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Epidemiological patterns of mental disorders and stigma in a community household survey in urban slum and rural settings in Kenya

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Abstract

Purpose—This study investigated the epidemiological patterns of mental illness and stigma in community households in Kenya using a cross-sectional community household survey among 846 participants.

Methods—A cross-sectional community household survey was conducted around urban slum (Kangemi) and rural (Kibwezi) selected health facilities in Kenya. All households within the two sites served by the selected health facilities were included in the study. To select the main respondent in the household, the oldest adult who could speak English, Kiswahili or both (the official languages in Kenya) was selected to participate in the interview. The Opinion about Mental Illness in Chinese Community (OMICC) questionnaire, and the MINI-International Neuropsychiatric Interview Plus Version 5 (MINI) tools were administered to the participants. Pearson's chi-square test was used to compare prevalence according to gender, while adjusted regression models examined the association between mental illness and views about mental illness, stratified by gender.

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Conflict of interest

None

Ethical Approval

The study was approved by Kenyatta National Hospital and University of Nairobi Research and Ethics Committee.

Availability of Data and Materials

Available on request from the corresponding author.

Results—The overall prevalence of mental illness was 45%, showing gender differences regarding common types of illness. The opinions about mental illness were similar for men and women, while rural respondents were more positively opinioned than urban participants. Overall, suffering from mental illness was associated with more positive opinions among women and more negative opinions among men.

Conclusion—More research is needed into the factors explaining the observed differences in opinion about mental illness between the subgroups, and the impact of mental illness on stigma in Kenya in order to create an evidence-based approach against stigma.

Keywords

Prevalence; mental disorder; stigma; rural; urban; Kenya

Introduction

Mental illness accounts for 14% of the global burden of disease (Prince et al., 2007). It is subjected to adverse social reactions and stigmatization (Corrigan, 2014); (Corrigan & Kosyluk, 2014; Poole, Higgs, & Robinson, 2013). This often affects self-esteem, treatment-seeking behavior resulting in reduced recovery rates (Wang, Weiss, Pachankis, & Link, 2016). Stigmatization labels the person as different (Yang et al., 2007) leading to discrimination (Chronister, Chou, & Liao, 2013; Rao & Valencia-Garcia, 2014) and predisposition to poor outcomes in many facets of life (Link & Phelan, 2010; Yang et al., 2007).

Mental health stigma is socially constructed, its manifestation being dependent on context and cultural norms (Rao & Valencia-Garcia, 2014; Yang et al., 2007). Most studies on stigma and its impacts have been done in developed countries (World Health Organization, 2008) with few in developing countries (Wirth & Bodenhausen, 2008) where it has been shown that culture has an influence on the experience, expression and determinants of stigma (Ikwuka et al., 2016) and where also perceived mental illness stigma was found to be higher than in developed countries (Alonso et al., 2008), Kenya included (Walton, Matheson, Webster, Kotadia, & Kapoor, 2016). Our study provides an overview of mental illness prevalence in community settings (rural and urban) in Kenya and compares attitudes and stigma towards persons with mental illness in urban and rural settings.

Methodology

Study site and design

This study entailed a cross-sectional community household survey around urban (Kangemi) and rural (Kibwezi) selected health facilities in Kenya. The facilities were selected with the guidance of the District Health Management Teams (DHMTs), as community health strategies and disease surveillance system were in place but there were no mental health services. In order to provide proximity for the majority of community members who required accessing mental health care, a community household survey was conducted to establish the prevalence of mental disorders and opinions about mental illness in the study areas. Kangemi is one of the largest informal settlements (urban slum) on the outskirts of

Nairobi in Kenya, characterized by overcrowding, insecurity and poor living conditions. Kibwezi is a remote and rural region in Makueni County, and is ranked among the top 10 counties in the country, with high poverty index (60.6% of individuals are below the poverty line). It is located 250 kilometers South East of Nairobi and lies astride the Mombasa Nairobi Highway.

Household selection

All households within the two sites served by the selected health facilities were included in the study. All adult residents (18 years and above) in the selected households were listed from the oldest to the youngest by gender, with the oldest male being assigned number '1'. The same listing of the male participants was also applied to the female participants, with their spoken languages also being recorded. The listing of all participants was done in order to enable quality control checks to be conducted using random visits or callbacks to the households by an independent person. To select the main respondent, the oldest adult who could speak either English, Kiswahili or both (the official languages in Kenya) was selected to participate in the interview. When the selected eligible participant was not available at the scheduled time of data collection, callbacks were made by telephone to reschedule an appropriate time for face-to-face interviews.

