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Research Paper

Psychiatric symptoms and related dysfunction in a general population sample

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ABSTRACT

Background: Along with the key clinical features of major psychiatric disorders such as psychosis, mania, and depression, these disorders are also associated with cognitive, social, and functional deficits. A growing body of evidence suggests that these disorders exist at the extreme end of a continuum of symptoms rather than as binary entities, so it is plausible that the associated cognitive, social, and functional deficits assume a similar pattern. Consistent with this approach, we sought to determine whether adults in the general population with psychiatric symptoms also demonstrate milder forms of the cognitive, social, and functional deficits that are often associated with the psychiatric disorders.

Methods: Using data from the Study of Resilience and Environmental Adversity in Midlife Health (STREAM), which includes survey responses of 811 individuals, we compared early academic achievement and self-reported social and functional outcomes between respondents who reported psychotic symptoms, manic symptoms, depressive symptoms, or no psychiatric symptoms (controls).

Results: Adults with psychotic symptoms had significantly poorer early academic performance ($p = .04$) and social and functional outcomes (self-reported marital status, $p = .021$, income, $p = .001$, and health, $p < .001$) than controls. Adults with depressive symptoms had significantly lower early academic performance and income and poorer health than controls (p's = 0.033, 0.037, 0.013 respectively), and adults with manic symptoms also reported significantly lower rates of marriage than controls ($p = .006$).

Conclusions: The results are consistent with the continuum view of the etiology of psychiatric disorders in which psychiatric disorders are dimensional and experienced in varying degrees of severity across the general and clinical population. Importantly, the results highlight the potential impact of psychiatric symptomatology on functional outcomes in the population.

1. Introduction

In addition to the psychiatric symptoms associated with psychotic and affective disorders, they also entail disabling cognitive (Heinrichs and Zakzanis, 1998; Meijer et al., 2012; Taylor Tavares et al., 2003), social (Kupferberg et al., 2016; Morgan et al., 2017; Simon et al., 2007; Velthorst et al., 2016), and functional (Coryell et al., 1993; Goetz et al., 2007; Morgan et al., 2017) impairments that tend to persist even with treatment (Lewis, 2004; Simon et al., 2007; Taylor Tavares et al., 2003; Velthorst et al., 2016). While these deficits have been thoroughly studied in clinical populations, less is known about similar impairments in those experiencing psychotic and affective symptoms in the general population. Prior studies indicate that this is a substantial group, with estimates of nonclinical psychotic symptoms ranging from 5.8%–16.3% (Henquet et al., 2006; McGrath et al., 2015), estimates of manic symptoms up to 37% (Kessler et al., 1997), and estimates of depressive symptoms ranging from 6.3%–11.8% (Judd et al., 1996; Rhee et al., 2014). These findings are suggestive of a continuum model of psychopathology, in which psychiatric disorders are not binary entities but exist at the most extreme end of a continuum of symptoms experienced in the general population.

If psychotic and affective disorders exist on a continuum rather than as binary entities, it is possible that the associated cognitive, social, and functional deficits follow a similar pattern, and that those in the general

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population experiencing psychotic and affective symptoms also experience some level of impairment. Few studies, however, have examined the association between psychotic and affective symptoms and cognitive, social, and functional impairments in the general population. Two studies found that adults in the general population who experienced psychotic symptoms had fewer educational attainments (Johns et al., 2004), lower intellectual and cognitive functioning (Johns et al., 2004; Rossler et al., 2007), and poorer social (Rossler et al., 2007) and employment outcomes (Rossler et al., 2007) than adults in the general population without psychotic symptoms. Although evidence exists for social dysfunction in adults with subthreshold affective disorders (Goldney et al., 2004; Judd and Akiskal, 2003), the evidence is mixed for cognitive (Dotson et al., 2014; Simons et al., 2009) and functional deficits (Coryell et al., 1993; Goldney et al., 2004; Hybels et al., 2001; Judd and Akiskal, 2003; Judd et al., 1996; Zarate et al., 2000).

In the present study, we examined whether psychotic, manic, and depressive symptoms were associated with lower cognitive performance in adolescence, and social and functional deficits in adulthood in a general population sample of Israeli adults. We hypothesized that consistent with a continuum view of psychopathology, adults with psychotic, manic, or depressive symptoms would show patterns of cognitive, social, and functional impairment similar to those of their clinical counterparts. More specifically, we hypothesized that compared to adults without psychotic, manic, or depressive symptoms (controls), adults with psychotic symptoms would have poorer adolescent cognition, and that adults with psychotic, manic, and depressive would all have poorer social and functional outcomes than controls. We also hypothesized that individuals with affective symptoms would have more pronounced social and functional deficits than controls but fewer than individuals with psychotic symptoms. To the best of our knowledge, this is the first general population study to examine the associations of psychotic, manic, and depressive symptoms with cognitive, social, and functional deficits, as well as the first study to directly compare these associations across symptom domains.

