



Short communication

Psychotic experiences are associated with greater impairment among students in higher education with depression and anxiety in the United States

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ABSTRACT

Background: Psychotic experiences are associated with depression and anxiety, but emerging research suggests that psychotic experiences are also associated with impairment within psychopathology.

Methods: We analyzed a subsample from the Healthy Minds Study (2020–2021; $N = 91,435$) and used multi-variable logistic regression to examine the associations between psychotic experiences and impairment resulting from depression and anxiety, adjusting for age, gender, and race/ethnicity.

Results: Around one-in-five students with depression or anxiety impairment reported 12-month psychotic experiences. Psychotic experiences were associated with greater odds of depression impairment and anxiety impairment, adjusting for age, gender, race/ethnicity. Odds ratios varied depending on the type of psychotic experience and the outcomes.

Conclusion: Psychotic experiences are associated with greater odds of impairment resulting from depression and anxiety. In clinical practice, psychotic experiences may serve as a useful marker of assessing impairment resulting from psychopathology.

1. Introduction

Psychosis has been known to occur along a continuum, where hallucinations and delusions have been reported in the general population without crossing the clinical threshold (Staines et al., 2022). In the United States (US), roughly one-in-ten adults have reported a lifetime psychotic experience (Kessler et al., 2005). Psychotic experiences have garnered attention in public health given that they are associated with a range of mental and physical health problems (Staines et al., 2022), including depression and anxiety (Oh et al., 2021; Yang et al., 2023). One study in the US found that among youth, psychotic experiences were associated with a 32 % greater odds of depression, 48 % greater odds of social phobia, and 21 % greater odds of specific phobia, along with several other mental and behavioral health problems (Calkins et al., 2014). However, not all types of psychotic experiences appear to be consistently related to depression or anxiety (Hartley et al., 2013).

For example, some studies have suggested paranoia but not grandiosity is associated with anxiety (Bird et al., 2018).

Many have argued that depressive, anxiety, and psychotic symptom are inter-related through a single latent dimension (Ratheesh et al., 2023), with psychotic experiences potentially signaling greater severity of psychopathology (Stochl et al., 2015). Over the past decade, studies have shown that people with depression and anxiety who also endorse psychotic experiences have greater impairment and worse functional outcomes (Koyanagi et al., 2016; Oh et al., 2019; Wigman et al., 2012). To corroborate this evidence, we analyzed data from a large sample of students in higher education from the United States to examine the extent to which various psychotic experiences (hallucinations and delusions) were associated with impairment resulting from depression and anxiety symptoms.

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2. Methods

The Healthy Minds Study is a non-probability web-based survey of students enrolled in higher education in the United States (Lipson et al., 2022). The survey was administered at 140 institutions of higher learning between September 2020 and June 2021. The response rate was 14 %, (comparable to other response rates from online surveys using convenience samples and panels). We restricted the sample to emerging adults (aged 18–29). We excluded individuals who did not report any anxiety or depression, and further excluded individuals who were missing data on any of the variables of interest (see Fig. S1 in the Supplemental Materials). The final (complete-case) analytic sample was 91,435. We used sample probability weights that adjust for non-response based on administrative data of full student populations at each institution (Lipson et al., 2022). HMS data were collected under the approval of Advarra and all participating colleges/universities (IRB number: Pro00028565). The secondary analysis presented in this study was deemed exempt under the approval of USC (UP-22-00068).

Psychotic experiences. Psychotic experiences were measured using an abbreviated version of the World Health Organization Composite International Diagnostic Interview Psychosis Screen, which asks whether respondents had ever experienced: (1) A feeling something strange and unexplainable was going on that other people would find hard to believe; (2) A feeling that people were too interested in you or that there was a plot to harm you?; (3) A feeling that your thoughts were being directly interfered or controlled by another person, or your mind was being taken over by strange forces?; and (4) An experience of seeing visions or hearing voices that others could not see or hear when you were not half asleep, dreaming, or under the influence of alcohol or drugs? Endorsing any one of these experiences signified the presence of a lifetime psychotic experience (McGrath et al., 2015). Additionally, individuals were also asked whether the experiences occurred over the past 12-months.