Data was collected by ten trained research assistants (RAs) with a minimum qualification of a diploma in a health or community health-related field and prior experience in data collection. The RAs were comprehensively trained for three days on identifying eligible participants in each household, obtaining consent and administering the questionnaires. As per the MINI tool instructions, the RAs read the questions exactly as written to the participants or as often as necessary without rephrasing the questions in order to standardize the assessment of diagnostic criteria. The responses were also restricted to either a 'Yes' or a 'No'. However, a licensed clinical psychologist reviewed and interpreted the information after data collection.

Tools

The investigation collected socio-demographic information (i.e. age, marital status and urban/rural status) from the study participants. Two tools were used in the survey, these being the Opinion about Mental Illness in Chinese Community (OMICC) questionnaire, and the MINI-International Neuropsychiatric Interview Plus Version 5 (MINI) - a diagnostic tool for mental disorders.

OMICC—This is a 34-item six-point Likert scale version (Ng & Chan, 2000), developed from the Opinions about Mental Illness (OMI) (Cohen & Struening, 1962). The questionnaire consisted of six sub-scales separatism (emphasizing the distinctiveness of people with mental illness); stereotyping (holding people with mental illness in a particular behavioural pattern); restrictiveness (holding a doubtful view on the right of people with mental illness); benevolence (kind orientation towards people with mental illness); pessimistic prediction (holding the view that people with mental illness are unlikely to improve); and stigma (perceived people with mental illness as shameful). Even though this instrument has not been previously used in Kenya, it has been utilized in diverse cultural

settings, including investigations in India (Salve, Goswami, Sagar, Nongkynrih, & Sreenivas, 2013), the United Kingdom (Ngai, Bozza, Zhang, Chen, & Bennett, 2014) and Nigeria (Afolayan, Buodeigha, Dada, & Tijani, 2014). Factor analysis of the OMICC scale has previously yielded a Cronbach's Alpha of 0.866 (Ng & Chan, 2000) and 0.77 in the current study.

MINI (Sheehan et al., 2001)—This instrument identifies the following disorders: major depressive episode (current/past/lifetime); major depressive episode (current) with melancholia; dysthymia; suicide risk (current); hypomanic episode; manic episode bipolar disorder (lifetime); panic disorder (lifetime/current); agoraphobia (current), panic disorder with/without agoraphobia; social phobia (current); obsessive compulsive disorder (current); post-traumatic stress disorder (current); alcohol (current) abuse/dependence; psychotic disorder (lifetime/current); anorexia nervosa (current); bulimia nervosa (current); generalized anxiety disorder (current); and antisocial personality disorder. These were aggregated into the following nine broad categories: depression; suicide risk (includes ideations, plans and attempts); bipolar; anxiety; obsessive compulsive disorder; post-traumatic stress disorder; alcohol abuse/dependence; psychosis and antisocial personality disorder before data analysis. Disorders are not mutually exclusive, and study participants may therefore belong to multiple disorder categories.

Translation of tools

A multilingual speaker translated the English version of the consent forms, its explanation and the MINI tool into Kiswahili, aiming at the conceptual equivalent of the specific words and phrases. An independent linguist who had not seen the original version of the tool back-translated the Kiswahili version into English. This was followed by an expert review workshop of a bilingual expert panel bilingual experts consisting of clinical psychologists, medical doctors, a psychiatrist, nurses, community development officers and lay persons to discuss the inconsistencies between back translation and the existing version of the tool. Any word-for-word translations or phrases that did not completely tally with the original phrases were iterated through back and forth translations by the panel until a final consensus version was reached.

Statistical analysis

First, demographic and clinical characteristics of participants, stratified by gender, were summarized using proportions (%); and significant associations between demographic characteristics and gender were then assessed using the Pearson's chi-square (χ^2) test. To establish opinion towards individuals with mental illness, the six OMI sub-scale scores [separatism, stereotyping, restrictiveness, benevolence, pessimistic prediction and stigma] were stratified by gender and urban/rural status, and summarized using means $\pm$ standard deviation (SD). An independent samples t-test was used for comparing significant differences.

Lastly, adjusted regression models were fitted to compare the association between various mental illnesses and opinion toward individuals with mental illness in women and men. The regression models were adjusted for age, marital and urban/rural status. The final analyses

involves regression analyses that examined gender differences in six OMI sub-scale scores, but focusing only among individuals with mental illness. This involves unadjusted regression (rather than adjusted) due to potentially small number of participants with specific types of mental illness which precluded us from controlling for many confounders. A p-value of <0.05 was considered to be statistically significant. All statistical analyses were performed using STATA 14.

