Transcultural Psychiatry

People with mental illness stigmatize less mental illness: A Comparison study between an hospital based sample of persons with mental illness and a non-clinical general population sample in urban India

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People with mental illness stigmatize less ~~Stigma towards Severely Mentally Ill Persons~~mental illness:~~:~~ A Comparison study between an hospital based sample of persons with mental illness and~~with~~ a non-clinical general population sample ~~from~~ in ~~Urban~~ urban India

Abstract

Evidence shows that stigma negatively influences the quality of life of persons with severe mental illness. Nonetheless, stigma towards mental illness is lower among persons with a lived experience of mental illness compared to the rest of the population. Understanding the association between stigma of mental illness and the mental status of individuals living in urban India and whether this association is moderated by demographic factors opens a new avenue for prevention of social exclusion. Persons diagnosed with schizophrenia, bipolar disorder, or severe unipolar depression (cases, n=647) were recruited from among hospital patients in New Delhi between November 2011 and June 2012 and matched with non-psychiatric urban dwellers by age, gender and location of residence (controls, n = 649). Propensity score matching with multivariable linear regression was used to test whether stigma towards mental illness, measured by a 13-item Stigma Questionnaire, differed between cases and controls. Cases reported significantly lower stigma scores than controls (b = -~~6.75~~0.50, $p < 0.0001$). The strength of the association between mental illness and stigma was not affected after controlling for age, caste, gender, education and employment status, while wealth marginally reduced the strength of the association. These findings suggest individuals with a lived experience of mental illness may be more tolerant towards mental illness and support the need to involve persons with lived experience in the development and implementation of health promotional campaigns and programs aimed at reducing stigma towards mental illness.

Keywords

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Introduction

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30   Severe mental illness —schizophrenia, severe depression and bipolar disorders—are

31   leading causes of years lived with disability (YLDs) (Vigo, Thornicroft, & Atun, 2016). Stigma

32   affects all spheres of life of persons with severe mental illness (PWSMI), making combatting

33   stigma a public health priority. Stigma was initially conceptualized by Goffman (1963) as a

34   process by which an attribute is perceived as undesirable, and persons with the attribute are

35   negatively stereotyped and undergo social discredit (Goffman, 1963). Authors have since

36   introduced new concepts around negative labeling of PWSMI out of ignorance, stereotyping, and

37   discrimination in a given social context characterized by relations of unequal power (B.G. Link

38   & Phelan, 2001; Thornicroft, Rose, Kassam, & Sartorius, 2007). Link and Phelan (2001)

39   introduced the concept of structural stigma associated with the idea of macrosocial forms of

40   stigma that induce oppression of certain social groups with identities or statuses considered as

41   devalued in the normative system of dominant cultural groups (Hatzenbuehler, 2016). PWSMI

42   represent one such group.

43   Stigma associated with mental illness is complex and comes in many forms. Institutional

44   stigma is represented by policies and laws promoting discrimination, legitimating and

45   perpetuating stigma (P. W. Corrigan, Markowitz, & Watson, 2004; Evans-Lacko, Brohan,

46   Mojtabai, & Thornicroft, 2012; Pryor & Reeder, 2011). Public stigma is expressed by the general

47   population (P. W. Corrigan, 2005). Public stigma of mental illness affects recovery (National

48   Academies of Sciences & Medicine, 2016), healthcare service utilization linked to dissimulation

49   of illness (P. Corrigan, 2004; Henderson et al., 2014; Rüsch et al., 2014; Thornicroft, 2008),

50   adherence to treatment (Fung, Tsang, & Chan, 2010), social relationships (Ando, Yamaguchi,

51   Aoki, & Thornicroft, 2013), access to employment and working conditions (P. W. Corrigan,

52   Larson, & Rüsch, 2009; P. W. Corrigan, Larson, Watson, Boyle, & Barr, 2006; Harris,

53   Matthews, Penrose-Wall, Alam, & Jaworski, 2014; McGurk, Mueser, Derosa, & Wolfe, 2009;

54   Thornicroft, Brohan, Rose, Sartorius, & Leese, 2009), housing (Axer, Prot-Klinger, & Lech,

55   2015; Rosentraub, 2007) and finally educational opportunities (Boysen & Vogel, 2008). Health

56   professionals are not immune to public stigma: they endorse stereotypes (Kingdon, Sharma, &

57   Hart, 2004); many fail to recognize recovery as a possible outcome for severe mental illness

58   (Magliano, Fiorillo, De Rosa, Malangone, & Maj, 2004). Public stigma is also prevalent among

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59   caregivers and family members compromising treatment access, referral, adherence and dropout,

60   and the recovery process (P. W. Corrigan & Miller, 2004; Larson & Corrigan, 2008; Liberman,

