

# **Flourishing and psychotic experiences among college students in the United States: Findings from the Healthy Minds Study 2020**

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## **ABSTRACT**

Psychotic experiences are prevalent in the general population and have gained attention in public health and preventive medicine because they appear to signal mental and physical health status. Most studies focus on the relations between psychotic experiences and negative outcomes, overlooking aspects of flourishing. We analyzed data from the Healthy Minds Study (September – December 2020; N=30,528), and found that approximately 14.6% of the sample reported a psychotic experience over the past 12 months, and approximately 37.61% of the sample was flourishing. Using multivariable logistic regression, we found flourishing was associated with 52% lower odds of having psychotic experiences (aOR: 0.48; 95% CI: 0.43-0.54), adjusting for sociodemographic characteristics. The association attenuated slightly but remained statistically significant after the additional adjustments for mental and physical health conditions. In conclusion, flourishing was inversely related to psychotic experiences.

**KEY WORDS:** FLOURISHING; PSYCHOTIC EXPERIENCES; PSYCHOSIS

## **INTRODUCTION**

Psychotic disorders are rare conditions that have historically imposed a significant burden on individuals and society (Cloutier et al., 2016; Rössler et al., 2005; Wu et al., 2005). However, there are milder expressions of psychosis, known as *psychotic experiences*, that are prevalent in the general population (Linscott & Van Os, 2010). In the United States, the prevalence of a psychotic experiences, however, are upwards of ten times the prevalence of psychotic disorders, ranging from around 10-20% (Cohen & Marino, 2013; Oh et al., 2020), and most of these individuals will not ever develop a psychotic disorder (though consider the work of Dominguez et al., 2011). Psychotic experiences are gaining attention in the fields of public health and preventive medicine because the experiences do not necessarily create significant distress or impairment in and of themselves, but seem to serve as correlates of mental and physical health (Oh et al., 2021). For example, psychotic experiences have been linked to psychiatric disorders (McGrath et al., 2016), substance use disorders (Cederlöf et al., 2017; Degenhardt et al., 2018), disability (Navarro-Mateu et al., 2017; Oh et al., 2018), quality of life (Alonso et al., 2018), physical health problems (Oh et al., 2020; Scott et al., 2018), and premature mortality (Sharifi et al., 2015).

Psychotic experiences have rarely, if ever, been explicitly studied with respect to flourishing. Flourishing is the presence of positive aspects of well-being, and encompasses concepts such as life satisfaction, happiness, character, social fulfillment, relationships, and purpose (Keyes, 2010). Most empirical studies on psychotic experiences have focused on illness (symptoms, deficits, disorders, and comorbidities), overlooking the positive aspects of wellbeing. To our knowledge, there are no formal studies that have examined the extent to which a full flourishing measure is related to psychotic experiences. As such, we conducted an exploratory study to examine the relations between flourishing (and its constitutive parts) and psychotic experiences among a large sample of students attending colleges across the United States. Given that the literature has already shown that a range of negative outcomes are related to psychotic experiences, we hypothesized that flourishing would be inversely related to psychotic experiences.

## **METHODS**

### *Sample*

We analyzed data from the Fall semester cohort of the 2020 Healthy Minds Study (HMS), a cross-sectional, web-based survey examining mental health and related factors in undergraduate and graduate student populations. The survey was administered at 36 universities between September through December of 2020. At each campus, a random sample of 8000 students was invited by e-mail to participate, except at smaller universities (<8,000 students) where all students were invited to participate. The response rate was 14%, which is typical of

online surveys of college populations. The HMS was approved by the Health Sciences and Behavioral Sciences Institutional Review Board at University of Michigan and by the Institutional Review Boards at all participating campuses.

### *Measures*

*Flourishing (independent variable).* Flourishing was measured using the Flourishing scale (Diener et al., 2009, 2010), which elicits the respondent's level of agreement to eight statements (listed in Table 1). Respondents could answer: *strongly disagree, disagree, mixed/neither agree nor disagree, slightly agree, agree, strongly agree*. The items were summed into a scale ranging from 8-56, with higher scores representing greater levels of flourishing. The flourishing scale was dichotomized such that a score of 48 or higher was considered flourishing in accordance with prior studies (Hone et al., 2014).