Results

Demographic and clinical background of study participants - Table 1

The participant sample consisted of 846 adults, with 672 in the urban setting and 174 in the rural area, with a selected description of their demographic characteristics being provided in Table 1. Approximately half of the participants were women ($n=428$; 50.6%), and the mean ages of women and men were 28 ($SD=8.7$) and 30 ($SD=9.71$) years respectively. The majority of women (61.6%) and men (54.3%) were either married or in a relationship, and most women (66.0%) and men (84.5%) reported fluency in both English and Kiswahili.

Of the nine broad categories of mental illness indicated in the MINI, among the women, the three most frequently found mental health problems were depression ($n=80$; 18.7%), anxiety ($n=54$; 12.6%) and suicide risk ($n=36$; 8.4%). For men, alcohol abuse/dependence ($n=89$; 21.3%), depression ($n=61$; 14.6%), and antisocial personality disorder ($n=55$; 13.2%) were the most frequent mental health problems. However, half of women ($n=247$; 57.7%) and men ($n=216$; 51.7%) did not score positive for any of the nine categories of mental illness. Significant gender differences ($p = 0.01$) were detected in the categories of suicide risk (women 8.4% vs. men 4.1%), anxiety (women 12.6% vs. men 6.5%), alcohol abuse/dependence (women 4.4% vs. men 21.3%), and antisocial personality disorder (women 4.2% vs. men 13.2%) based on Pearson's chi-square test. There was mental disorders co-morbidity in 15% and 18% of the females and males respectively but there were no significant gender differences.

Opinion towards individuals with mental illness - Table 2

Table 2 presents the scores for the six OMICC subscales [separatism, stereotyping, restrictiveness, benevolence, pessimistic prediction and stigma] according to gender and geographic location. There were no significant differences ($p<0.05$) between genders.

There were significant rural-urban differences ($p<0.01$) in OMICC scores on four subscales. Rural respondents had a more positive opinion towards individuals with mental illness in subscales separatism, benevolence and stigma, while urban respondents had a more positive opinion towards individuals with mental illness in the subscale stereotyping.

Regression Analyses - Table 3

The final multiple regression models in Table 3 show the OMICC scores that were separated according to gender and adjusted for age, marital status and location/place of residence, the results being found significant with a p-value <0.05 . Table 3 displays the final multiple regression model, and compares women and men with a mental illness to those without

(reference category), and gender difference in case positives only, adjusting for age, marital status and geographic location. Women with antisocial personality disorder displayed a more positive opinion towards people with mental illness in the subscale of separatism.

- i. ***In Women:*** Women with depression were found more positive in the subscale stereotyping and stigma, and those with obsessive compulsive disorder showed a more positive opinion in the subscale 'pessimistic prediction'. Compared to women without any diagnosis, those diagnosed with a single mental illness were more positive in the subscale stigma, while those with multiple mental illness diagnoses were more positive in subscale stereotyping. Only in two instances, women with mental illness were found to be more negatively opinioned about people with mental illness: women at risk of suicide in the subscale of separatism, and with anxiety in the subscale of benevolence.
- ii. ***In Men:*** There was negative opinion in the subscale of separatism among men diagnosed with depression, suicide risk, bipolar and anxiety. Men with anxiety and suicide risk additionally had a more negative opinion in the subscale stereotyping, while suicidal men also had a more negative opinion in the subscale restrictiveness. A more positive opinion was only found among men with antisocial personality disorder in the subscale separatism, and among those with anxiety in the subscale benevolence.
- iii. ***Gender differences in opinion towards individuals with mental illness:*** Regression analyses, on one hand, indicated negative opinion in the subscales of separatism (among men diagnosed with depression, and bipolar disorder), stereotyping (among men diagnosed with anxiety), and restrictiveness (among men at risk of suicide) compared to women. On the other hand, regression analyses indicated negative opinion in the subscales of restrictiveness (among women diagnosed with antisocial personal disorder), benevolence and pessimistic prediction (among women diagnosed with anxiety) compared to men. Overall, men diagnosed with a mental illness reported more negative opinions towards individuals with mental illness than women based on gender stratified analysis.