61   Kopelowicz, Ventura, & Gutkind, 2002). Individuals with mental illness learn about public

62   stigma and internalized ideas associated with mental illness such as "dangerous", "weak" or

63   "useless". This process, called "modified labelling theory," results in self-stigma, the

64   internalization of negative beliefs and social responses (P. W. Corrigan, Kerr, & Knudsen, 2005;

65   P. W. Corrigan, Sokol, & Rüsch, 2013; Ritsher & Phelan, 2004). Self-stigma negatively erodes

66   PWSMI's self-esteem, leading to social withdrawal, demoralization, secrecy, and lower quality

67   of life, contributing to delay in illness detection and treatment and affecting coping mechanisms

68   to fight stigma (P. W. Corrigan et al., 2004; Lien et al., 2015; Bruce G Link, Cullen, Struening,

69   Shrout, & Dohrenwend, 1989; B. G. Link, Struening, Neese-Todd, Asmussen, & Phelan, 2001;

70   Rosenfield, 1997). In addition, stigma by association toward the families and caregivers of

71   PWSMI adds to the challenging process of recovery (Andrea & Darryl, 2015; Koschorke,

72   Thornicroft, Thara, Balaji, & Patel, 2017; Roe, 2001).

73   The treatment gap for persons with mental illness is widest in low and middle income

74   countries (LMICs), where 76-85% of such persons go untreated, compared to 35-50% in high-

75   income countries (World Health Organization, 2017). For example, in China and India, the two

76   largest LMICs in terms of population, an estimated 80% of persons with mental illness —230

77   million and 150 million persons, respectively— are in need of mental health care (Gururaj et al.,

78   2016; Huang et al., 2016; Phillips et al., 2009). Stigma faced by PWSMI is highly prevalent in

79   LMICs and constitutes a considerable barrier to accessing care as it plays an important role in

80   treatment avoidance (Mascayano, Armijo, & Yang, 2015). Stigma towards mental illness results

81   in multipronged negative influence on PWSMI overall quality of life through negative influence

82   on healthcare provision, loss of education, employment and relationships' opportunities, poor

83   self-esteem and overall social exclusion making recovery elusive (Kallivayalil & Enara, 2016;

84   Mascayano et al., 2015; Sarkar & Punnoose, 2016). In Ethiopia, for instance, Shibre et al. (2001)

85   have shown that patients with schizophrenia prefer to hide their condition when interacting with

86   health professionals (Shibre et al., 2001).

87   Given its role as an obstacle to treatment seeking and recovery, investigating stigma of

88   SMI is of central importance in India for several reasons. First, persons with mental illness are

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89   perceived as dangerous and aggressive, triggering more social distance (Kermode, Bowen,

90   Arole, Pathare, & Jorm, 2009). Second, largely because of stigma, people with mental illness are

91   more likely to be poor and unemployed (authors, 2015), to face barriers to recovery (Sandeep

92   Grover et al., 2016) and higher poverty, as is the case elsewhere (authors, 2015). Stigma —and

93   poverty— associated with mental illness is even higher for women (Thara, Kamath, & Kumar,

94   2003a, 2003b) and for persons from historically disadvantaged social groups such as Scheduled

95   Tribes; Scheduled Castes and Other Backward Castes (ST/SC/OBC) (Jaspal, 2011). Third, due to

96   limited mental healthcare services, informal unpaid care is widespread and assumed by family

97   members (Seshadri, Sivakumar, & Jagannathan, 2019; Thara, Islam, & Padmavati, 1998),

98   particularly women (Balaji et al., 2012; Chatterjee et al., 2014; Jagannathan, Thirthalli, Hamza,

99   Nagendra, & Gangadhar, 2014). Yet, this role is hardly socially valorized, and women

100 caregivers, particularly women lose opportunities for social connection including getting

101 married, but also education, employment, and do not benefit from any social support and go

102 through different phases of emotions and attitudes associated with their experience (Mirjam A

103 Dijkxhoorn, Padmakar, Bunders, & Regeer, 2022; Mirjam Anne Dijkxhoorn, Padmakar, Jude,

104 Bunders, & Regeer, 2019; K. Mathias, Kermode, San Sebastian, Davar, & Goicolea, 2019). The

105 caregiver's burden has been shown to be correlated with the severity of the pathology

106 (Jagannathan et al., 2011; Jagannathan et al., 2014). Literature has demonstrated that stigma

107 towards caregivers may result in efforts to conceal the mental illness from outsiders, as well as in

108 family members' negative attitudes and discriminatory behavior towards the PWSMI (S. Grover,

109 Aneja, Hazari, Chakrabarti, & Avasthi, 2019; S. Loganathan & Murthy, 2011; Shrivastava et al.,

110 2011).