*Psychotic experiences (dependent variable).* Psychotic experiences were measured using an abbreviated version of the World Health Organization Composite International Diagnostic Interview Psychosis Screen, which has been used in large global epidemiology studies (McGrath et al., 2015). Respondents were asked if they had ever experienced the following: (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 of these experiences constituted lifetime psychotic experience. Respondents were then asked a single item (yes/no) about whether these experiences occurred over the past 12 months.

*Mental and physical health.* Mental health was measured using a checklist of conditions with the following prompt: Have you ever been diagnosed with any of the following conditions by a health professional (e.g., primary care doctor, psychiatrist, psychologist, etc.)? The mental health conditions included: depression (e.g. major depressive disorder, persistent depressive disorder), bipolar (e.g. bipolar I or II, cyclothymia), anxiety (generalized anxiety disorder, phobias), obsessive-compulsive disorder or related disorders (e.g. body dysmorphism), trauma and stressor-related disorders (post-traumatic stress disorder), neurodevelopmental disorder or intellectual disability (e.g., attention deficit disorder, attention deficit hyperactivity disorder, intellectual disability, autism spectrum disorder), eating disorder (e.g., anorexia nervosa, bulimia nervosa), psychosis (e.g., schizophrenia, schizo-affective disorder), personality disorder (e.g., antisocial personality

disorder, paranoid personality disorder, schizoid personality disorder), or substance use disorder (e.g., alcohol abuse, abuse of other drugs). Having at least one of these conditions was considered a positive endorsement of having a mental health condition.

Similarly, physical health conditions were measured using a checklist, with the following prompt: Have you ever been diagnosed with any of the following health conditions, which required ongoing treatment by a healthcare professional (i.e., chronic diseases)? Physical health conditions included: diabetes, high blood pressure, asthma, thyroid disease (e.g., hypothyroid or hyperthyroid), gastrointestinal disease (e.g., Crohn's Disease, Ulcerative Colitis), arthritis, sickle cell anemia, seizure disorders (e.g., epilepsy), cancers, high cholesterol, HIV/AIDS, other autoimmune disorder, other chronic disease. Having at least one of these conditions was considered a positive endorsement of having a physical health condition.

*Sociodemographic characteristics (covariates).* Respondents self-reported sociodemographic characteristics, including age (continuous), gender (man, woman, other), sexual orientation (straight, LGBTQ+), race/ethnicity (White, Black, Asian American/Pacific Islander, Hispanic, Multiracial, Other), and international student (yes/no).

### *Analysis*

A total of 36,875 college students completed the HMS. An arbitrary age cut-off was used to drop five respondents because they reported being over 80 years old, leaving a sample with an age range of 18 to 80, with a median age of 21, and most of the sample (95%) being under the age of 40. A total of 30,582 students completed the 12-month psychotic experiences screen. Missing data for individual variables was addressed using listwise deletion, given the low frequency of missingness (<10%). Multivariable logistic regression analyses were used to test for associations between flourishing and psychotic experiences. We adjusted all models for age, gender, sexual orientation, race/ethnicity, and international student status. Sample probability weights were used to adjust for non-response using administrative data on full student populations at each participating college. Gender, race/ethnicity, academic level, and grade point average were used to estimate the response propensity of each type of student (based on multivariate logistic regression), and then assigned response propensity weights to each student who completed the survey. Students who were less likely to have completed the survey were assigned a larger weight in the analysis. Sample weights give equal aggregate weight to each school in the national estimates rather than assigning weights in proportion to school size, so that overall national estimates were not dominated by schools in our sample with large enrollment. Standard errors were clustered by college. We present results as odds ratios with 95% confidence intervals.

## RESULTS

Approximately 14.6% of the sample reported a psychotic experience over the past 12 months, and approximately 37.61% of the sample was flourishing. The means of the individual flourishing items and proportion of flourishing were significantly lower among people with psychotic experiences than among people without. [TABLE 1].