Discussion

Prevalence of mental disorders

Almost half of the respondents were screened for a mental disorder (27.34% females and 30.62% males for one disorder; 14.95% and 17.7% for two or more disorders, respectively) at the time of the study. This closely resembles the prevalence of 56.3% that was found in Kenyan primary health care centers (Aillon et al., 2014) but much higher than 10.8% in Kenyan households (Jenkins et al., 2012). This could be explained by the use of different instruments in the studies. Nevertheless, the prevalence of common psychiatric disorders ranges between 8% to 47% in Africa and globally (Jablensky et al., 2001; RC Kessler et al., 2007). There was no significant overall prevalence difference between males and females, also found in an earlier study (Jenkins et al., 2012) and similar to Western countries (Rosenfield & Smith, 2004). There were however discrepancies in the common types of

disorders between men and women, with women approximately twice as prone to being diagnosed with anxiety or at risk of suicide and men four times as likely to suffer from alcohol abuse/dependence, and three times as likely to have antisocial personality disorder. These sex differences are similar to those found in Western settings (R Kessler, 2010). Possible explanations for these findings include biological factors; divisions between men and women in terms of power, responsibilities and personal characteristics, these factors are being responsible for shaping different experiences and reactions under stress (Rosenfield & Smith, 2004).

Opinions about mental illness – men versus women

While several studies claim that men tend to have more negative opinions towards mental illness, evidence on the association between gender and opinion remains inconsistent (Dietrich, 2006; Ikwuka et al., 2016; Ng & Chan, 2000). The current findings showed no gender differences in any of the subscales, contrasting with the trend in other study concerning mental illness stigma in Kenya, which found that primary school boys show stronger stigmatizing beliefs than girls (Ndeti et al., 2016). This discrepancy may be explained by the age differences, as the current study only included adults, or the influence of mediating or confounding factors, such as socio-demographic characteristics (Ikwuka et al., 2016).

Opinions about mental illness – urban versus rural

OMICC scores of urban and rural respondents were compared in order to investigate the influence of geographic location on opinion towards mental illness. This resulted in significantly different opinions in four of the six subscales, with rural residents displaying a slightly less negative opinion on the scale of separatism and stigma, as well as a more good-natured attitude towards mentally ill people on the scale of benevolence. The urban inhabitants showed less stereotyping opinion. Overall, the results suggest that the rural inhabitants had a more positive opinion towards mental illness. Of note was a 2011 multi-country study that compared different regions and ethnic groups, and showed large variation in beliefs about mental disorders and attitudes towards people with mental illness, both between and within countries (Dietrich, 2006). Factors such as age, religion and amount of mental health knowledge could complicate efforts to find evidence for the differences between rural and urban areas, which has been inconsistent (Ikwuka et al., 2016). Moreover, while establishing an association between geographic location and stigma is useful, future research should focus on factors that underlie or cause this urban/rural difference, including belief systems. Viewing mental illness in a purely biological way, as a 'brain disease', may cause more stigma, as it creates the idea that nothing can be done about it, and that with those with mental illness are dangerous (Corrigan & Watson, 2004). This could be the case in urban areas with the adoption of more Western lifestyles, which coincides with considering mental disorders being equal to physical illnesses (Kiima, Njenga, Okonji, & Kigamwa, 2004). Some studies have shown that people of African descent are also considered to react with more sympathy and support towards people with mental illness in an effort to strengthen their group (Abdullah & Brown, 2011).

Opinions about mental illness – positively versus negatively diagnosed

The final finding concerns the attitude of people who were found to suffer from a mental illness. We compared opinions about mental illness between people with and without such conditions, and adjusting for age, marital status and geographic location; and detected significant differences between the two subgroups in several areas.

The study found that women diagnosed with one or more mental illnesses had either a similar or more positive opinion about people with mental illness to women without diagnosis. More specifically, in four cross-comparisons, women with a mental illness diagnosis held a more positive opinion than those without, indicating that those with antisocial personality disorder do not strongly feel that people with mental illness should be separated; women with depression were less stereotyping and stigmatizing; and women with obsessive compulsive disorder were less pessimistic in their predictions towards others with mental illness. The women living with a mental disorder have experience, and are thus highly familiar with the phenomenon, which is seen to be associated with higher acceptance and lower stigma (Corrigan, Green, Lundin, Kubiak, & Penn, 2001).

Additionally, positive attitudes and greater tolerance towards people with mental illness were associated with a higher mental health knowledge level specifically when supplemented with experiential knowledge, which is supported by our findings (Ikwuka et al., 2016).