2. Methods

2.1. Sample

This study uses data from the Study of Resilience and Environmental Adversity in Midlife Health (STREAM) cohort (Velthorst et al., 2015). The STREAM cohort consists of 811 participants between 34 and 44 years old that were randomly selected from 7000 individuals who were born and raised in inner-Jerusalem (Velthorst et al., 2015). After confirmation that there was no history of psychiatric hospitalization, participants were contacted for a telephone survey in 2007–2008 and were followed-up for a second round one year later. Survey topics included physical health (e.g. BMI, occurrence of migraines), psychiatric vulnerabilities (e.g. psychotic and depressive symptoms), socioeconomic status, lifestyle behavior (e.g. smoking, exercise), and other measures of daily experience (e.g. social contact, stress levels). Survey data was then retrospectively linked with data from national registry sources. For more detailed information on the data collection and survey methodology used in STREAM, see Velthorst et al. (2015).

2.2. Measures

2.2.1. Mental health

All questions assessing mental health variables were adapted from the Mini-International Neuropsychiatric Interview (MINI) (Sheehan et al., 1998): questions on psychotic symptoms were adapted from the Psychotic Disorders section; questions on manic symptoms were adapted from the Manic/Hypomanic Episode section; and questions on depressive symptoms were adapted from the Major Depressive Episode section. For specific questions, rating scales, and coding criteria, see Table 1.

2.2.1.1. Psychotic symptoms. Participants were asked about lifetime experiences of psychotic experiences (hallucinations and delusions (Table 1). Those who experienced both delusions and hallucinations were grouped into a severe psychotic symptom category and those who experienced delusions or hallucinations were grouped into a mild psychotic symptom category. This classification of mild vs. severe by number of symptoms is consistent with prior studies on psychotic symptoms in the general population (McGrath et al., 2015).

2.2.1.2. Manic symptoms. Participants were asked about lifetime experiences of euphoric mania (e.g. increased excitement and energy) and dysphoric mania (irritability) (Table 1). Participants who experienced euphoric mania dysphoric mania were grouped into a severe manic symptom category and those who experienced euphoric mania/increased excitement and energy or dysphoric mania/irritability were grouped into a mild manic symptom category.

2.2.1.3. Depressive symptoms. Participants were asked about depressive symptoms (despondency, anhedonia) in the past month (Table 1). Because there were fewer questions (and therefore less opportunity for a severe and mild group to emerge), we did not split the depressive symptom group by severity.

2.2.1.4. Controls. Participants who did not meet the criteria for the severe psychotic experience group, mild psychotic experience group, severe mania group, mild mania group, or depressive symptom group were included in the control group.

2.2.2. Adolescent scholastic achievement

School records come from the Jerusalem adolescent development study (JADs) (Ullman et al., 2012) for which the Jerusalem Municipality routinely collected 8th grade school records from all public school students from 1978 to 1988 (n = 21,449). All school grades range from 0 to 100 and the final data archive included report card grades for academic school subjects (e.g. math) as well as for nonacademic subjects (e.g. physical education). For this study specifically, grades for survey participants in Hebrew, math, geography, science, English (as a second language), gym, music, art, and handcraft were analyzed.

To examine overall adolescent scholastic achievement, scores in all subjects (Hebrew, math, geography, science, English as a second language, music, art, handcraft, and gym) were averaged into an overall composite score. To determine whether potential differences in scholastic achievement are driven by cognition (rather than behavior), we also averaged scores from academic subjects (Hebrew, math, geography, science, and English as a second language) into a core composite score and scores from nonacademic subjects (music, art, and handcraft) into a nonacademic composite score for comparison.

2.2.3. Midlife social and functional outcomes

We assessed social outcomes through self-reported marital status and functional outcomes through self-reported health and income.

2.2.3.1. Marital status. Participants were asked whether they were single, married without children, married with children, divorced/widowed without children, divorced/widowed with children. For the purpose of these analyses, responses were grouped into the categories of single, married, and divorced/widowed.

2.2.3.2. Income. Participants were asked to rate their total family income in relation to the average household monthly income in Israel (NIS 11,500 or ~3306 USD) on a scale from 1 to 5 (e.g. 1 = a lot below average, 2 = below average, 3 = around average, 4 = above average, 5 = a lot above average). For the purpose of these analyses, those who responded a lot below average and below average were considered below average, those who responded average were considered average,

Table 1
Questions and coding criteria for psychotic, manic, and depressive symptom groups.