**Table 1: Descriptive statistics (weighted), Healthy Minds Study (September – December 2020)**

	No 12-month psychotic experiences (n=26311)	Psychotic experiences (n = 4271)	Total (N=30582)	P-value
<b>FLOURISHING ITEMS</b>				
I lead a purposeful and meaningful life (0-7)	5.39 (5.29 - 5.50)	4.76 (4.63 - 4.89)	5.30 (5.20 - 5.41)	0.00
My social relationships are supportive and rewarding (0-7)	5.48 (5.41 - 5.55)	4.91 (4.80 - 5.03)	5.40 (5.32 - 5.48)	0.00
I am engaged and interested in my daily activities (0-7)	4.98 (4.87 - 5.09)	4.27 (4.15 - 4.38)	4.87 (4.77 - 4.98)	0.00
I actively contribute to the happiness and well-being of others (0-7)	5.66 (5.60 - 5.71)	5.40 (5.33 - 5.47)	5.62 (5.57 - 5.67)	0.00
I am competent and capable in the activities that are important to me (0-7)	5.72 (5.66 - 5.78)	5.26 (5.16 - 5.36)	5.66 (5.59 - 5.72)	0.00
I am a good person and live a good life (0-7)	5.73 (5.66 - 5.80)	5.16 (5.06 - 5.26)	5.65 (5.57 - 5.72)	0.00
I am optimistic about my future (0-7)	5.48 (5.39 - 5.58)	4.79 (4.67 - 4.92)	5.38 (5.28 - 5.48)	0.00
People respect me (0-7)	5.49 (5.43 - 5.56)	4.91 (4.78 - 5.03)	5.41 (5.34 - 5.48)	0.00
<b>FLOURISHING (Dichotomized)</b>				
No	15579 (58.22%)	3317 (77.10%)	18896 (60.97%)	
Yes	10495 (41.78%)	908 (22.90%)	11403 (39.03%)	0.00
<b>Sociodemographic characteristics</b>				
Age	24.51 (23.53 - 25.49)	23.21 (22.26 - 24.16)	24.32 (23.37 - 25.27)	0.07
Race/ethnicity				0.00
White	16617 (63.83%)	2618 (62.76%)	19235 (63.68%)	
Asian American / Pacific Islander	3226 (8.05%)	416 (7.71%)	3642 (8.00%)	
Black	1582 (7.90%)	286 (5.82%)	1868 (7.60%)	
Hispanic	2034 (9.17%)	341 (8.40%)	2375 (9.06%)	
Multiracial	2386 (9.52%)	529 (13.54%)	2915 (10.11%)	
Other	363 (1.02%)	60 (1.13%)	423 (1.04%)	
Missing/ unknown	103 (0.50%)	21 (0.63%)	124 (0.52%)	
Gender				0.00
Man	7473 (41.42%)	1306 (44.55%)	8779 (41.88%)	
Woman	18271 (56.49%)	2717 (49.53%)	20988 (55.47%)	
Other	520 (1.93%)	234 (5.66%)	754 (2.47%)	
Missing/ unknown	47 (0.16%)	14 (0.26%)	61 (0.18%)	
Sexual Orientation				0.00
Straight	21197 (81.41%)	2745 (66.02%)	23942 (79.17%)	
LGBTQ+	4697 (17.25%)	1444 (32.44%)	6141 (19.46%)	
Missing/ unknown	281 (1.33%)	48 (1.54%)	329 (1.36%)	
International student status				0.50
No	24699 (96.02%)	4052 (96.43%)	28751 (96.08%)	
Yes	1605 (3.98%)	218 (3.57%)	1823 (3.92%)	
Any psychiatric condition				0.00
No	15163 (62.36%)	1573 (40.80%)	16736 (59.27%)	

Yes	9250 (37.64%)	2258 (59.20%)	11508 (40.73%)	
Any chronic health condition				0.00
No	19195 (71.62%)	2849 (64.87%)	22044 (70.64%)	
Yes	7082 (28.38%)	1418 (35.13%)	8500 (29.36%)	