Depression was measured using the Patient Health Questionnaire – 9 (PHQ-9; Kroenke and Spitzer, 2002), which contained nine questions eliciting the information about depression symptoms over the past two weeks. Respondents could answer the frequency of these symptoms from ‘not at all’ to ‘nearly every day’. We summed the depression items into a scale ranging from 0 to 27, and excluded individuals who scored a 0 from the analyses, as they did not receive the impairment follow-up question. In a sensitivity analysis, we also excluded individuals who scored under a 10 on the scale, as these individuals fell into the ‘minimal’ range. Depression impairment was measured using the single ordinal item: “How difficult have these problems [referring to the PHQ-9 items] made it for you to do your work, take care of things at home, or get along with other people?” Response options included: Not difficult at all, Somewhat difficult, Very difficult, Extremely difficult. These response options were dichotomized to reflect very/extremely difficult vs. somewhat/not difficult.

Anxiety was measured using the General Anxiety Disorder – 7 (GAD-7; Spitzer et al., 2006), which elicited information about anxiety symptoms over the past two weeks. We summed the anxiety items into a scale ranging from 0 to 12, and excluded individuals who scored a 0 from the analyses, as they did not receive the impairment follow-up question. In a sensitivity analysis, we also excluded individuals who scored under a 10 on the scale, as these individuals fell into the ‘minimal’ range. Anxiety impairment was measured using the single ordinal item: “How difficult have these problems [referring to the GAD-7 items] made it for you to do your work, take care of things at home, or get along with other people?” Response options included: Not difficult at all, somewhat difficult, very difficult, extremely difficult. These response options were dichotomized to reflect very/extremely difficult vs. somewhat/not difficult.

Covariates. We controlled for age (continuous), gender (cis-gender man, cis-gender woman, transgender/nonbinary/other), and race/ethnicity (White, Black, Latinx/Hispanic, Asian American/Pacific

Islander, Multiracial, and Other).

2.1. Analysis

We used multivariable logistic regression models to examine associations between psychotic experiences and depression impairment among people who scored above 0 on the PHQ-9, adjusting for age, gender, and race/ethnicity. Similarly, we examined associations between psychotic experiences and anxiety impairment among people who scored above a 0 on the GAD-7. In a set of sensitivity analyses, we examined subsamples to explore whether psychotic experiences were associated with depression impairment among individuals who scored ≥ 10 on the PHQ-9 but < 10 on the GAD-7 (i.e., depression only), and whether psychotic experiences were associated with anxiety impairment among individuals who scored ≥ 10 on the GAD-7 but < 10 on the PHQ-9 (i.e., anxiety only). We then examined whether psychotic experiences were associated with both depression and anxiety impairment among individuals scored ≥ 10 on the PHQ-9 and the GAD-7. We presented findings as odds ratios with 95 % Confidence Intervals, clustering standard errors by institution. We performed all statistical analyses using R.

3. Results

Sociodemographic characteristics of the sample are available in the Supplemental Materials [Tables S1A–S1B], and descriptive statistics are available in Tables S2A–S2B. Among those who reported any amount of depression (score > 0 on the PHQ-9), approximately 82 % (95 % CI: 81.61 %–82.12 %) of the sample reported depression impairment, and around 20 % (95 % CI: 19.92 %–20.51 %) of those who reported depression impairment had 12-month psychotic experiences [TABLE S2A]. Among those who reported anxiety (score > 0 on the GAD-7), approximately 81 % (95 % CI: 81.07 %–81.59 %) of the sample reported anxiety impairment, and around 20 % (95 % CI: 19.97 %–20.56 %) of those who reported anxiety impairment had 12-month psychotic experiences [TABLE S2B]. We found that among students who reported any amount of depression, 12-month psychotic experiences were associated with 2.9 times greater odds of depression impairment, and 2.9 times greater odds of anxiety impairment, adjusting for age, gender, race/ethnicity. Lifetime psychotic experiences were associated with around 2.3 times greater odds of depression impairment and around 2.4 times greater odds of anxiety impairment. Subtypes of psychotic experiences were related to depression and anxiety impairment, with odds ratios ranging between 2.2 and 3, depending on the psychotic experience type and outcome [Fig. 1; Tables S2A–S2B]. Sensitivity analyses [Tables S5–S6] showed that 12-month psychotic experiences were associated with approximately 1.5 times greater odds of depression impairment and anxiety impairment among those who have both moderate to severe depression (i.e., PHQ-9 ≥ 10) and moderate to severe anxiety (GAD-7 ≥ 10). However, these associations were not significant among individuals who exclusively had moderate to severe depression or anxiety [Tables S3–S4].