Psychotic experiences		
Delusions	1. "Have you ever felt that people were following you or spying on you?"	Scale from 1 to 4 (1 = never, 2 = seldom, 3 = frequently, 4 = very frequently)
	If response is ≥2	
	1a. "Have you ever felt that people are deliberately acting against you and want to harm you or your interests?"	Scale from 1 to 4 (1 = never, 2 = seldom, 3 = frequently, 4 = very frequently)
	If response is ≥2 **PRESENT**	
Hallucinations	1. "Did you ever hear or see things that other people cannot see or hear?"	Scale from 1 to 4 (1 = never, 2 = seldom, 3 = frequently, 4 = very frequently)
	If response is ≥2	
	1a. "Have you ever heard voices saying all sorts of things when there was nobody else around?"	Scale from 1 to 4 (1 = never, 2 = seldom, 3 = frequently, 4 = very frequently)
	If response is ≥2 **PRESENT**	
Mania		
Euphoric Mania	1. "Was there ever a period in which you felt exceptionally happy, you were full of energy, 'hyper,' and needed less sleep than usual?"	Scale from 1 to 5 (1 = not at all, 2 = for a few days, 3 = for 1–2 weeks, 4 = for > 2 weeks, 5 = almost every day)
	If response is ≥3	
	1a. "During those days when you felt happy and full of energy, did you get into trouble or did someone close to you say that you were behaving strangely;"	Scale from 1 to 4 (1 = never, 2 = sometimes, 3 = mostly, 4 = always)
	1b. "During those days when you felt happy and full of energy, did you speak faster than usual, or did you feel that many uncontrollable thoughts were racing in your head?"	Scale from 1 to 4 (1 = never, 2 = sometimes, 3 = mostly, 4 = always)
	If response to 1a. is ≥2 OR response to 1b. is ≥2 **PRESENT**	
Dysphoric Mania	1. "Was there ever a time when you felt particularly nervous and annoyed?"	Scale from 1 to 5 (1 = not at all, 2 = for a few days, 3 = for 1–2 weeks, 4 = for > 2 weeks, 5 = almost every day)
	If response is ≥3	
	1a. "During these periods. Were you involved in arguments, fights, or did you shout at people?"	Scale from 1 to 4 (1 = never, 2 = sometimes, 3 = mostly, 4 = always)
	If response is ≥2 **PRESENT**	
Depression	"During the past four weeks have you been plagued by any of the following:	Scale from 1 to 5 (1 = not at all, 2 = for a few days, 3 = for 1–2 weeks, 4 = for > 2 weeks, 5 = almost every day)
	1. Feeling of despondency, depression or hopelessness?"	
	2. Little interest or pleasure in doing things?"	
	If response to 1. is ≥3 AND response to 2. Is ≥3 **PRESENT**	

Note. Follow-up questions were only asked when required criterion was met which was auto-determined as survey responses were entered.

and those who responded above average and a lot above average were considered above average.

2.2.3.3. Health. Participants were asked to rate their health in general on a scale from 1 to 5 (e.g. 1 = excellent, 2 = very good, 3 = good, 4 = fair/mediocre, 5 = not good). For the purpose of these analyses, those who responded with excellent, very good, or good were considered healthy and those who responded with fair/mediocre and not good were considered unhealthy.

2.3. Statistical analyses

Group differences in adolescent scholastic achievement were investigated using univariate analyses of covariance (ANCOVA) controlling for gender. Pairwise comparisons were done using Tukey's Honest Significant Difference. Group differences in social and functional outcomes were investigated using chi-squared tests. Due to the small sample size within the subgroups with severe symptomatology and the use of planned comparisons, corrections for multiple testing were not included. Findings were considered significant when $p < .05$. All analyses were performed in IBM SPSS Version 23.

3. Results

3.1. Sample characteristics

Of the 811 participants in the STREAM dataset, 228 (28.1%) had two Israeli parents, 237 (29.2%) had one Israeli parent, 344 (42.4%) had no Israeli parent, and 2 (0.25%) were missing. Four hundred fourty-four (54.7%) were male, 366 (45.1%) were female, and 1 (0.1%) was missing.

Rates of psychotic, manic, and depressive symptoms were as follows: 53 (6.5%) reported mild psychotic symptoms (lifetime), 8 (1%) reported severe psychotic symptoms (lifetime), 153 (18.9%) reported mild manic symptoms (lifetime), 19 (2.3%) reported severe manic symptoms (lifetime), 34 (4.2%) reported depressive symptoms (current), and 478 (58.9%) reported no psychotic, manic or depressive symptoms. These rates are similar to those found in other studies of general population samples (Henquet et al., 2006; Kessler et al., 1997; McGrath et al., 2015; Merikangas et al., 2007; Scott et al., 2006; Wiles et al., 2006).