P-values by t-test for continuous variables and Chi2 test for binary/categorical variables. Design-based Pearson Chi2 test p-value

Each item on the flourishing scale was associated with lower odds of 12-month psychotic experiences, adjusting for age, gender, sexual orientation, race/ethnicity, and international student status. After dichotomizing the scale, flourishing was associated with 52% lower odds of having 12-month psychotic experiences. [TABLE 2]. These odds ratios attenuated slightly but remained statistically significant after the additional adjustments for mental and physical health conditions. All analyses were repeated for lifetime psychotic experiences, with similar results. Further, the associations between flourishing and specific types of psychotic experiences were evident for delusional ideation (without hallucinatory experiences), but was not associated with hallucinatory experiences (without delusional ideation) at a conventional level of statistical significance. [Supplemental Materials, TABLE S1 and S2]

**Table 2. Multivariable logistic regression models showing associations between flourishing and 12-month psychotic experiences**

	Basic adjustments for sociodemographic characteristics			Basic adjustments plus adjustments for mental and physical health conditions		
	aOR [95% CI]	p-value	N	aOR [95% CI]	p-value	N
<b>Flourishing Scale Items (scale 0-7 each)*</b>						
I lead a purposeful and meaningful life	0.83 [0.80, 0.86]	0.000	30,321	0.87 [0.83, 0.90]	0.000	27,985
My social relationships are supportive and rewarding	0.80 [0.78, 0.83]	0.000	30,339	0.83 [0.80, 0.86]	0.000	28,004
I am engaged and interested in my daily activities	0.81 [0.78, 0.84]	0.000	30,348	0.84 [0.81, 0.88]	0.000	28,009
I actively contribute to the happiness and well-being of others	0.90 [0.87, 0.93]	0.000	30,351	0.92 [0.89, 0.96]	0.000	28,014
I am competent and capable in the activities that are important to me	0.83 [0.80, 0.86]	0.000	30,356	0.86 [0.83, 0.90]	0.000	28,016
I am a good person and live a good life	0.80 [0.78, 0.83]	0.000	30,340	0.84 [0.81, 0.88]	0.000	28,004
I am optimistic about my future	0.83 [0.80, 0.86]	0.000	30,356	0.86 [0.83, 0.90]	0.000	28,016
People respect me	0.79 [0.76, 0.83]	0.000	30,358	0.83 [0.79, 0.87]	0.000	28,019
<b>Flourishing**</b>						
No	1.00	-	-	1.00	-	-
Yes	0.48 [0.43, 0.54]	0.000	30,125	0.56 [0.49, 0.64]	0.000	27,814

\*Each item of the Flourishing Scale was examined in a separate multivariable logistic regression model.

\*\*The flourishing scale ranged from 8-56, which was dichotomized such that a score of 48 or higher signified flourishing. All models were adjusted for age, gender, sexual orientation, race/ethnicity, and international student status.

## **DISCUSSION**

To the best of our knowledge, this was the first large scale study that examines associations between flourishing and psychotic experiences among college students in the United States. In accordance with our exploratory hypothesis, we found that flourishing was inversely related to psychotic experiences, such that an increase in flourishing was associated with lower odds of having psychotic experiences. Put differently, languishing was associated with greater odds of psychotic experiences. Our findings comport with a few existing studies that touch on aspects of flourishing: for example, Koyanagi and colleagues (2017) found that psychotic experiences were inversely related to happiness; Healy and colleagues (2019) found that psychotic experiences were related to self-concept, which includes aspects of life satisfaction; Alonso and colleagues (2018) found that psychotic experiences were associated with lower health-related quality of life; and multiple studies have found that psychotic experiences were associated with reduced functioning (Navarro-Mateu et al., 2017; Oh et al., 2018). However, studies are still few and far between, and have rarely used a full flourishing scale. To our knowledge, this is among the first studies to examine whether psychotic experiences are related to a sense of meaning, feeling like a good person, feeling respected, and being optimistic about the future.