111   Many studies —in India and elsewhere— have investigated the association between

112 familiarity with mental illness and stigma. A majority of studies found an inverse association

113 between familiarity and stigma: The more familiar someone is with mental illness, including

114 caregiver and other family members having close relationship with a person with SMI, the less

115 they display stigmatizing attitudes (Adewuya & Makanjuola, 2008; K. Mathias et al., 2018). Yet,

116 other studies have found greater familiarity to be associated with greater stigma, particularly

117 among members of families who have a very close relationship with PWSMI and report a high

118 burden of caregiving (van der Sanden, Pryor, Stutterheim, Kok, & Bos, 2016). Yet, to the best of

119 our knowledge, the extent to which persons with severe mental illness themselves share the

120 stereotypes (negative beliefs), prejudice (negative attitudes) and discrimination (negative

121 behaviors) towards mental illness has never been investigated. Given the complex nature of

122 stigma experienced by people with mental illness, its potentially negative consequences for

123 persons with SMI, and the high burden of untreated mental illness in India, our study aims at

124 addressing the four following questions: (i) Do persons with SMI themselves share the same

125 public stigma towards mental illness in the Indian context as members of the general population?

126 (ii) Does the stigma expressed by persons with and without mental illness differ by demographic

127 and socioeconomic characteristics such as age, gender, caste, education, employment and wealth,

128 all factors that have been shown to influence stigma? (iii) Does knowing a person with SMI

129 influence the expressed stigma of severe mental illness? And (iv) Do cultural factors such as

130 beliefs that persons with SMI have special powers or that the illness could be caused by some

131 spirit or someone ill intended also influence stigma?

132 The present study investigates differences in the perception of stigma of SMI comparing

133 persons with a clinical diagnosis of severe mental illness and persons in the general population

134 without a clinical diagnosis of severe mental illness. We examined if persons with SMI have

135 stigmatizing attitudes towards severe mental illness that differ from persons in the general

136 population, controlling for gender, caste, education level, employment status and wealth. A

137 finding of lower levels of expressed stigma among persons with clinical SMI would substantiate

138 enhancing quality of anti-discriminatory programs by involving PWSMI themselves in their

139 conception and implementation.

Methods

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Study design

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142 The study design has been described elsewhere (authors, 2015). In brief, data were

143 collected in New Delhi, India from November 2011 to June 2012. Outpatients diagnosed either

144 with schizophrenia or severe affective disorders using International Classification of Diseases,

145 10th revision (ICD-10) criteria were randomly recruited after due informed consent from the

146 psychiatry outpatient department of a public, free, teaching hospital in New Delhi, India. A

147 comparison group of non-psychiatrically ill control individuals matched one-to-one with cases

148 on the basis of gender, age, and place of residence were randomly selected from the community,

149 all over Delhi. There were no exclusion criteria other than refusal to consent to participate.

150 Study personnel, assisted by caregivers, conducted face-to-face interviews with 647

151 persons with SMI during their hospital visits. All respondents with SMI were in a clinically

152 stable enough state to be able to provide informed consent and actively participate in the

153 interview. Matched community controls (n=647) were interviewed in their homes. To identify

154 controls, we started at the level of the house of the PWSMI and randomly selected a direction by

155 spinning a pointer. We then selected the closest household in the direction of the pointer and

156 interviewed a resident of that household who matched the PWSMI by gender and age (plus or

157 minus 5 years). *Full confidentiality of the index case was maintained. We did not mention to*

158 *anyone the house number of the person with mental illness. We stopped in front of the address*

159 *but we span the pointer outside in the street and did not reveal to anyone the reason why we*

160 *stopped at such a spot in the street. We introduced the study in the neighborhoods where*

161 *persons with mental illness were living as being a health and livelihood survey done by the*

162 *hospital.* In addition to the measure of stigma (see below), the interview assessed demographic

163 and socioeconomic characteristics such as gender, age, caste, marital status, level of education,

164 asset ownership, income, employment, as well as information about health behavior, healthcare

165 services, and social participation.

166 ***Measures***

167 *Outcome: Stigma*

168 Stigma was measured using the Stigma Questionnaire (SQ), which was developed

169 through a large-scale, cross-cultural collaborative initiative for understanding stigma, translated

170 in Hindi, tested and validated in India (Littlewood, Jadhav, & Ryder, 2007). The SQ is based on

171 "the psychiatric emphasis on extrusion and the sociological emphasis on a devalued identity"

172 (Littlewood, Jadhav, & Ryder, 2007, p.180), but also attempted to bring in local sociocultural

173 concepts to define and measure stigma. From a total of 123 initial questions related to stigma,

174 Littlewood, Jadhav et al., 2007 retained a validated set of 24 items measuring stigma that we

175 used for the interview in the present study.

