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Psychotic experiences and disability: Findings from the Collaborative Psychiatric Epidemiological Surveys

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1. Introduction

Psychotic experiences are manifestations of psychosis that resemble frank hallucinations and delusions found in psychotic disorders, but are typically less intense, impairing, or persistent (Van Os et al., 2009). They can be ten times as prevalent as psychotic disorders, manifesting in approximately 10% of adults in the general US population (DeVlyder et al., 2014). Extant research suggests psychotic experiences are useful indicators of general health. In addition to being associated with an increased risk for psychotic disorder (Dominguez et al., 2011), psychotic experiences are associated with increased risk for a wide variety of adverse health outcomes such as (non-psychotic) mental disorders (DeVlyder et al., 2014; Kelleher et al., 2012; McGrath et al., 2016; Wigman et al., 2012) and physical disorders (Moreno et al., 2013; Oh & DeVlyder, 2015), as well as suicidal behavior (DeVlyder et al., 2015; Kelleher et al., 2013), and perceived need for help and treatment-seeking behaviors (DeVlyder et al., 2014; Murphy et al., 2010; Oh et al., 2015).

While there has been extensive research on the relationship between psychotic experiences and mental and physical disorders, less is known about the relationship between psychotic experiences and functional disability in the United States. Two clinic-based studies (Yung et al., 2006; Wigman et al., 2014) and one general population study (Kelleher et al., 2015) have reported a relationship between psychotic experiences and poorer overall or 'global' functioning. However, it is important to examine the specific domains of functioning to more precisely understand potential target areas for intervention. To our knowledge, two studies have looked at specific domains of functioning, beyond global function: Yung and colleagues (2006) assessed social functioning in young people with psychotic experiences and found increased peer- and family-relationship difficulties; and Navarro-Mateu and

colleagues (2017) analyzed the World Mental Health Surveys and found that respondents with psychotic experiences had elevated odds of reporting disability (specifically social and role impairment) across 19 countries, and these associations persisted after controlling for comorbid medical and mental disorders.

In the current study, we wished to look at a range of functional domains and their relationships with psychotic experiences using the World Health Organization (WHO) Disability Assessment Scale. Specifically, we investigated psychotic experiences as a marker of risk for disability in the following domains (1) social function, (2) role function, (3) cognitive function, (4) mobility, (5) self-care and (6) time out of role. We hypothesized that psychotic experiences would be associated with poorer functioning across all six domains.

2. Methods

2.1. Sample

We analyzed the Collaborative Psychiatric Surveys (CPES), which comprises three household surveys: (1) the National Comorbidity Survey Replication (NCS-R; Kessler et al. 2004), (2) the National Latino and Asian American Study (NLAAS; Alegria et al. 2004) and (3) the National Survey of American Life (NSAL; Jackson et al. 2004). These surveys were conducted between 2001 and 2003, and used a common core instrument, and similar multi-stage probability sampling strategies to achieve nationally representative samples of adults in the general population of the United States. The NCS-R is a nationally representative survey of 9282 individuals (predominantly White, reflecting the general population of the US), of which a random subsample (n=2322) completed the psychosis screen. In an effort to collect more robust data on racial and ethnic minority populations, two additional surveys were conducted. The NLAAS is a nationally representative sample of Latino Americans (n=2554) and Asian Americans (n=2095). The NSAL is a nationally representative sample of African-American households (n=3570), with Afro-Caribbean (n=1621) and White (n=891) respondents drawn from the same source neighborhoods, although Whites did not complete the psychosis screen. Taken together, these three surveys offer a more variegated and detailed portrait of the US population than any of three surveys alone. Sampling methodology of the CPES is described in detail elsewhere (Heeringa et al., 2004; Pennell et al., 2004). Socio-demographic comparisons across the three surveys can be found in prior studies (see DeVyllder et al., 2014). While all three surveys used a common core instrument, we analyzed each sample separately because problems arise from the CPES weights and psychosis screen when examining racial/ethnic groups across the combined data (DeVyllder et al., 2013).