Languishing has been related to poor mental health (Keyes et al., 2010), and in our study, we add to the literature by offering preliminary evidence to suggest that languishing increased odds of having psychotic experiences. This finding may be partially explained by the stress-response system, and the complex pathways by which social environments may produce psychosis, vis-à-vis social stress (Mizrahi, 2016), social defeat (Selten & Cantor-Graae, 2005), and social deafferentation (Hoffman, 2007). The association may also be partially explained by confounders, such as mental and physical illness, which have been linked to both flourishing and psychotic experiences. It is also possible that flourishing is constrained by the social and economic forces that shape opportunity structures and make individuals resilient or vulnerable to adversities. While flourishing has been measured in this study using a subjective report of perceptions about oneself and one's relationships to others, it is important to acknowledge the hazards and constraints that exist in the environment that can alter these views while also shaping risk for psychosis.

### *Limitations*

Our study is among the first large-scale studies to examine flourishing and psychotic experiences among college students in the US; however, there were several limitations. First, data were cross-sectional and did not allow for us to establish the temporal order of events (whether psychotic experiences preceded or followed flourishing). It is conceivable that the association may be bidirectional. Second, the data were self-reported, and

may have been vulnerable to recall and social desirability biases (e.g., reluctance to disclose the occurrence of psychotic experience). Third, this study was only conducted among college students, which raises concerns about generalizability. College students are part of an advantaged socio-economic group relative to less educated groups, and so it is unknown whether the association between flourishing and psychotic experiences is more or less pronounced in the general population. Fourth, the response rate was 14%, which raises concerns about selection bias and generalizability of findings, though this response rate is comparable to surveys of this nature (Lipson et al., 2019), and survey weights were used to adjust for non-response.

### *Conclusion*

Flourishing was inversely related to psychotic experiences. While the clinical utility of psychotic experiences is still emerging in preventive medicine and public health, it is conceivable that psychotic experiences may serve as an indicator of health and wellness, and may thus be integrated into brief screenings and assessments. In other words, clinicians may consider assessing for aspects of flourishing in those who endorse psychotic experiences, and vice versa, to guide referrals to various levels of care at formal settings (including online flourishing interventions; see Przybylko et al., 2021) as well as informal community-based settings. As psychotic experiences appear to be indicative of a host of mental and physical health problems, the experiences may also signal the need to looking beyond the alleviation of illnesses, toward aspects of recovery, capability, and thriving, calling for the creation of more paths that lead to flourishing.

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**SUPPLEMENTAL TABLES**

<b>Table S1. Multivariable logistic regression models showing associations between flourishing and lifetime psychotic experiences</b>									
	Lifetime Any Psychotic Experiences			Lifetime Hallucinatory experiences			Lifetime Delusional ideation		
	aOR [95% CI]	p-value	N	aOR [95% CI]	p-value	N	aOR [95% CI]	p-value	N
<b>Flourishing Scale Items (scale 0-7 each)</b>									
I lead a purposeful and meaningful life	0.84 [0.82-0.87]	0.000	30,365	0.85 [0.74, 0.98]	0.030	29,941	0.86 [0.83, 0.89]	0.000	30,374
My social relationships are supportive and rewarding	0.82 [0.79, 0.85]	0.000	30,384	0.98 [0.78, 1.22]	0.826	29,957	0.82 [0.79, 0.85]	0.000	30,393
I am engaged and interested in my daily activities	0.83 [0.82, 0.86]	0.000	30,393	0.86 [0.75, 0.98]	0.026	29,966	0.87 [0.84, 0.90]	0.000	30,402
I actively contribute to the happiness and well-being of others	0.91 [0.89, 0.94]	0.000	30,396	0.96 [0.76, 1.20]	0.705	29,969	0.93 [0.89, 0.97]	0.001	30,405
I am competent and capable in the activities that are important to me	0.84 [0.82, 0.87]	0.000	30,402	0.77 [0.67, 0.88]	0.000	29,976	0.87 [0.83, 0.90]	0.000	30,411
I am a good person and live a good life	0.82 [0.79, 0.84]	0.000	30,384	0.88 [0.71, 1.08]	0.201	29,960	0.83 [0.81, 0.87]	0.000	30,393
I am optimistic about my future	0.86 [0.84, 0.89]	0.000	30,401	0.94 [0.78, 1.13]	0.509	29,976	0.88 [0.84, 0.91]	0.000	30,410
People respect me	0.80 [0.77, 0.84]	0.000	30,402	0.91 [0.73, 1.14]	0.407	29,977	0.80 [0.77, 0.84]	0.000	30,411
<b>Flourishing</b>									
No	1.00	-	-	1.00	-	-	1.00	-	-
Yes	0.52 [0.48, 0.56]	0.000	30,168	0.87 [0.38, 2.00]	0.731	29,743	0.50 [0.44, 0.57]	0.000	30,177
<p>Each item of the Flourishing Scale was examined in a separate model.                      The flourishing scale ranged from 8-56, which was dichotomized such that a score of 48 or higher signified flourishing.                      All models were adjusted for age, gender, sexual orientation, race/ethnicity, and international student status.                      Hallucinatory experiences excluded individuals with delusional ideation, and vice versa                      Health Minds Study, September 2020-December 2020</p>									