176   To assess attitudes and beliefs, study participants responded to questions about a

177   hypothetical vignette, narrated in lay terms, about a young man with schizophrenia who partially

178   responds to treatment (see appendix for the vignette). Vignettes are often used in mental health

179   research to describe signs of a mental health condition without a diagnostic label (B. G. Link,

180   Cullen, Frank, & Wozniak, 1987). Vignettes offer a standardized presentation of various facets

181   of the condition to a large number of respondents (Schomerus, Matschinger, & Angermeyer,

182   2014). The vignette is followed by the set of 24 questions that assess how the respondent would

183   treat the hypothetical person with SMI described in the vignette, perception of dangerousness

184   and the desire for social distance (Jorm & Oh, 2009). For instance, as a measure of the

185   respondent's comfort with a level of physical proximity to a person with SMI, the first question

186   asks: "Would you be frightened if this man came to live next door to you? The second question,

187   "Would you be happy if he married your sister?" measures the threat to the family reputation.

188   The 24 stigma items have a four-category rating scale: 1 – yes, very much (highest stigma), 2 –

189   yes, a little, 3 - no, not much, 4 - no, not at all (lowest stigma).

190   Among the 24 items, ten items were removed based on the findings of (Littlewood et al.,

191   2007): eight items were removed because they measure "aetiological beliefs that might be related

192   to stigma" which were not relevant to our study (p. 186), and two items were removed due to low

193   correlations between the item responses and the total scale score. We also removed the item

194   "Should he stay in hospital his whole life?" because of its correlation with the rest of the other

195   items (cor=0.48, p<0.001). We then summed the remaining thirteen items, taking into account

196   those that were reverse coded, to create a single scale score. Higher composite stigma scores

197   indicate higher levels of public stigma of SMI. Also following the methods used by Littlewood,

198   et al. (2007), we deleted observations with missing responses on two-thirds or more of items

199   (Littlewood et al., 2007). We therefore discarded data from 86 persons with SMI (13.3%) and 21

200   controls (3.2%) due to incomplete data.

201   *Exposure: Severe mental illness*

202   The mental health status of respondents was the primary independent variable (severe

203   mental illness or not). New outpatients were diagnosed by well-trained psychiatrists based on

204   ICD-10 criteria.

Cofounding factors

205

206   We adjusted for individual characteristics that have been shown to influence self- stigma

207   of mental illness (S. Grover et al., 2017b). Demographic covariates included age (continuous, 11-

208   85 years old), education (three categories: below primary or primary completed, middle school,

209   high school or higher education) and employment status (three categories: no employment, stable

210   work i.e. work as regular wage or salaried employee, unstable work i.e. occasional work without

211   contract), gender (men/women), caste (scheduled castes -SC, scheduled tribes -ST and other

212   backward castes -OBC, i.e. disadvantaged groups vs. other castes). A three category variable for

213   wealth (lowest 20%/ middle 20-80%/ highest 20%) was created based on a 15-indicator assets

214   index, with scores calculated using polychoric principal component analysis (PCA) (Kolenikov

215   and Angeles 2009).

216   In addition to demographic covariates, we included as covariates other factors that have

217   been shown to be associated with both SMI and public stigma (Jorm & Oh, 2009). Exposure to

218   individuals with mental illness was assessed by the question in reference to the vignette: "Has

219   any person you know personally ever had a similar illness?" (response options "yes" or

220   "no").(Adewuya & Makanjuola, 2008; K. Mathias et al., 2018). Familiarity with a PWSMI has

221   been identified as reducing negative attitudes and discrimination (Dietrich et al., 2004). To assess

222   cultural and spiritual beliefs in mental illness as an expression of supernatural powers,

223   participants were asked regarding the young man described in the vignette: "Might this young

224   man have any special powers (to heal, to predict future events, to cause illness)?" A previous

225   study in urban India using the same vignette has shown that such beliefs were associated with

226   higher expressed stigma (Jadhav S. et al., 2007). To investigate if study participants make some

227   specific moral attribution about the aetiology of mental illness —whether mental illness is

228   considered a disease or a moral failure (P. Corrigan, Markowitz, Watson, Rowan, & Kubiak,

229   2003; Krendl & Freeman, 2019; Pescosolido & Martin, 2015)— we asked "could this illness be

230   caused by some spirits or an enemy harming him [the young man in the vignette]?"or in other

231   words, does he bear some part of responsibility and could have brought the disease on himself?

232   The extent to which such prejudice is prevalent potentially relates to discrimination and stigma

233   of mental illness (Jadhav S. et al., 2007).