Since this study focused on sub-threshold psychotic experiences, we excluded 23 individuals who self-reported ever having received a diagnosis of schizophrenia from a medical professional, given that there is already extensive empirical evidence that schizophrenia is associated with functional impairment. Further, participants were excluded from the analysis who were missing data for any of the variables of interest, resulting in smaller analytic samples (NCS-R n=2287; NLAAS n=4617; NSAL n=4958). The Role Functioning variable was not available in the NLAAS, and had additional missing values in the NLAAS and

NSAL. Thus, analyses for Role Functioning domain in the NCS-R and NSAL were based on smaller samples (NCS-R n=2176; NSAL n=4612).

2.2. Measures

2.2.1. Psychosis—Psychotic experiences were assessed using the WHO-CIDI 3.0 Psychosis Screen (Kessler and Ustun, 2004), which is a validated measure used internationally (see Kaymaz et al., 2012; McGrath et al., 2015). Respondents were asked to report the lifetime occurrence of six psychotic experiences, including: (1) visual hallucinations, (2) auditory hallucinations, (3) thought insertion, (4) thought control, (5) telepathy, and (6) delusions of persecution. Endorsing at least one of these experiences constituted a positive endorsement of lifetime psychotic experiences. Responses were not considered a psychotic experience when occurring in the context of falling asleep, dreaming, or substance use.

2.2.2. Disability—Disability was measured using the WHO Disability Assessment Schedule II (WHO-DAS II; Rehm et al., 1999), a 36-item general disability instrument which elicits the frequency and intensity of impairments over the past 30 days across the following six disability domains: (1) Cognition; (2) Mobility; (3) Self-care; (4) Social Interaction; (5) Role Functioning; and (6) Time Out of Role (See WHO-DAS II included in the online supplemental materials). Impairments could be due to health conditions, such as diseases or illnesses, other short/long-lasting health problems, injuries, mental or emotional problems, and problems with alcohol or drugs. Respondents were asked about the extent to which they experienced difficulties performing several activities, and could answer: none, mild, moderate, severe, and extreme/cannot do. Each domain was scored and standardized to a scale from 0 (no disability) to 100 (full disability); however, the most respondents reported having no disability. To deal with the skewness of the data, we dichotomized each domain to signify either having no disability or having any amount of disability (i.e. non-zero), as per previous studies using these data (e.g. Fortuna et al., 2010). Time out of role was defined as the number of days that one was unable to carry out usual activities because of any health condition, and was coded as a dichotomous variable reflecting at least one day out of role versus no days. The WHO-DAS II items measuring participation in society were not collected in the CPES.

2.2.3. Mental and physical health problems—Psychiatric disorders included lifetime anxiety disorders (generalized anxiety disorder, panic disorder, social phobia, agoraphobia with and without panic attacks, post-traumatic stress disorder), mood disorders (major depressive disorder, dysthymia), substance use disorder (abuse and dependence), and alcohol use disorder (abuse and dependence). A single dichotomous variable was created to indicate the presence of any one of these psychiatric disorders over the course of one's lifetime. In the NCS-R only, data on chronic health conditions were available, and so a single dichotomous variable was created to indicate the lifetime presence of (1) any diagnoses from a doctor for asthma, hypertension, cancer, seasonal allergies, diabetes, epilepsy, heart disease, lung problems, peptic ulcer at any point in life; or (2) self-reports of arthritis, back or neck pain, headache, other chronic pain, or stroke at any point in life.

2.2.4. Sociodemographics—Self-reported socio-demographic variables that had the potential to confound the analyses were included as covariates, per prior studies on psychosis (Kelleher & Cannon, 2011; Scott et al., 2006). In the NCS-R, race adjustments included Black, Asian, Latino, White, and other. In the NLAAS, race adjustments included Latino and Asian. In the NSAL, ethnicity adjustments included Caribbean Black American and African American. Other covariates included sex (Spauwen et al., 2003), age (18–29, 30–44, 45–59, 60+; Linscott & Van Os, 2013), marital status (single, married, previously married; e.g. Scott et al., 2006), nativity (US born, foreign born; Oh et al., 2015), education level (less than high school, high school, some college, college and beyond), and income-poverty ratio (e.g. Scott et al., 2006), which is defined relative to the federal poverty line (0=poor, 1–2=near poor, 3+=non-poor; e.g. Kessler et al., 2005).