Contradicting studies done elsewhere, however, indicated more negative opinions in two cross-comparisons, these being of suicidal women displaying stronger separatism towards people with mental illness, possibly reflecting a form of internalized stigma or self-stigma (Hansson, Jormfeldt, Svedberg, & Svensson, 2011). Self-stigma is demonstrated when persons with mental illness have a negative belief about themselves and accept the stigmatizing images that exist in their culture, which could result in lower self-esteem and self-efficacy (Corrigan & Watson, 2002). It could be theorized that this negative self-image, combined with their experience and knowledge about their capability to injure or harm, translates into a more separating attitude and notion that people with mental illness should be hidden away.

For men, the majority of the findings showed that the opinions of respondents suffering from a mental illness were more negative than those without a mental illness. Stronger attitudes of separatism were observed among men who were depressed, suicidal and had bipolar or anxiety. Suicidal and anxious men portrayed more stereotyping, and the former were also more restrictive towards people with mental illness. These findings contradict the findings that better knowledge of mental illness, familiarity and experiential knowledge lead to more positive attitudes, yet also resemble findings in other studies (Hansson et al., 2011). Stronger attitudes of separatism were observed among men that were depressed, suicidal, had bipolar or anxiety. Suicidal and anxious men portrayed more stereotyping, and suicidal men were also more restrictive towards people with mental illness. These findings are in accordance with earlier studies and reviews that state that men tend to have negative attitudes towards people with mental illness as compared to women (Angermeyer & Matschinger, 2003; Bhugra, 1989; Dietrich, 2006; Ng & Chan, 2000). A more positive opinion was only found among men with antisocial personality disorder in the subscale separatism, and among men with anxiety in the subscale benevolence.

Opinions about mental illness – men with mental illness versus women with mental illness

Interestingly, while there was no difference in the opinions between men and women in the overall population, in this study we found that the opinions of women with mental illness are more positive towards people with mental illness, while men with a mental disorder show an opposite trend and demonstrate more negative opinions if diagnosed with a mental disorder. The study suggests an association between experiencing a mental illness and the opinion towards people with mental illness. The gender-difference found in this study may be explained by a combination of differences in the characteristics of men and women, one of these being a help-seeking attitude, of which gender is an accomplished predictor; with masculinity being associated with less willingness to seek help (Leong & Zachar, 1999). This trait manifests as a gender-gap in mental health service use, as they are less likely to recognize the helpfulness of psychotherapy than women, and prefer quick self-care options, possibly because it enables them to continue performing their work roles (Pattyn, Verhaeghe, & Bracke, 2015).

Women generally tend to care for the health of the whole family and refer others to seek help when deemed necessary (Pattyn et al., 2015). In times of stress, women display this protective and nurturing trait in a distinct human stress response called “tend and befriend”, which is characterized by activities to protect the self and offspring, as well as create and maintain social networks (Taylor et al., 2000). We hypothesize that when women suffer from a mental illness, they acquire a better understanding of the phenomenon, which may reinforce this nurturing nature; and that enable them to develop a less stigmatizing and more understanding attitude towards people with such conditions. Although it is a possible explanation for our findings, testing this hypothesis was beyond the scope of the current study.

Limitations

It is important to acknowledge some limitations in this study. First, as the nature of the design was cross-sectional, the findings can only address associations and not causal inferences about whether the mental disorder has changed the opinions of the respondents. Secondly, the data used in this study was obtained through self-report interviews, and therefore relies on the understanding and honesty of the respondents, as they might have been influenced by factors such as conformity to perceived expectations or norms. Thirdly, the findings reflect only the attitudes towards mental illness within two specific Kenyan communities, and thus cannot be generalized to other contexts and populations. Finally, did not specify whether and how these opinions translate into behavior, and thus how they influence the lives of people with mental illness in Kenya, namely how opinions towards mental illness relate to behavior in relation to mental illness. In light of this being one of the first studies addressing stigma in mental health in Kenya, there is a pressing need for more research on stigma per se in this context.

Conclusion

This study has shown that almost half of the respondents suffered from one or more psychiatric disorder, which highlights a high burden of mental illness in these specific

Kenyan communities. Although the prevalence of mental disorders among men and women was found to be similar, an important gender difference was noted in the common types of mental disorders that affected them. This finding is relevant for current mental health practice, promotion and prevention approaches in Kenya.

