohol abuse/dependence and illicit substance abuse/dependence was 27.7% and 23.9%, respectively. The table also displays the relationship between CIDI diagnoses based on model 1, which adjusts only for age and gender, and model 2, which adjusts for age, gender, and comorbid diagnoses. As predicted, those with depression and anxiety disorders were significantly more likely to have higher PDI total scores. In particular, those with major depression were over 6 times more likely to be in the highest (vs lowest) PDI quartile (OR = 6.57, 95% confidence interval [CI] = 4.64–9.29). Anxiety disorders showed a similarly strong association (OR = 4.94, 95% CI = 3.70–6.61). Alcohol and substance abuse/dependence were also associated with PDI score when adjusted for effect of depressive and anxiety disorders (OR = 1.40, 95% CI = 1.04–1.90, and OR = 2.24, 95% CI = 1.65–3.04, respectively). When we adjusted the model for the presence of the other comorbid psychiatric disorders under investigation, this pattern of significant association for major depressive disorders and anxiety disorders remained unchanged.

Those with depression or an anxiety disorder were also significantly more likely to endorse CIDI hallucination or delusion items (table 2). We also examined the influence of current symptoms on the PDI scores. For subjects with an anxiety disorder, those who reported symptoms within

the previous month were significantly more likely to have higher PDI score (highest vs lowest quartile: OR = 5.81, 95% CI = 3.68–9.16) compared with other cohort members with anxiety disorders. However, when those with depressive disorders were examined, there was no significant association between PDI scores and current vs noncurrent symptoms (results not shown). When participants meeting criteria for lifetime diagnosis of PTSD were excluded (*n* = 153) from all analyses, the general pattern of findings for depressive and anxiety disorders remained unchanged (model 2: OR = 5.01, 95% CI = 3.43–7.4; OR = 3.04, 95% CI = 2.17–4.27, respectively).

## Discussion

Young adults with either a major depressive disorder or an anxiety disorder were significantly more likely to report psychotic-like experiences compared with those

**Table 2.** ORs and Endorsement of CIDI Hallucinations or Delusions Items

CIDI Diagnosis	Any CIDI Hallucination Item, OR (95% CI)	Any CIDI Delusion Item, OR (95% CI)
Major depressive disorders	Model 1	<b>3.21 (2.39–4.31)</b>
	Model 2	<b>2.27 (1.65–3.11)</b>
Anxiety disorders	Model 1	<b>2.99 (2.23–4.01)</b>
	Model 2	<b>2.10 (1.53–2.88)</b>

*Note:* Significant results are shown in bold face. Model 1—adjusted for age and gender; model 2—adjusted for age, gender, and the presence of major depressive disorders, anxiety disorders, alcohol abuse/dependence, and illicit substance abuse/dependence diagnoses. OR, odds ratio; CIDI, Composite International Diagnostic Interview; CI, confidence interval.

without mental disorders. These findings persisted when adjusted for comorbidity with alcohol and illicit substance misuse. While psychotic-like symptoms are traditionally linked with clinical psychotic disorders, our findings suggest that they are associated with a range of common psychiatric disorders.

Among those with a lifetime diagnosis of an anxiety disorder, we found that the presence of current anxiety symptoms was associated with higher PDI scores. This finding is broadly consistent with other community-based studies that examined the relationship between anxiety symptoms and psychotic-like experience.<sup>4</sup> This pattern of findings was not identified when the comparable state vs trait variables were examined in those with lifetime diagnoses of depressive disorders. With respect to the association of anxiety and depressive disorders and psychotic-like experiences, future studies may be able to examine trait vs state issues in a more focused fashion.

The association between anxiety and psychotic-like experiences is of interest as level of distress associated with the delusion-like experiences has previously been identified as a predictor of clinically relevant psychosis.<sup>28</sup> While both depressive and anxiety syndromes are well recognized as forming part of the prodrome of schizophrenia,<sup>29</sup> the presence of psychotic-like experiences in depression and anxiety disorders is less well understood. Studies with more precise measures of symptom severity and time course are needed to confirm and extend these findings.

The study has several limitations. Like other birth cohort studies, attrition was evident by the 21-year follow-up. While this was primarily due to lack of resources to track all original cohort members rather than refusal to participate, participants lost to follow-up were more likely to be male, have younger mothers, come from lower income families, and have at least one migrant parent.<sup>30</sup> These factors may influence the generalizability of the findings. Also, the diagnoses were based on the CIDI and were not clinically validated. While the diagnostic categories examined in this study generally have good-to-excellent validity,<sup>31–33</sup> we hope to further explore this issue in follow-up studies.

While we found a significant association between the presence of lifetime diagnosis of depression or an anxiety disorder and psychotic-like experience, no conclusions can be drawn about the direction of causality. It is feasible that the presence of anxiety and depressive disorder predated the development of psychotic-like experiences and contributed to the prominence of these symptoms.<sup>34</sup> Conversely, preexisting psychotic-like experience may have been a stressor for the members of this cohort and contributed to the later development of anxiety or depression disorders. It is also feasible that both (a) psychotic-like experiences and (b) clinical disorders such as depression and anxiety disorders are both

“downstream” consequences of neurobiological vulnerabilities and/or developmental challenges such as childhood trauma. Just as population-based epidemiological studies<sup>35</sup> and genetic studies<sup>36–40</sup> are calling into question the taxonomy demarcating affective vs psychotic disorders, the presence of psychotic-like experiences in those with depression and anxiety disorders raises important questions about how we deal with subclinical-level symptoms both clinically and within the research setting.

Within the field of schizophrenia nosology, there is discussion about the utility of adopting dimensional approaches to capture mood and anxiety features in addition to the core psychotic features.<sup>41,42</sup> In a reciprocal fashion, our results suggest that researchers interested in depression- and anxiety-related syndromes may wish to consider the dimensional aspects of psychotic-like experiences within these disorders. While psychotic-like experiences have been traditionally linked to psychotic disorders, there is now robust evidence that these experiences are prevalent in otherwise well individuals. Our results extend these findings by demonstrating that psychotic-like experiences are also associated with common mental disorders.

## Funding

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