234   *Statistical analyses*

235   Descriptive statistics were computed and chi-squared tests and t-tests were used to

236   compare the demographic and socioeconomic characteristics and stigma scores between persons

237   with SMI and matched controls. Confirmatory factor analysis (CFA) was used to check for the

238   unidimensionality of the composite stigma score. The root means square error of approximation

239   (RMSEA), the comparative fit index (CFI) and the standardized root mean square residuals

240   (SRMSR) were examined to confirm the acceptable fit of a unidimensional model. The internal

241   reliability of the unidimensional composite stigma score was evaluated using Cronbach's alpha

242   (Terwee et al., 2007).

243   Despite having matched persons with SMI to controls without SMI on gender, age and

244   residence, to further ensure that comparisons were made on similar individuals, we evenly

245   balanced the distributions of observable confounding factors across these two groups using the

246   nearest neighbor propensity score matching (PSM) method in a 1:1 ratio, and a 0.25 caliper

247   (Stuart et al., 2009). In addition, robustness check analyses were conducted using an OLS model

248   and a coerced exact matching model, both without PSM. The three models were recalculated

249   using the CFA first factor as the dependent variable. Results were similar regardless of method

250   used. Diagnostic assumptions for the models were met: normal distribution of stigma score

251   residuals, absence of multicollinearity, and confirmation of assumptions of independence of

252   observations. The balancing tests show that propensity score matching using the Nearest

253   Neighbor Matching estimator removes most of the bias between the treatment and non-treatment

254   groups: In all analyses, Rubin's B is below 25%, Rubin's R is within 0.5 and 2 and the

255   percentage bias is below 10% for almost all covariates (with the exception of employment)

256   (Figure 1) (Rubin, 2001). We interpreted any remaining difference in the outcomes as the

257   average treatment effect on the treated (ATT), the group of persons with SMI. We reported the

258   effect size by showing the partial version of Eta-squared (η^2) with one sided confidence

259   interval, which means upper bound fixed at 1.00. For a partial eta-squared, 0.14 is considered a

260   large effect size (Lakens, 2013). All data analysis was conducted using R version 4.2.1.

261   Figure 1 approximately here

262   We tested models with interaction terms that accounted for differing effects of SMI with

263   gender, caste, education level, employment status, assets index, exposure to SMI, beliefs in

10

264 special powers and in supernatural causes of the illness before introducing all terms together in

265 the same model (Jaccard & Turrisi, 2003). Literature has shown that, in India, the level of public,

266 associated or self-stigma may vary by gender (Boge et al., 2018), age (S. Grover et al., 2017c;

267 Thara & Srinivasan, 2000), education (Zieger et al., 2016), employment, caste (authors, 2015),

268 income or socioeconomic status (S. Grover et al., 2019; Pal, Sharan, & Chadda, 2017). We only

269 retained significant interaction terms that improved the fit of the model (Jaccard & Turrisi,

270 2003).

271 *Ethical clearance*

272 The present study received ethical approval from University College London Research

273 Ethics Committee and the Dr Ram Manohar Lohia Hospital Institutional Ethics Committee.

274 **Results**

275 Table 1 presents information on the demographic characteristics for PWSMI and controls

276 in the general population. There were no significant differences between cases and controls on

277 age or gender, with a mean age of 36 years and women comprising slightly over one-third of

278 each group. The mean stigma score differed significantly between groups, with PWSMI having a

279 lower mean score of 2322.84 74 (SD=5.3) compared to that of 3029.449 (SD=6.2) (p<0.001) for

280 controls. PWSMI were significantly more likely to be in the lowest quintile for wealth index, be

281 unemployed, be of a lower caste, and to have a lower education level than control participants. In

282 addition, PWSMI were highly more likely to know personally another person with mental

283 illness. Conversely, there was no significant difference in cultural beliefs about power or moral

284 attribution between PWSMI and controls.

285

286 Table 1 near here

287

288 Table 2 compares mean and median scores for each of the 13 stigma items between

289 PWSMI and controls in the general population. It shows that the stigma score was higher for

290 controls on each item. The highest mean difference was observed for the question "Would you

291 avoid talking to him if possible?" (mean score 2.73 among controls compared to 1 among

292 PWSMI). The smallest difference of 0.27 in both cases was observed for "Do you think he will

293 get ill again even if he takes the doctor's medicine?" and "Would it be wise for this man to

294 inherit his parent's property?"

295 Table 2 near here

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297 Figure 2 shows the distribution of stigma score between PWSMI and controls. The overall distribution is

298 more compact and towards the origin of the x axis for PWSMI compared to controls.