3.2. Adolescent scholastic achievement

Table 2 presents composite scores of adolescent scholastic achievement in the three symptoms groups and in controls. Both the mild and severe psychotic symptom (lifetime) groups had lower overall composite scores than controls. In the manic symptom (lifetime) group, only the mild symptom group had lower overall composite scores than controls.

To determine whether these differences in overall composite scores were associated with academic subjects (core) or non-academic subjects (nonacademic), we analyzed differences in core composite score and nonacademic composite score across groups. Significant deficits in core composite score were observed in the groups with psychotic (lifetime) and depressive (current) symptoms (p's = 0.03), and exploratory pairwise analyses revealed significantly poorer composite scores for the groups with mild psychotic symptoms (lifetime) ($p = .023$) and mild manic symptoms (lifetime) ($p = .008$) than for controls. No statistically significant differences emerged for nonacademic composite score.

3.3. Social and functional outcomes

The social and functional outcomes of the psychotic symptom (lifetime), manic symptom (lifetime), depressive symptom (current), and control groups are presented in Fig. 1. The group with psychotic

Table 2
Childhood cognitive functioning in symptom groups and controls.

	Psychotic symptoms		Manic symptoms		Depressive symptoms	Control group
	Mild (n = 53)	Severe (n = 8)	Mild (n = 153)	Severe (n = 19)	(n = 34)	(n = 478)
Overall composite score	78.22 (10.12)	74.20 (10.82)	78.84 (9.97)*	83.59 (9.71)	78.21 (12.96)	80.54 (10.63)
Between-group difference	F(2.536) = 3.20, p = .041 d = 0.22		F(2647) = 3.40, p = .034 d = 0.20		F(1510) = 2.52, p = .113 d = 0.14	
Core subject composite score	75.87 (11.60)*	73.88 (10.10)	77.01 (11.67)**	82.05 (10.50)	75.44 (14.26)*	79.39 (12.27)
Between-group difference	F(2536) = 3.42, p = .033 d = 0.23		F(2647) = 3.84, p = .022 d = 0.22		F(1510) = 4.55, p = .033 d = 0.19	
Nonacademic composite score	84.50 (10.94)	78.57 (14.64)	83.97 (11.79)	85.29 (11.37)	86.44 (12.92)	84.56 (12.27)
Between-group difference	F(2449) = 1.21, p = .298 d = 0.14		F(2541) = 0.61, p = .545 d = 0.09		F(1422) = 0.23, p = .635 d = 0.06	

Note: Between group differences refer to the difference between the symptom group (including mild and severe groups) and the control group. Asterisks refer to significant differences between the subgroup (mild or severe) and the control group revealed in… *p < .05 **p < .01. For illustration, we also present effect sizes of the difference between symptom groups and controls in scores. Effect sizes of 0.20, 0.50, and 0.80 reflect small, medium, and large effects, respectively (Cohen, 1992).

symptoms (lifetime) was significantly more likely than controls to report being unmarried (χ^2 (2, 277) = 10.32, p = .006). Exploratory subgroup analyses also found that individuals with mild psychotic symptoms (lifetime) (χ^2 (2, 273) = 11.33, p = .003) and mild manic symptoms (lifetime) (χ^2 (2, 349) = 6.62, p = .037) were also significantly more likely than controls to report being unmarried.

The groups with psychotic experiences (lifetime) and depressive symptoms (current) were significantly more likely than controls to report below average income (psychotic symptom group χ^2 (2215) = 11.08, p = .004, depressive symptom group χ^2 (2209) = 6.61, p = .037). Within the psychotic symptom group (lifetime), exploratory analyses showed that the severe symptom group (χ^2 (2, 196) = 13.44, p = .001) was significantly more likely than controls to report below average income. Although the differences were not significant, the percent of individuals reporting below average income in the mild psychotic (26.3%), mild manic (21.9%), and severe manic (18.2%) symptom groups were more than in the control group (12.5%). Adults with depressive symptoms (current) and mild psychotic symptoms (lifetime) were also significantly more likely than controls to report themselves as not healthy (χ^2 (2, 235) = 21.49, p < .001; χ^2 (1, 237) = 8.54, p = .003).

4. Discussion

In this cohort study, results showed that a high proportion of individuals in the general population with psychotic, manic, and depressive symptoms experience cognitive, social and functional deficits. As in earlier research, the groups with affective symptoms had better outcomes than those with psychotic symptoms but still had poorer outcomes than healthy controls (Bellack et al., 1990; Bowie et al., 2010). Adults with psychotic experiences demonstrated the most severe social and functional deficits, followed by adults with depressive symptoms; while adults with manic symptoms had exhibited fewer deficits than these groups, they still had worse outcomes than controls.