Furthermore, the current study investigated opinions about mental illness among population subgroups in Kenyan community settings. This yielded evidence that geographic location is associated with opinions, and demonstrated a more positive opinion among the rural community compared to the urban population. This difference is a reason for future research to investigate the underlying factors that influence these opinions, such as belief systems, in the search for knowledge that could be useful attempting to decrease mental illness stigma.

While gender did not appear to be a determining factor in mental illness stigma in the general population, we did find that the opinions of women with mental illness were generally more positive-minded towards people with mental illness, while men demonstrated the opposite. These results suggest a need to implement interventions among men in order to encourage positive trend among women. Future research should also be conducted to determine whether these gender-related characteristics underlie the current findings. As this study is one of the first to address community mental health stigma in Kenya, more research is needed to comprehend the impact of stigma on people with mental illness and potential approaches to address the problem.

In general, attitude towards mental illness in community settings plays a key role in help-seeking behavior as well as treatment adherence among individuals with mental illness. These findings provide a potential opportunity for researchers and field experts to invest in interventions that target the attitudes of individuals such as anti-stigma campaigns and psycho-education programmes not only in Kenya but other developing countries in order to reduce the huge mental health treatment gap.

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Table 1

Demographic and clinical background of study participants

	Female (n=428)		Male (n=418)		χ^2	df	p
	n	%	n	%			
(i) Socio-Demographics							
Age category:							
18–24	175	41.27	118	28.57	15.03	2	<0.01
25–34	161	37.97	196	47.46			
35+	88	20.75	99	23.97			
Marital status:							
Single/Separated/Widow	163	38.44	190	45.67	4.50	1	0.04
Married/In relationship	261	61.56	226	54.33			
Language:							
English (in addition to Kiswahili)	278	66.03	350	84.54	38.35	1	<0.01
Kiswahili only	143	33.97	64	15.46			
Geographic location:							
Rural	86	20.09	88	21.05	0.12	1	0.73
Urban	342	79.91	330	78.95			
(ii) Mental Disorders positive (+)							
Depression+:	80	18.69	61	14.59	2.56	1	0.11
Suicide risk+:	36	8.41	17	4.07	6.80	1	0.01
Bipolar +:	16	3.74	13	3.11	0.25	1	0.62
Anxiety+:	54	12.62	27	6.46	9.26	1	<0.01
Obsessive compulsive disorder+:	3	0.70	2	0.48	0.18	1	0.67
Post-traumatic stress disorder+:	1	0.23	1	0.24	<0.01	1	0.99
Alcohol abuse/dependence+:	19	4.44	89	21.29	53.93	1	<0.01
Psychosis+:	34	7.94	33	7.89	<0.01	1	0.98
Antisocial personality disorder+:	18	4.21	55	13.16	21.50	1	<0.01
(iii) Co-morbidity of mental disorders							
Number of mental illness category positive:							
None	247	57.71	216	51.67	3.18	2	0.20

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	Female (n=428)		Male (n=418)		χ^2	df	p
	n	%	n	%			
One	117	27.34	128	30.62			
Two or more	64	14.95	74	17.7			

Above (chi-square) analyses based cross tabulation against gender. Use of Fisher's exact did not alter the significance of any findings. For specific mental illness, cross tabulation is based on screen positive and negative against gender (i.e. – not shown due to space limit).

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Table 3

Regression models examining the association between mental health challenges and opinion toward individuals with mental illness