299

300 Figure 2 near here

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302 The Cronbach's Alpha for inter-factor correlation of stigma items was 0.72, indicating

303 acceptable reliability (Nunnally & Bernstein, 1994). A confirmatory factor analysis showed that

304 one factor solution provided an excellent fit, with all factor loadings between 0.51 and 1.88 (See

305 Table 3) (Nunnally & Bernstein, 1994). Similarly, the RMSEA of 0.035 (good fit at <0.05), TLI

306 of 0.94 and CFI of 0.96 demonstrate an excellent fit (Bentler & Bonett, 1980; Bollen, 1986).

307 These findings confirm that it is relevant to treat the 13 items stigma questionnaire as a

308 unidimensional score scale (Littlewood et al., 2007).

309

310 Table 3 near here

311

312 The crude regression model showed that the average stigma scores of PWSMI were 6.6 5

313 points lower than those of controls. The effect size , with average scores of 30.8 and 37.5 for

314 those with and without SMI, respectively (p < 0.001) (data not shown). of mental health on

315 stigma The stigma score is considered large (0.26) remained 6.63 points lower for PWSMIeven

316 after adjusting for gender, age, caste, level of education, employment status, asset index,

317 familiarity with mental illness beliefs in supernatural power and moral attribution about the

318 etiology of mental illness (See Table 4). It shows that PWSMI exhibited less stigma towards

319 others with similar illness, compared to controls. Beliefs in supernatural powers -was

320 ~~significantly~~ marginally associated with less- stigma (~~-1.93~~-0.05, ~~SD=0.81~~95CI[-0.11-0.00],

321 p<0.~~05~~001) with a negligible effect size (5.05e-03). Conversely, moral attribution of mental

322 illness to a spirit or an enemy translated into a ~~2.34~~0.10 point higher stigma (95CI[0.05-

323 016]~~SD=0.69~~, p<0.001) but the effect size was small (0.01).

324 We examined several interaction effects between having a mental illness and each of the

325 covariates and found no significant differences between models with and without the

326 interactions. The adjusted R^2 also did not increase with the addition of any of the interaction

327 terms indicating that the interaction effect had minimal influence on the main effect of SMI on

328 stigmas score (results not shown). Fitness of the model did not increase with interaction terms

329 between mental illness and gender, caste, education level, asset index, beliefs in supernatural

330 power, moral attribution and familiarity with mental illness, indicating that the association

331 between mental illness status and stigma score did not vary by levels of these variables. In

332 addition to testing interactions, we also fit mediation models to examine whether any

333 demographic attributes or beliefs in supernatural power, moral attribution, or familiarity with

334 mental illness mediated the association between mental illness status and stigma (results not

335 shown). These models produced some statistical evidence of a mediating effect of moral

336 attribution on the association between mental illness status and stigma; however since the

337 magnitudes of these effects were negligible, accounting for only ~1.5% of the total effect.

338 Table 4 near here

Discussion

340 This study investigated whether public stigma related to mental illness differed according

341 to one's mental health status —testing whether one's own mental health status influences desire

342 for social distance towards PWSMI— in New Delhi, India, where the high level of public stigma

343 towards PWSMI and its consequences on internalization of stigma has been investigated

344 previously (Koschorke et al., 2014). We controlled for demographic and socioeconomic

345 characteristics, for cultural beliefs in supernatural faculties, moral attribution and familiarity with

346 the disease.

347 To the best of our knowledge, this is the first study from a middle-income country to

348 scrutinize public stigma using an ethnographically derived stigmatization scale among a large

349 urban sample of PWSMI and matched controls in the community. Existing studies focus on other

350 dimensions of stigma and are exclusively hospital-based studies. One study investigated

351 experienced stigma of PWSMI and/or their caregivers (S. Grover et al., 2017a; Singh, Mattoo, &

352 Grover, 2016). Both caregivers and patients experienced high levels of stigma, with persons with

353 schizophrenia perceiving highest stigma (Grover et al 2015). Those who had more modern

354 perceptions of mental illness reported less stigma (Mukherjee & Mukhopadhyay, 2018). Similar

355 results have been found in other LMICs. For instance, family members of persons with mental

356 illness —both from an outpatients' department, and in a community survey— reported high

357 'family stigma' in two studies carried out in Ethiopia (Girma, Möller-Leimkühler, Dehning, et

358 al., 2014; Girma, Möller-Leimkühler, Müller, et al., 2014)

359 The results indicate that people in the general population exhibited significantly higher

360 stigma scores compared to PWSMI. Our findings suggest that acceptance of social stereotypes

361 about mental illness among PWSMI is less intense than among members of the general public.

362 PWSMI might have identified with the person in the vignette due to their shared experience and

363 demonstrated a more tolerant attitude towards someone else with mental illness. If PWSMI

364 identify with the person with schizophrenia described in the vignette, but express lesser stigma

365 than individuals in the community, it may indicate that they agree to a lesser degree with a

366 perception of mental illness characterized by prejudice and discrimination (P. W. Corrigan &

367 Watson, 2002). A meta-analysis of anti-stigma programs towards mental illness reported that in-

368 person contact with members of the stigmatized group is an effective strategy to fight public

369 stigma —with long-lasting effects on attitudes (Patrick Corrigan, Michaels, & Morris, 2015; P.