These findings are consistent with previous research showing that individuals who reported psychotic symptoms have lower IQ and fewer educational qualifications (Johns et al., 2004), and that those who reported more psychotic or schizotypal symptoms have greater social and functional impairment than a comparison group without these symptoms (Rossler et al., 2007). Moreover, in line with our results, adults with manic and depressive symptoms have been found to report a greater likelihood of being unmarried (Hybels et al., 2001) and poorer health (Goldney et al., 2004) compared to adults without affective symptoms.

While no study to date has examined adolescent cognitive functioning in adults with affective symptoms, our results suggest that cognitive impairments may also predate symptom onset in this population. Prior studies have also found that cognitive deficits precede clinical (Airaksinen et al., 2007) and subclinical (Simons et al., 2009) depression, although there appears to be no evidence for premorbid cognitive impairments in patients with bipolar disorder (Cannon et al., 1997; Reichenberg et al., 2002). The (nonsignificant) superior performance in adolescent academic records of the adults in the severe manic symptom group is surprising, although it is consistent with other epidemiological studies (Koenen et al., 2009; MacCabe et al., 2010; Stringaris et al., 2014). Possible explanations proposed for increased cognitive ability and scholastic achievement in children with current or future mania/bipolar disorder include the increased output and intellectual creativity associated with euphoric hypomanic states (MacCabe et al., 2010; Stringaris et al., 2014). Further research is needed to determine the trajectory of cognitive deficits in clinical and subclinical affective disorders, particularly in bipolar disorder.

The present study has several limitations. While the classification of severe and mild symptom groups was based on criteria used in other general population studies of psychotic symptoms (McGrath et al., 2015), the classification system was restricted to information provided in the telephone survey, limiting the potential sources for this classification. Although the sample itself was large, the groups of individuals experiencing the most severe symptoms were small, resulting in lower statistical power for exploratory analyses involving these groups. The lower power also potentially explains the outcomes with statistically significant differences between the control group and the mild subgroups but not the severe subgroups. This reduced power also precluded testing of possible gender effects, something that should be examined in future studies. Furthermore, the sample was ethnically homogeneous, and further research is needed to replicate this pattern in more heterogeneous populations and test for the potential influence of ethnicity. All of the social and functional outcomes measured were based on self-report (e.g. health status, income) and may therefore be biased. The use of marital status as a proxy for social functioning is consistent with clinical and subclinical literature (Harvey, 2014; Judd and Akiskal, 2003; Rossler et al., 2007), although we acknowledge that it would be more informative if a social functioning measure included detailed information on quantity and quality of relationships and other social activities. There was also a significant amount of data missing for adolescent scores in nonacademic subjects, which may have biased the results. Finally, although all individuals with a history of psychiatric hospitalization were excluded, we did not have access to outpatient records and were therefore unable to confirm that reported symptoms did not stem from a past or current clinical diagnosis that did not require hospitalization. Since the rates of psychiatric symptoms in our study population were concordant with those in prior studies (Henquet