2.3. Analyses

Standard errors were estimated through design-based analyses that used the Taylor series linearization method to account for the complex multistage clustered design, with US metropolitan statistical areas or counties as the primary sampling units. Sampling weights were used for all statistical analyses to account for individual-level sampling factors (i.e. non-response and unequal probabilities of selection). All analyses were performed using STATA SE 13. Wald χ^2 tests were used to test for differences in prevalence of each disability domain among people with and without lifetime psychotic experiences. Multivariable logistic regression models were used to examine the relation between each disability domain and lifetime psychotic experience adjusting for potential socio-demographic confounders in the first block, and then further adjusting for lifetime occurrence of mood, anxiety, substance use, and alcohol use disorders in the second block. Using the NCS-R, additional analyses were conducted adjusting for socio-demographics, psychiatric disorders, and chronic health conditions. Additional analyses were performed and included in the supplemental materials. Multivariable logistic regression models examined the associations between disability domains and hallucinations (i.e. the lifetime presence of visual and/or auditory hallucinatory experiences). Similar models examined the associations between disability domains and delusional ideation (i.e. the lifetime presence of thought insertion, thought control, telepathy, and/or ideas of persecution). Linear trend tests were performed between a count of disability domains and lifetime psychotic experiences. STATA coding for preliminary models leading up to the final models, as well as sensitivity analyses, are available upon request. For all analyses, significance was set at $\alpha=0.05$, two-tailed.

3. Results

Psychotic experiences were significantly more prevalent in individuals with any disability over the past 30 days (see Table 1). The associations between psychotic experiences and disability estimated by multivariable logistic regression are shown in Table 2. In the initial models (adjusted for sociodemographic factors, i.e. Block I), there was a significantly increased odds of reporting lifetime psychotic experiences for all disability domains, except for borderline results for self-care in both the NLAAS (OR=1.65; 95% CI=0.96–2.86) and the NSAL (OR=1.37; 95% CI=0.90–2.09). Adjusting for mental disorders diminished the

odds slightly (see Table 2); however, most associations remained statistically significant except that the relationship between psychotic experiences and role functioning in the NSAL became only borderline significant ($OR=1.30$; $95\%CI=0.98-1.74$). In the NCS-R, associations between disability and lifetime psychotic experiences remained statistically significant after controlling for sociodemographic variables, psychiatric disorders, and chronic health conditions, except for self-care, which was borderline significant ($OR=1.72$, $95\%CI=0.91-3.24$). Supplemental analyses revealed that disability domains were associated with hallucinatory experiences and delusional ideation; however, delusional ideation was far less common than hallucinatory experiences, thus yielding somewhat larger odds ratios and wider confidence intervals (Table S1). Further, reporting more types of disability domains were associated with greater odds of reporting lifetime psychotic experience in a dose-response fashion (Table S2).

4. Discussion

In the current study, we found that psychotic experiences were associated with increased disability across a broad range of functional domains. This remained the case even after adjusting for the presence of mental and physical disorders, indicating that psychotic experiences, when present, indicate risk for functional impairment beyond what might be explained by the diagnoses alone. Findings were consistent across all three racially and ethnically diverse surveys, and generally comport with other recent studies on the same topic (Navarro-Matteu et al., 2017). As such, our findings underscore the value of psychotic experiences as markers of health and functioning.

4.1. Strengths and limitations

Strengths of this study included the large sample sizes, the replication of findings across three samples, and, importantly, the replication of findings across diverse ethnic groups. Another strength of this study is that it adjusted for a broad array of physical and mental health conditions. Still, potential limitations should be acknowledged and addressed in future research. While our findings show that various domains were associated with psychotic experiences, we can only speculate why certain associations were stronger than others, and whether the combination of specific domains have synergistic effects. Furthermore, we observed that associations between disability domains and psychotic experiences varied across racial categories, suggesting the presence of some potential moderating effects of social context. Again, the limitations of our study do not allow us to explain these racial differences, but this can be scrutinized in future research.