370 W. Corrigan, Morris, Michaels, Rafacz, & Rüsch, 2012). By analogy, we argue that PWSMI

371 develop knowledge from their lived experience with mental illness is and can better relate to

372 other PWSMI.

373 Findings were consistent across age, gender, caste, level of education, wealth and

374 employment status, and the size of the difference in stigma between the two groups did not

375 significantly vary with sociodemographic predictors. This is at odds with existing literature that

376 indicates some disparity in stigma according to socioeconomic characteristics. Yet, comparison

377 must be done with caution because of the diversity of tools used to measure various dimensions

378 of stigma, which may explain why different factors are associated in a variety of ways with

379   stigma measures (Griffiths, Christensen, & Jorm, 2008; Wolff, Pathare, Craig, & Leff, 1996).

380   This variety might also suggest the pervasiveness of stigma across individual demographic and

381   socioeconomic characteristics in India (Boge et al., 2018; S. Loganathan & Murthy, 2011). Some

382   socioeconomic characteristics —such as being an older adult, poor, from a SC/ST/OBC, and

383   being unemployed or uneducated, especially for women— are associated with prejudice and

384   exclusion in India, particularly when these groups also show signs of mental illness (Sandeep

385   Grover et al., 2016; Kijima, 2006; S. Loganathan & Murthy, 2011) (authors, 2015).

386   Studies looking at expressed stigma or desire for social distance towards mental illness

387   have reported gender and age differences in different directions. Multiple studies in the general

388   population showed no significant gender difference (Angermeyer, Beck, & Matschinger, 2003;

389   Angermeyer, Matschinger, & Corrigan, 2004; Martin, Pescosolido, & Tuch, 2000) while some

390   showed greater expressed stigma among women (C. Lauber, Nordt, Falcato, & Rössler, 2004)

391   and others showed greater expressed stigma among men (Jorm & Griffiths, 2008; Martin,

392   Pescosolido, Olafsdottir, & McLeod, 2007). In India specifically, women with schizophrenia

393   scored higher on stereotype endorsement (Singh et al., 2016). Another study conducted in the

394   general population of five Indian urban centers reported higher rates of perceived stigma among

395   women (Boge et al., 2018). Nevertheless, in our study, our mixed sample of women did not show

396   a higher mean score of negative stereotypes than men.

397   Literature also reports that lower education, particularly illiteracy, increases perceived

398   and experienced stigma (Girma et al., 2013; Lincoln, Arford, Doran, Guyer, & Hopper, 2015;

399   Zieger et al., 2016). Yet, higher negative perception of mental illness has been observed among

400   caregivers with higher education in West Bengal (Mukherjee & Mukhopadhyay, 2018). Other

401   studies, including ours, have shown small size or no significant associations (Jorm & Griffiths,

402   2008; Taskin et al., 2003). A possible explanation lies in the relatively high average level of

403   education of our study population.

404   Surprisingly, employment status and wealth background did not influence stigma scores.

405   In India, a study showed that patients with schizophrenia who were employed were more likely

406   to exhibit stigma resistance (Singh et al., 2016). Studies in other cultural contexts examining the

407   association between socioeconomic background and stigma have found that low socioeconomic

408   class affects social distance and discrimination (Sağduyu, Aker, Özmen, Ögel, & Tamar, 2001;

409   Taskin et al., 2003). A study in China has shown that levels of internalized stigma among

410   PWSMI from families with lower income levels were higher than those living in families with

411   higher income: the authors argued that PWSMI with lower wealth might face social stigma more

412   often and have lower level of self-esteem (Ran et al., 2018).

413   Beliefs in supernatural causes and powers of mental illness are widespread in India

414   (Srinivasan & Thara, 2001) and therefore the cure can only come from God and those in direct

415   relations with Them such as *pandit*, priests and *mali*, oracles (Rawat, Jadhav, Bayetti, & Mathias,

416   2021). We found that such beliefs were marginally associated with lower stigma scores. A study

417   comparing rural and urban India using the same measure found that such beliefs were associated

418   with lower stigma of mental illness, particularly in rural areas (Jadhav S. et al., 2007). Cultural

419   beliefs about supernatural powers tend to move away from negative labeling and translates to

420   lower rejection and discrimination of PWSMI. A possible explanation is that PWSMI are

421   believed to interact with divinity and intercede with God on behalf of lay people (Sinha &