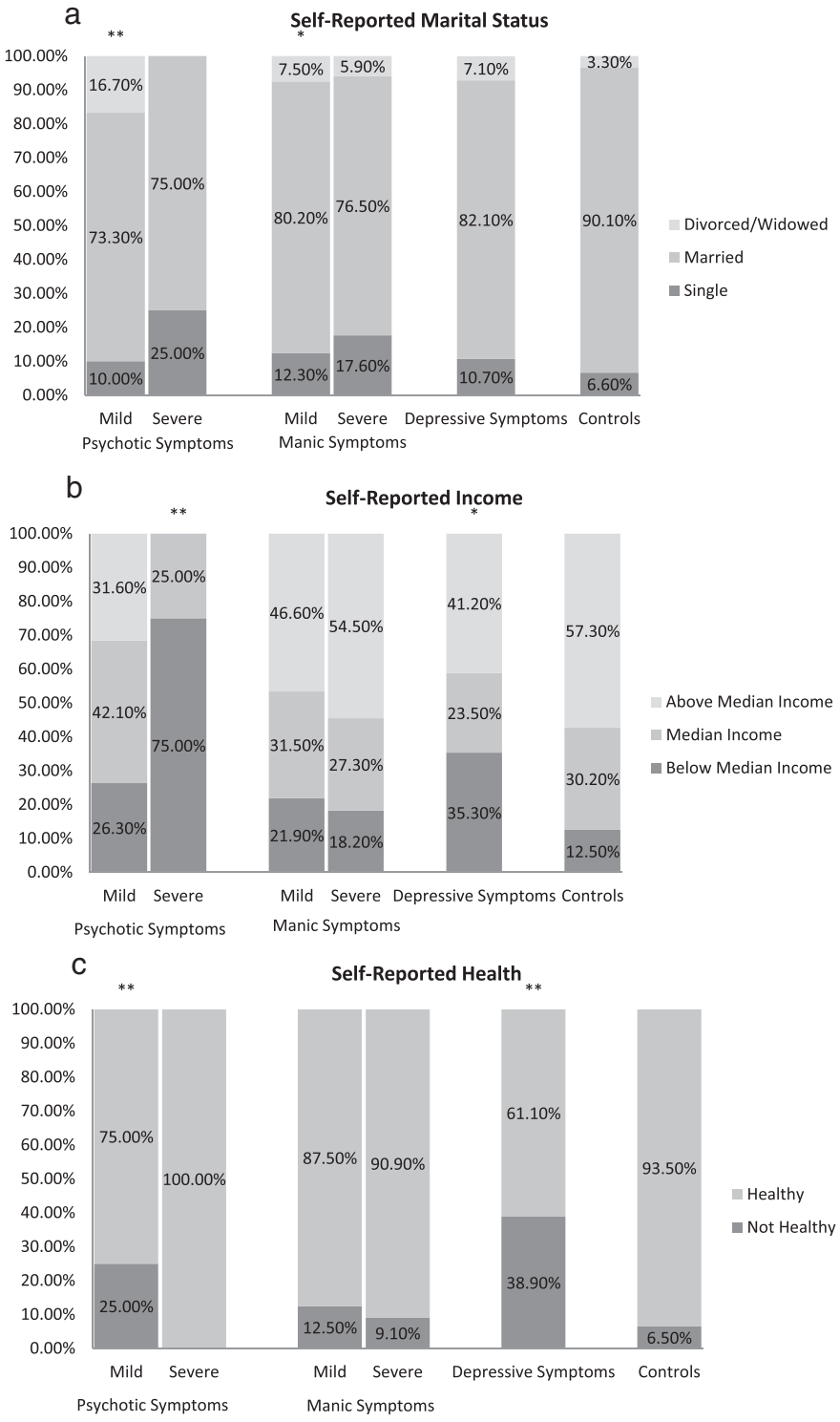

Fig. 1. Self-reported marital status, income, and health in symptom groups and controls.
Note: Asterisks refer to significant difference between the symptom group and the control group. *p < .05 **p < .01.

et al., 2006; Kessler et al., 1997; McGrath et al., 2015; Merikangas et al., 2007; Scott et al., 2006; Wiles et al., 2006), however, it seems unlikely that this could fully account for our results. The results of this study suggest there is a substantial population with psychiatric symptomatology experiencing cognitive, social, and functional impairments. Identifying and targeting this population for early interventions or other services could be useful in remedying these deficits and improving quality of life. Further longitudinal research including multiple assessment points is needed to confirm the existence of an interrelationship between psychiatric symptoms and functional deficits, and identify whether a causal association exists. Future studies should also aim to identify the onset and trajectory of these impairments and potential mechanisms for change.

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Conflict of interest

None.

Ethical standards

The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008. Data collection was approved by the local Institutional Review Board and all participants gave informed consent.

References

Airaksinen, E., Wahlin, A., Forsell, Y., Larsson, M., 2007. Low episodic memory performance as a premorbid marker of depression: evidence from a 3-year follow-up. Acta Psychiatr. Scand. 115 (6), 458–465.

Bellack, A.S., Morrison, R.L., Wixted, J.T., Mueser, K.T., 1990. An analysis of social competence in schizophrenia. Br. J. Psychiatry J. Ment. Sci. 156, 809–818.

Bowie, C.R., Depp, C., McGrath, J.A., Wolyniec, P., Mausbach, B.T., Thornquist, M.H., Luke, J., Patterson, T.L., Harvey, P.D., Pulver, A.E., 2010. Prediction of real-world functional disability in chronic mental disorders: a comparison of schizophrenia and bipolar disorder. Am. J. Psychiatry 167 (9), 1116–1124.

Cannon, M., Jones, P., Gilvarry, C., Rifkin, L., McKenzie, K., Foerster, A., Murray, R.M., 1997. Premorbid social functioning in schizophrenia and bipolar disorder: similarities and differences. Am. J. Psychiatry 154 (11), 1544–1550.

Cohen, J., 1992. A power primer. Psychol. Bull. 112 (1), 155–159.

Coryell, W., Scheftner, W., Keller, M., Endicott, J., Maser, J., Klerman, G.L., 1993. The enduring psychosocial consequences of mania and depression. Am. J. Psychiatry 150 (5), 720–727.

Dotson, V.M., Szymkowicz, S.M., Kirton, J.W., McLaren, M.E., Green, M.L., Rohani, J.Y., 2014. Unique and interactive effect of anxiety and depressive symptoms on cognitive and brain function in young and older adults. J. Depression Anxiety(Suppl. 1).