Our study was cross-sectional and therefore did not allow us to infer a causal direction between disability and psychotic experience. The relationship may be bi-directional to some extent. Moreover, the pathways between disability and psychotic experiences are unclear, but may include the mediating roles of social support (Saha et al., 2012) and social deafferentation (Hoffman, 2007), as well as sleep deprivation (Koyanagi et al., 2016; Oh et al., 2016), psychological distress (Armando et al., 2010), and neuropsychological impairment (e.g. memory, see Mollon et al., 2016).

Nonetheless, this does not detract from the finding that psychotic experiences are risk markers for disability. Given the dichotomous nature of the disability variable we used in our analyses, we were unable to determine the extent to which psychotic experiences are associated with severity of functional impairment. Future studies can examine whether psychotic experiences are associated with degrees of disability (e.g. low, moderate, and severe).

Health conditions were only included in the NCS-R, and so future studies can make more comprehensive adjustments for comorbid health conditions among Asian-, Latino-, and Black-Americans. This may be particularly relevant since racial disparities are not always apparent when using traditional psychiatric diagnoses, but may be more apparent when using physical health, psychological distress, or disability measures. For instance, when compared with Whites, racial and ethnic minorities do not appear to be at more risk for certain mental disorders (e.g. Alegría et al., 2007; Breslau et al., 2005; 2006; Williams et al., 2007), but may be at risk for specific physical health problems (e.g. Vega et al., 2009; Peek et al., 2007). Notably Black-Americans report lower prevalence of major depressive disorder, but experience more disability associated with the symptoms (Williams et al., 2007).

4.2. Implications

As stated earlier, the causal direction between disability and psychotic experiences is unclear and confounded by several factors. If by chance psychotic experiences were to confer any amount of distress or impairment, by definition, the weight of this burden would not be comparable to that which is conferred by schizophrenia. There are some who may find psychotic experiences distressing, but much depends on the type of experience (e.g., bizarre experiences, persecutory ideas; Yung et al., 2006) and one's ability to regulate emotions (Osborne et al., 2016). It is worth stressing that many individuals who report psychotic experiences likely find them to be fleeting (Oh et al., 2015). While prior work has shown elevated rates of service utilization among people with psychotic experiences (DeVylder et al., 2014; Murphy et al., 2010), it has been unclear whether this is due to functional impairment associated with psychotic experience, and whether this impairment extends above and beyond the disability associated with co-occurring psychiatric and health conditions.

The findings that psychotic experiences are associated with most disability domains in a diverse general population sample supports the idea that psychotic experiences are clinically relevant in and of themselves. But rather than striving to eliminate psychotic experiences, we find it more sensible at this stage to simply regard psychotic experiences as indicators of mental and physical health. The existence of the association between psychotic experiences and disability after extensive and conservative adjustments for potential confounds suggests that psychotic experiences are –at least for some individuals –associated with greater functional difficulties, underscoring the importance of assessing the presence and nature of psychotic experiences in clinical settings, even among those without psychiatric disorder. By looking at specific domains, our findings underscore the value of providing tailored health

services to respond to psychotic experiences with psychosocial interventions that aim to enhance functioning in multiple areas of life.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1
Prevalence of 30 day disability in total sample, and by individuals with and without lifetime psychotic experiences