4. Discussion

Overall, we found that among students in higher education, psychotic experiences were associated with depression and anxiety-related impairment, aligning with prior studies in different populations from across the globe (Kelleher et al., 2015; Koyanagi et al., 2016; Oh et al., 2019; Wigman et al., 2012). For example, Kelleher et al. (2015) found that in Dublin, Ireland, adolescents with a psychiatric disorder who reported psychotic experiences had poorer functioning than adolescents with a disorder who did not report psychotic experiences. In a community sample of adolescents and young adults in Munich, Germany, Wigman and colleagues (Wigman et al., 2012) found psychotic experiences were associated with poorer illness course. Perhaps in the most

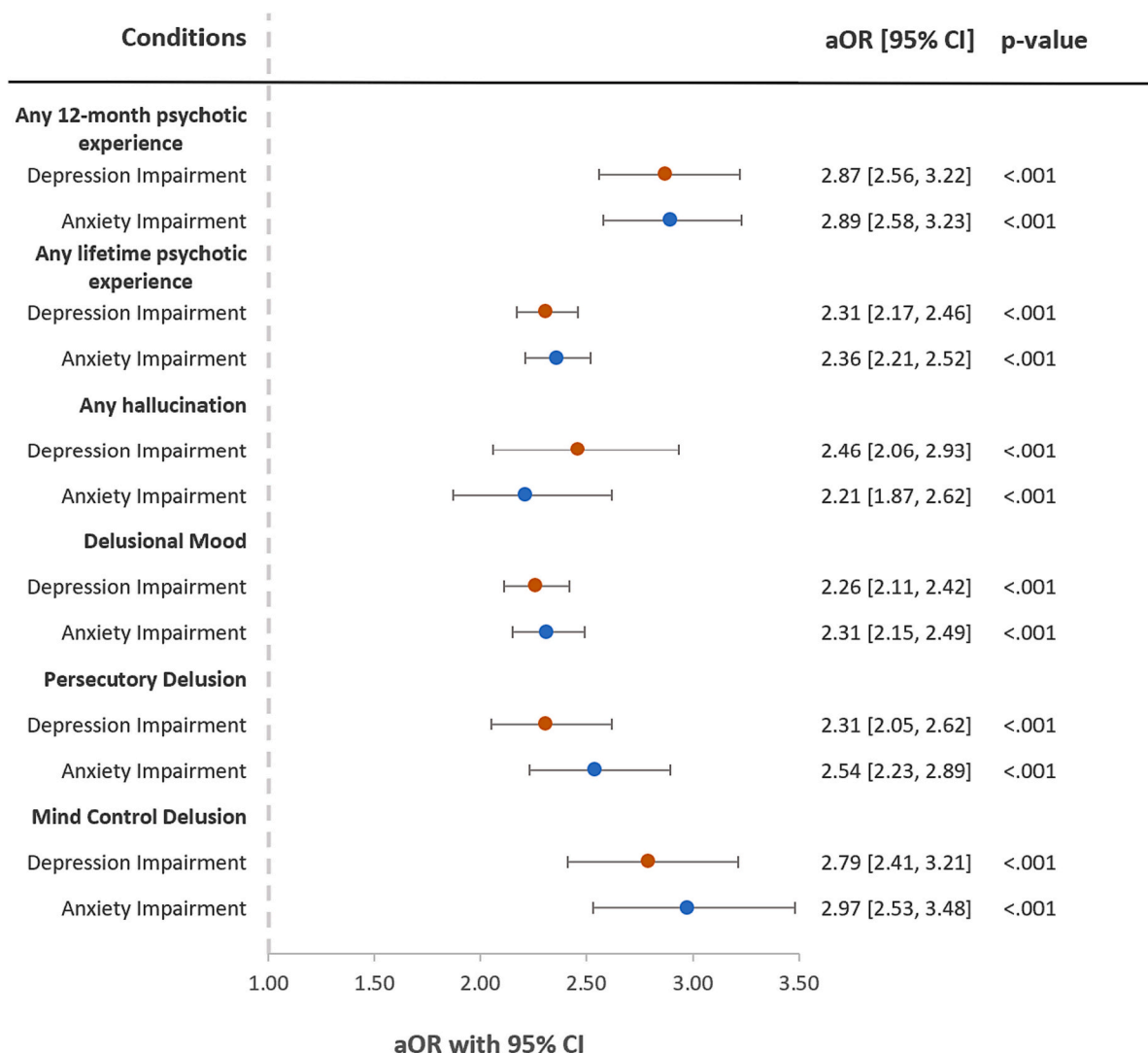


Fig. 1. Multivariable logistic regression models showing associations between psychotic experiences and depression or anxiety impairment among young adult students in higher education, Healthy Minds Study, United States, 2020–2021. Adjusted for age, gender, and race/ethnicity.

wide-reaching study to date, Koyanagi and colleagues (Koyanagi et al., 2016) found in 44 low- and middle-income countries that having co-occurring psychotic experiences and depression was associated with higher risk for observable illness behavior and a significant decline in health status (e.g., cognition, interpersonal activities, and sleep/energy), compared with those with only depression. In the United States, Oh and colleagues (Oh et al., 2019) found that among people of color with mood and/or anxiety disorders, psychotic experiences were associated with greater odds of reporting disabilities (e.g., cognition, mobility, social interaction, and time out of role), treatment seeking behaviors, and perceived need for help. Our findings contribute to this emerging literature by showing that psychotic experiences (12-month, lifetime, any hallucination, delusional mood, persecutory delusion, mind control delusion) are associated with impairment resulting from depression and anxiety symptoms in a large sample of emerging adults in higher education. Sensitivity analyses showed that when focusing on those with probable psychopathology (i.e., those who have moderate to severe levels), the association between psychotic experiences and psychopathology-related impairment was only significant among individuals who had both depression and anxiety, and not among those who exclusively had depression or anxiety.