Goetz, I., Tohen, M., Reed, C., Lorenzo, M., Vieta, E., Board, E.A., 2007. Functional impairment in patients with mania: baseline results of the EMBLEM study. Bipolar Disord. 9 (1–2), 45–52.

Goldney, R.D., Fisher, L.J., Dal Grande, E., Taylor, A.W., 2004. Subsyndromal depression: prevalence, use of health services and quality of life in an Australian population. Soc. Psychiatry Psychiatr. Epidemiol. 39 (4), 293–298.

Harvey, P.D., 2014. Disability in schizophrenia: contributing factors and validated assessments. J. Clin. Psychiatry 75 (Suppl. 1), 15–20.

Heinrichs, R.W., Zakzanis, K.K., 1998. Neurocognitive deficit in schizophrenia: a quantitative review of the evidence. Neuropsychology 12 (3), 426–445.

Henquet, C., Krabbendam, L., de Graaf, R., ten Have, M., van Os, J., 2006. Cannabis use and expression of mania in the general population. J. Affect. Disord. 95 (1–3), 103–110.

Hybels, C.F., Blazer, D.G., Pieper, C.F., 2001. Toward a threshold for subthreshold depression: an analysis of correlates of depression by severity of symptoms using data from an elderly community sample. The Gerontologist 41 (3), 357–365.

Johns, L.C., Cannon, M., Singleton, N., Murray, R.M., Farrell, M., Brugha, T., Bebbington, P., Jenkins, R., Meltzer, H., 2004. Prevalence and correlates of self-reported psychotic symptoms in the British population. Br. J. Psychiatry J. Ment. Sci. 185, 298–305.

Judd, L.L., Akiskal, H.S., 2003. The prevalence and disability of bipolar spectrum disorders in the US population: re-analysis of the ECA database taking into account subthreshold cases. J. Affect. Disord. 73 (1–2), 123–131.

Judd, L.L., Paulus, M.P., Wells, K.B., Rapaport, M.H., 1996. Socioeconomic burden of subsyndromal depressive symptoms and major depression in a sample of the general population. Am. J. Psychiatry 153 (11), 1411–1417.

Kessler, R.C., Rubinow, D.R., Holmes, C., Abelson, J.M., Zhao, S., 1997. The epidemiology of DSM-III-R bipolar I disorder in a general population survey. Psychol. Med. 27 (5), 1079–1089.

Koenen, K.C., Moffitt, T.E., Roberts, A.L., Martin, L.T., Kubzansky, L., Harrington, H., Poulton, R., Caspi, A., 2009. Childhood IQ and adult mental disorders: a test of the cognitive reserve hypothesis. Am. J. Psychiatry 166 (1), 50–57.

Kupferberg, A., Bicks, L., Hasler, G., 2016. Social functioning in major depressive disorder. Neurosci. Biobehav. Rev. 69, 313–332.

Lewis, R., 2004. Should cognitive deficit be a diagnostic criterion for schizophrenia? J. Psychiatry Neuroscience: JPN 29 (2), 102–113.

MacCabe, J.H., Lambe, M.P., Cnattingius, S., Sham, P.C., David, A.S., Reichenberg, A., Murray, R.M., Hultman, C.M., 2010. Excellent school performance at age 16 and risk of adult bipolar disorder: national cohort study. Br. J. Psychiatry J. Ment. Sci. 196 (2), 109–115.

McGrath, J.J., Saha, S., Al-Hamzawi, A., Alonso, J., Bromet, E.J., Bruffaerts, R., Caldas-de-Almeida, J.M., Chiu, W.T., de Jonge, P., Fayyad, J., Florescu, S., Gureje, O., Haro, J.M., Hu, C., Kovess-Masfety, V., Lepine, J.P., Lim, C.C., Mora, M.E., Navarro-Mateu, F., Ochoa, S., Sampson, N., Scott, K., Viana, M.C., Kessler, R.C., 2015. Psychotic experiences in the general population: a cross-national analysis based on 31,261 respondents from 18 countries. JAMA Psychiatry 72 (7), 697–705.

Meijer, J., Simons, C.J., Quee, P.J., Verweij, K., Investigators, G, 2012. Cognitive alterations in patients with non-affective psychotic disorder and their unaffected siblings and parents. Acta Psychiatr. Scand. 125 (1), 66–76.

Merikangas, K.R., Akiskal, H.S., Angst, J., Greenberg, P.E., Hirschfeld, R.M., Petukhova, M., Kessler, R.C., 2007. Lifetime and 12-month prevalence of bipolar spectrum disorder in the National Comorbidity Survey replication. Arch. Gen. Psychiatry 64 (5), 543–552.