Disability Domains	NCS-R			NLAAS			NSAL					
	Total Sample % (SE)	PE % (SE)	No PE % (SE)	F-Statistic	Total %	PE % (SE)	No PE % (SE)	F-Statistic	Total %	PE % (SE)	No PE % (SE)	F-Statistic
Cognition	9.92 (0.71)	18.11 (2.78)	8.00 (0.97)	18.53	6.60 (0.60)	20.92 (3.95)	7.89 (0.50)	28.85	13.48 (0.65)	24.72 (2.14)	09.69 (0.72)	92.16
Mobility	17.26 (1.01)	14.1 (1.73)	7.94 (1.01)	12.64	9.59 (0.53)	22.72 (3.23)	7.27 (0.57)	45.01	19.85 (0.91)	21.60 (1.52)	09.27 (0.77)	90.39
Self-Care	5.10 (0.47)	18.02 (4.50)	8.52 (0.94)	7.74	2.82 (0.30)	14.25 (3.04)	8.59 (0.59)	5.15	4.98 (0.43)	18.76 (3.22)	11.35 (0.78)	7.65
Social Interaction	5.31 (0.42)	20.77 (2.77)	8.34 (0.90)	44.65	3.42 (0.40)	20.49 (4.15)	8.34 (0.59)	17.57	8.62 (0.57)	27.45 (2.75)	10.23 (0.70)	83.03
Role Functioning	26.56 (1.12)	13.57 (1.65)	6.98 (1.07)	13.05	-	-	-	-	27.68 (1.05)	15.36 (1.47)	8.86 (0.81)	19.64
Days Out of Role	31.73 (1.10)	13.34 (1.34)	6.99 (1.09)	15.09	21.31 (0.74)	17.21 (1.86)	6.46 (0.44)	75.90	37.43 (1.08)	17.62 (1.27)	8.19 (0.82)	47.69

Weighted percentage with standard errors

F-statistics with p-values less than 0.05 are indicated in bold

'Days Out of Role' is defined as having at least one day of being unable to perform usual activities due to health condition.

Table 2

Associations between lifetime psychotic experiences and disability domains

		NCS-R (n=2287)		NLAAS (n=4617)		NSAL (n=4958)	
		I	I + II	I + II + III	I	I + II	I + II
Disability Domains	OR (95% CI)	OR (95% CI)	OR (95% CI)		OR (95% CI)	OR (95% CI)	OR (95% CI)
Cognition	2.44 (1.57–3.79)	1.97 (1.28–3.04)	1.84 (1.19–2.84)	3.10 (1.99–4.83)	2.31 (1.55–3.45)	2.57 (2.02–3.26)	1.89 (1.47–2.44)
Mobility	1.89 (1.28–2.76)	1.68 (1.16–2.43)	1.51 (1.04–2.21)	4.09 (2.75–6.10)	3.36 (2.21–5.10)	2.31 (1.85–2.89)	1.82 (1.44–2.31)
Self-Care	1.98 (1.01–3.86)	1.90 (1.01–3.54)	1.72 (0.91–3.24)	1.65 (0.96–2.86)	1.33 (0.74–2.39)	1.37 (0.90–2.09)	1.00 (0.64–1.56)
Social Interaction	2.80 (1.97–3.96)	2.24 (1.56–3.21)	2.05 (1.40–3.02)	2.53 (1.46–4.40)	1.85 (1.05–3.25)	2.83 (2.14–3.76)	2.09 (1.55–2.83)
Role Functioning	2.26 (1.58–3.24)	1.97 (1.42–2.74)	1.85 (1.32–2.57)	–	–	1.70 (1.30–2.22)	1.30 (0.98–1.74)
Days Out of Role	2.16 (1.54–3.02)	1.88 (1.39–2.56)	1.76 (1.31–2.37)	2.98 (2.36–3.75)	2.45 (1.94–3.10)	2.05 (1.58–2.65)	1.59 (1.19–2.10)

p<0.05 indicated in bold

Block I. Adjusted for socio-demographic variables (race/ethnicity, sex, age, income, education, marital status, nativity)

Block II. Adjusted for lifetime psychiatric disorder, defined as the presence of at least one of the following at some point in life: mood disorders (major depressive disorder, dysthymia), anxiety disorders (agoraphobia with and without panic attacks, panic disorder, social phobia, post-traumatic stress disorder), substance use disorder (substance abuse, substance dependence), and alcohol use disorder (alcohol abuse, alcohol dependence)

Block III. Adjusted for lifetime chronic health conditions (any diagnoses from a doctor for asthma, high blood pressure, cancer, seasonal allergies, diabetes, epilepsy, heart disease, lung problems, peptic ulcer; or self-reports of arthritis, back or neck pain, headache, other chronic pain, or stroke).

* The Role Functioning variable was not available in the NLAAS, and had missing values in the NCS-R and the NSAL. For this domain only, analyses were performed using smaller samples (n=2169 in the NCS-R, and n=4612 in the NSAL).

** Health NCS-R (n=2279)