<b>Table S2. Multivariable logistic regression models showing associations between flourishing and lifetime psychotic experiences</b>									
	Lifetime Any Psychotic Experiences			Lifetime Hallucinatory experiences			Lifetime Delusional ideation		
	aOR [95% CI]	p-value	N	aOR [95% CI]	p-value	N	aOR [95% CI]	p-value	N
<b>Flourishing Scale Items (scale 0-7 each)</b>									
I lead a purposeful and meaningful life	0.87 [0.85, 0.90]	0.000	28,014	0.89 [0.77, 1.03]	0.121	27,639	0.90 [0.86, 0.93]	0.000	28,023
My social relationships are supportive and rewarding	0.85 [0.82, 0.88]	0.000	28,034	1.03 [0.82, 1.29]	0.795	27,656	0.84 [0.81, 0.87]	0.000	28,043
I am engaged and interested in my daily activities	0.87 [0.85, 0.89]	0.000	28,039	0.92 [0.80, 1.07]	0.256	27,661	0.90 [0.87, 0.94]	0.000	28,048
I actively contribute to the happiness and well-being of others	0.93 [0.90, 0.96]	0.000	28,044	1.02 [0.80, 1.31]	0.875	27,666	0.95 [0.91, 0.99]	0.012	28,053
I am competent and capable in the activities that are important to me	0.88 [0.85, 0.90]	0.000	28,046	0.78 [0.67, 0.91]	0.002	27,670	0.90 [0.87, 0.94]	0.000	28,055
I am a good person and live a good life	0.85 [0.82, 0.88]	0.000	28,033	0.96 [0.78, 1.19]	0.698	27,658	0.87 [0.83, 0.91]	0.000	28,042
I am optimistic about my future	0.90 [0.88, 0.92]	0.000	28,046	1.00 [0.84, 1.20]	0.975	27,670	0.91 [0.87, 0.95]	0.000	28,055
People respect me	0.84 [0.81, 0.88]	0.000	28,048	0.96 [0.77, 1.20]	0.729	27,672	0.84 [0.80, 0.87]	0.000	28,057
<b>Flourishing</b>									
No	1.00	-	-	1.00	-	-	1.00	-	-
Yes	0.59 [0.55, 0.63]	0.000	27841	1.01 [0.46, 2.23]	0.986	27,466	0.58 [0.51, 0.67]	0.000	27,850
<p>Each item of the Flourishing Scale was examined in a separate model.  The flourishing scale ranged from 8-56, which was dichotomized such that a score of 48 or higher signified flourishing.  All models were adjusted for age, gender, sexual orientation, race/ethnicity, and international student status, any mental health condition, and any chronic health condition  Hallucinatory experiences excluded individuals with delusional ideation, and vice versa  Health Minds Study, September 2020-December 2020</p>									