	Mental illness category	Separatism				Stereotyping				Restrictiveness				Benevolence				Pessimistic prediction				Stigma			
	Model	β (adj)	SE	t	p	β (adj)	SE	t	p	β (adj)	SE	t	p	β (adj)	SE	t	p	β (adj)	SE	t	p	β (adj)	SE	t	p
(i) Females only:																									
1a	Depression	-0.05	0.11	-0.50	0.62	-0.50	0.13	-3.70	<0.01	-0.27	0.14	-1.95	0.05	-0.02	0.08	-0.23	0.82	-0.13	0.11	-1.18	0.24	-0.33	0.14	-2.30	0.02
2a	Suicide risk	0.34	0.14	2.48	0.01	-0.14	0.18	-0.81	0.42	-0.10	0.18	-0.55	0.58	0.02	0.11	0.15	0.88	0.10	0.15	0.70	0.49	-0.02	0.19	-0.13	0.90
3a	Bipolar	0.02	0.19	0.10	0.92	-0.06	0.25	-0.23	0.82	-0.01	0.25	-0.04	0.97	-0.01	0.15	-0.06	0.95	-0.19	0.21	-0.90	0.37	-0.18	0.26	-0.69	0.49
4a	Anxiety	0.07	0.11	0.62	0.54	-0.24	0.15	-1.61	0.11	-0.12	0.15	-0.78	0.44	-0.20	0.09	-2.20	0.03	-0.14	0.12	-1.16	0.25	-0.17	0.15	-1.14	0.25
5a	Obsessive compulsive disorder	-0.21	0.44	-0.48	0.63	0.05	0.56	0.08	0.94	0.00	0.58	0.00	1.00	-0.42	0.34	-1.23	0.22	-0.95	0.46	-2.06	0.04	-0.69	0.58	-1.19	0.23
6a	Post-traumatic stress disorder	0.39	0.76	0.52	0.61	-0.23	0.97	-0.24	0.81	0.12	0.99	0.12	0.91	-0.27	0.59	-0.45	0.66	-0.37	0.80	-0.47	0.64	1.76	1.00	1.76	0.08
7a	Alcohol abuse/dependence	-0.29	0.20	-1.44	0.15	-0.21	0.26	-0.81	0.42	-0.14	0.26	-0.53	0.60	-0.21	0.16	-1.31	0.19	-0.27	0.22	-1.23	0.22	-0.38	0.27	-1.39	0.17
8a	Psychosis	-0.14	0.16	-0.91	0.36	0.13	0.20	0.67	0.50	0.33	0.20	1.60	0.11	-0.05	0.12	-0.42	0.68	0.20	0.16	1.24	0.22	0.27	0.21	1.30	0.19
9a	Antisocial personality disorder	-0.39	0.20	-1.99	0.05	0.10	0.25	0.40	0.69	0.33	0.27	1.25	0.21	-0.11	0.16	-0.69	0.49	0.03	0.22	0.12	0.91	-0.36	0.28	-1.31	0.19
10a Co-morbidity																									
	One screen	0.03	0.10	0.26	0.80	-0.19	0.13	-1.46	0.15	-0.11	0.13	-0.83	0.41	-0.12	0.08	-1.53	0.13	-0.09	0.11	-0.81	0.42	-0.30	0.14	-2.21	0.03
	Two or more screen	-0.07	0.12	-0.57	0.57	-0.43	0.15	-2.83	0.01	-0.06	0.16	-0.35	0.73	-0.18	0.09	-1.92	0.06	-0.14	0.13	-1.12	0.26	-0.23	0.16	-1.41	0.16
(ii) Males only:																									
1b	Depression	0.41	0.10	4.05	<0.01	-0.09	0.14	-0.61	0.54	-0.20	0.15	-1.32	0.19	0.16	0.09	1.71	0.09	0.08	0.13	0.60	0.55	-0.17	0.14	-1.29	0.20
2b	Suicide risk	0.42	0.18	2.38	0.02	0.52	0.24	2.21	0.03	0.59	0.26	2.27	0.02	-0.04	0.17	-0.25	0.80	0.14	0.23	0.60	0.55	0.11	0.24	0.47	0.64
3b	Bipolar	0.97	0.20	4.91	<0.01	0.03	0.27	0.11	0.91	0.07	0.30	0.22	0.83	0.20	0.19	1.06	0.29	-0.02	0.26	-0.08	0.94	<0.01	0.28	<0.01	1.00
4b	Anxiety	0.42	0.14	2.92	<0.01	0.49	0.19	2.55	0.01	0.01	0.21	0.07	0.95	0.26	0.13	2.00	0.05	0.26	0.18	1.46	0.15	-0.31	0.19	-1.65	0.10
5b	Obsessive compulsive disorder	-1.27	0.69	-1.85	0.07	0.68	0.93	0.74	0.46	-1.09	0.99	-1.11	0.27	-0.75	0.63	-1.19	0.24	-0.59	0.85	-0.69	0.49	0.02	0.90	0.02	0.98
6b	Post-traumatic stress disorder	-0.09	0.69	-0.13	0.90	-0.19	0.93	-0.20	0.84	0.24	0.99	0.24	0.81	0.59	0.63	0.93	0.35	-0.29	0.86	-0.34	0.73	0.98	0.90	1.09	0.28
7b	Alcohol abuse/dependence	-0.02	0.09	-0.20	0.84	0.00	0.12	-0.02	0.98	-0.07	0.13	-0.55	0.59	-0.04	0.08	-0.53	0.60	-0.13	0.11	-1.16	0.25	0.13	0.12	1.10	0.27
8b	Psychosis	-0.23	0.15	-1.54	0.13	-0.02	0.20	-0.10	0.92	-0.12	0.21	-0.57	0.57	0.12	0.13	0.88	0.38	0.12	0.18	0.64	0.52	-0.10	0.19	-0.54	0.59
9b	Antisocial personality disorder	-0.28	0.11	-2.71	0.01	-0.18	0.14	-1.30	0.20	-0.14	0.15	-0.90	0.37	-0.16	0.10	-1.68	0.10	-0.20	0.13	-1.48	0.14	-0.04	0.14	-0.27	0.79
10 b Co-morbidity																									
	One diagnosis	0.08	0.09	0.83	0.41	-0.06	0.12	-0.46	0.64	-0.26	0.13	-1.94	0.05	-0.02	0.08	-0.29	0.77	-0.04	0.12	-0.36	0.72	-0.02	0.12	-0.14	0.89