Findings from this study should be interpreted bearing in mind that

the sample could have been biased given that the survey was administered to a non-probability sample and the response rate was relatively low. We used survey weights to account for non-response; however, sampling bias remains a concern. Further, it is important to note that the cross-sectional design of this study did not allow a temporal understanding of events and we could not ascertain whether psychotic experiences causally contributed to impairment. Moreover, this study used a sample of emerging adults in higher education and therefore may not generalize outside of this population.

Still, our findings suggest that psychotic experiences are associated with greater odds of impairment resulting from depression and anxiety, especially when depression and anxiety co-occur at moderate to severe levels. Some have argued that depression, anxiety, and psychotic experiences should be conceptualized as a ‘transdiagnostic stage’ with shared pathophysiological processes early in life that indicate need for care (Ratheesh et al., 2023). Future direction of research can translate epidemiological findings on psychotic experiences into practice, such as investigating the utility of screening for psychotic experiences as a broad indicator of functioning on campuses. While wide-spread screenings can open the possibility for false-positives, the benefits may outweigh the costs, provided that the screenings are properly framed and carefully explained to minimize stigma. Further, a positive screen may be

followed by providing resources, many of which might contain broadly beneficial preventive interventions (e.g., sleep hygiene, diet, exercise, stress reduction). Additionally, there may be value in screening for psychotic experiences among people identified as having depression or anxiety, bearing in mind that the psychotic experiences may serve as a marker of impairment beyond the psychopathological diagnosis alone.

CRedit authorship contribution statement

HO: Conceptualization, Writing Original Draft. JD: Formal analysis. LS: Reviewing and Editing. AK: Reviewing and Editing.

Declaration of competing interest

None.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jad.2023.10.083>.

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