Morgan, V.A., Waterreus, A., Carr, V., Castle, D., Cohen, M., Harvey, C., Galletly, C., Mackinnon, A., McGorry, P., McGrath, J.J., Neil, A.L., Saw, S., Badcock, J.C., Foley, D.L., Waghorn, G., Coker, S., Jablensky, A., 2017. Responding to challenges for people with psychotic illness: updated evidence from the survey of high impact psychosis. Aust. N. Z. J. Psychiatry 51 (2), 124–140.

Reichenberg, A., Weiser, M., Rabinowitz, J., Caspi, A., Schmeidler, J., Mark, M., Kaplan, Z., Davidson, M., 2002. A population-based cohort study of premorbid intellectual, language, and behavioral functioning in patients with schizophrenia, schizoaffective disorder, and nonpsychotic bipolar disorder. Am. J. Psychiatry 159 (12), 2027–2035.

Rhee, S.J., Kim, E.Y., Kim, S.H., Lee, H.J., Kim, B., Ha, K., Yoon, D.H., Ahn, Y.M., 2014. Subjective depressive symptoms and metabolic syndrome among the general population. Prog. Neuro-Psychopharmacol. Biol. Psychiatry 54, 223–230.

Rossler, W., Riecher-Rossler, A., Angst, J., Murray, R., Gamma, A., Eich, D., van Os, J., Gross, V.A., 2007. Psychotic experiences in the general population: a twenty-year prospective community study. Schizophr. Res. 92 (1–3), 1–14.

Scott, J., Chant, D., Andrews, G., McGrath, J., 2006. Psychotic-like experiences in the general community: the correlates of CIDI psychosis screen items in an Australian sample. Psychol. Med. 36 (2), 231–238.

Sheehan, D.V., Lecrubier, Y., Sheehan, K.H., Amorim, P., Janavs, J., Weiller, E., Hergueta, T., Baker, R., Dunbar, G.C., 1998. The Mini-International Neuropsychiatric Interview (M.I.N.I.): the development and validation of a structured diagnostic psychiatric interview for DSM-IV and ICD-10. J. Clin. Psychiatry 59 (Suppl. 20), 22–33 (quiz 34–57).

Simon, G.E., Bauer, M.S., Ludman, E.J., Operskalski, B.H., Unutzer, J., 2007. Mood symptoms, functional impairment, and disability in people with bipolar disorder: specific effects of mania and depression. J. Clin. Psychiatry 68 (8), 1237–1245.

Simons, C.J., Jacobs, N., Derom, C., Thiery, E., Jolles, J., van Os, J., Krabbendam, L., 2009. Cognition as predictor of current and follow-up depressive symptoms in the general population. Acta Psychiatr. Scand. 120 (1), 45–52.

Stringaris, A., Castellanos-Ryan, N., Banaschewski, T., Barker, G.J., Bokde, A.L., Bromberg, U., Buchel, C., Fauth-Buhler, M., Flor, H., Frouin, V., Gallinat, J., Garavan, H., Gowland, P., Heinz, A., Itterman, B., Lawrence, C., Nees, F., Paillere-Martinot, M.L., Paus, T., Pausova, Z., Rietschel, M., Smolka, M.N., Schumann, G., Goodman, R., Conrod, P., Imagen, C., 2014. Dimensions of manic symptoms in youth: psychosocial impairment and cognitive performance in the IMAGEN sample. J. Child Psychol. Psychiatry Allied Discip. 55 (12), 1380–1389.

Taylor Tavares, J.V., Drevets, W.C., Sahakian, B.J., 2003. Cognition in mania and depression. Psychol. Med. 33 (6), 959–967.

Ullman, V.Z., Levine, S.Z., Reichenberg, A., Rabinowitz, J., 2012. Real-world premorbid functioning in schizophrenia and affective disorders during the early teenage years: a population-based study of school grades and teacher ratings. Schizophr. Res. 136 (1–3), 13–18.

Velthorst, E., Reichenberg, A., Rabinowitz, J., Levine, S.Z., 2015. Study of resilience and environmental adversity in midlife health (STREAM). Soc. Psychiatry Psychiatr. Epidemiol. 50 (12), 1915–1922.

Velthorst, E., Fett, A.J., Reichenberg, A., Perlman, G., van Os, J., Bromet, E.J., Kotov, R., 2016. The 20-year longitudinal trajectories of social functioning in individuals with psychotic disorders. Am. J. Psychiatry 174 (11), 1075–1085.

Wiles, N.J., Zammit, S., Bebbington, P., Singleton, N., Meltzer, H., Lewis, G., 2006. Self-reported psychotic symptoms in the general population: results from the longitudinal study of the British National Psychiatric Morbidity Survey. Br. J. Psychiatry J. Ment. Sci. 188, 519–526.

Zarate Jr., C.A., Tohen, M., Land, M., Cavanagh, S., 2000. Functional impairment and cognition in bipolar disorder. Psychiatr. Q. 71 (4), 309–329.