	Mental illness category	Separatism				Stereotyping				Restrictiveness				Benevolence				Pessimistic prediction				Stigma			
	Model	β (adj)	SE	t	p	β (adj)	SE	t	p	β (adj)	SE	t	p	β (adj)	SE	t	p	β (adj)	SE	t	p	β (adj)	SE	t	p
	Two or more diagnoses	0.19	0.11	1.73	0.08	0.01	0.14	0.08	0.94	-0.21	0.15	-1.39	0.17	0.04	0.10	0.43	0.67	-0.09	0.14	-0.70	0.49	-0.09	0.14	-0.66	0.51
(iii) Gender difference in case positives only:																									
1c	Depression	0.31	0.13	2.26	0.03	0.29	0.18	1.58	0.12	0.05	0.14	0.36	0.72	0.08	0.11	0.76	0.45	0.24	0.16	1.51	0.13	0.02	0.15	0.12	0.90
2c	Suicide risk	0.01	0.22	0.03	0.98	0.52	0.27	1.92	0.06	0.64	0.25	2.57	0.01	-0.14	0.17	-0.87	0.39	0.09	0.23	0.39	0.70	0.04	0.27	0.14	0.89
3c	Bipolar	0.80	0.28	2.85	0.01	-0.01	0.35	-0.03	0.97	0.07	0.39	0.18	0.86	0.12	0.20	0.60	0.55	0.20	0.30	0.67	0.51	0.05	0.32	0.15	0.88
4c	Anxiety	0.26	0.18	1.47	0.15	0.62	0.21	2.89	0.01	0.08	0.18	0.44	0.66	0.33	0.14	2.33	0.02	0.42	0.17	2.44	0.02	-0.23	0.18	-1.28	0.20
5c	Obsessive compulsive disorder	-1.24	0.99	-1.25	0.34	0.28	1.93	0.14	0.90	-1.11	1.18	-0.94	0.44	-0.40	1.23	-0.33	0.78	0.33	1.17	0.29	0.80	0.67	1.00	0.42	
7c	Alcohol abuse/dependence	0.17	0.18	0.93	0.35	0.10	0.24	0.43	0.67	0.04	0.22	0.18	0.86	0.07	0.18	0.38	0.71	0.20	0.23	0.86	0.39	0.36	0.24	1.50	0.14
8c	Psychosis	-0.10	0.19	-0.52	0.61	-0.10	0.30	-0.34	0.74	-0.37	0.25	-1.47	0.15	0.08	0.20	0.42	0.68	0.07	0.25	0.27	0.79	-0.29	0.25	-1.16	0.25
9c	Antisocial personality disorder	0.02	0.15	0.10	0.92	-0.39	0.22	-1.73	0.09	-0.57	0.22	-2.61	0.01	-0.18	0.19	-0.96	0.34	-0.24	0.20	-1.21	0.23	0.13	0.18	0.72	0.47

Adj = Model adjusted for age, marital status, and urban/rural in the multiple regression. For models 1a/1b-9a/9b, the main predictor is specific type of mental illness that was screened positive where reference category being screen negative.

For an example, regression coefficient for model 1a should be interpreted as outcome score difference in depression screened positive compared to depression screen negative adjusted for covariates mentioned above.

For models 10a/10b, the main predictor of the outcome is number of mental illness category screened positive. The reference category for 10a/10b is zero number of mental illness study participants screened positive.

For models 1c-9c, the main predictor is gender with reference category being women. For models 1c-9c, the analysis is limited to the study participants with specific types of mental illness.

For an example, model 1c should be interpreted as gender differences in outcome score, but only amongst men and women who screened positive for depression. Model 6c is not shown due to low sample size who screened positive for that category.