422   Ranganathan, 2020).

423   As expected, higher stigma was demonstrated by participants who attribute the etiology

424   of mental illness to moral factors. Sixty percent of study participants believe that the PWSMI

425   might be responsible for their condition, by making enemies or deserving the wrath of spirits, in

426   accordance with other studies in different cultural contexts (Bignall, Jacquez, & Vaughn, 2015;

427   Ventevogel, 2016). The role of malevolent forces, an evil spirit or an ancestor, someone using

428   black magic or witchcraft in causing mental disorders is recognized as crucial in various non-

429   Western contexts and justifies the role of traditional methods for treating mental illness

430   (Crawford & Lipsedge, 2004; Galvin et al., 2022; Joel et al., 2003). A large majority of subjects

431   believing in moral attribution also showed negative attitudes and discrimination towards mental

432   illness. Predisposition to reject mental illness is particularly apparent in the situation of

433   individual proximity, such as being afraid to have a neighbor with mental illness (85.9% of

434   controls and 74.8% of PWSMI) or being unhappy if a PWSMI would work with them

435   (respectively 76.2% and 68.7%) or marry their sister (77.4% and 65.0%) as found in other

436   studies (Taskin et al., 2003). A study among patients and their relatives in Vellore, south India

437   reported that belief in karma and evil spirits as causes of the illness among relatives was

438   associated with higher expressed stigma (Charles, Manoranjitham, & Jacob, 2007). Such beliefs

439 have been shown to influence the way people present a potential mental health problem and

440 have implications for quality of care (delay in seeking care, poor patient/health professional

441 interaction and limited medication compliance), rehabilitation and social inclusion of individuals

442 with mental illness in India (Rawat et al., 2021). Community beliefs are largely ignored by

443 mental health services in India and a previous study examining a "Programme for Improving

444 Mental Health Care" (PRIME), a multiplatform multicomponent mental healthcare intervention

445 in Madhya Pradesh for people with depression and alcohol use suggested to increase

446 contextually defined community-based care for better impact (Shidhaye et al., 2019). Going a

447 step forward, psychosocial interventions could be built and implemented in partnership with

448 local community through an empowering approach (Kaaren Mathias, Pillai, Gaitonde, Shelly, &

449 Jain, 2020).

450   Surprisingly, familiarity with PWSMI did not significantly predict less desire for social

451 distance, in contrast with findings from studies in other cultural contexts that have found that

452 familiarity reduced desire for social distance (Lyndon, Crowe, Wuensch, McCammon, & Davis,

453 2019), particularly among caregivers (Aromaa, Tolvanen, Tuulari, & Wahlbeck, 2011). It may be

454 that familiarity is counterproductive in India, where discrimination has been shown to primarily

455 come from community members and even from family and friends of PWSMI (S. Grover,

456 Shouan, & Sahoo, 2020).

Limitations

458   Our study is not without limitations. First, the cross-sectional nature of the study does not

459 allow us to draw any causal inference but only correlation. Second, although PWSMI in the

460 sample were patients were diagnosed with major mental disorders by a Board certified

461 psychiatrist, we did not equally have the resources to enable assessment ofassess each control

462 using a detailed psychiatric diagnostic questionnaire. Therefore, it is possible that some control

463 participants may themselves be PWSMI. Third, PWSMI were selected from among people

464 seeking care at a tertiary care public teaching hospital and therefore might not be representative

465 of all PWSMI in urban India. Persons from lower socio-economic groups who cannot afford

466 private mental healthcare may be overrepresented, while those with the financial resources to

467 obtain private mental healthcare and those from the most marginalized groups who do not even

468 seek care may be underrepresented. It can be argued that some PWSMI do not seek care because

469 of stigma – among other reasons such as cost of transportation, unavailability of a caregiver to

470 come along, disbelief in the capacity of the healthcare system to address the issue at stake. Yet

471 the bias due to interviewing treated individuals might be minimal here because several studies

472 have found that stigma delays care more than suppresses it (Dockery et al., 2015; C Lauber &

473 Rossler, 2007). Fourth, the study took place in New Delhi and findings can~~from members of this~~

474 ~~urban population may~~ not be generalized to ~~PWSMI in~~ rural India. Fifth, there could be a

475 difference in understanding of the stigma questionnaire between PWSMI and controls. However,

476 we would argue that any such difference would likely be minimal because ~~. Not only has~~ the SQ

477 has previously been validated ~~in India in the general population and among PWSMI~~ (Jadhav S. et

478 al., 2007), ~~but~~ and we ~~also~~ tested ~~the questionnaire~~it for content validity ~~among both persons~~

479 ~~with and without SMI by asking the person's understanding of each item and comparing their~~

480 ~~responses with the intended meaning of each item (DeVellis, 2012)~~. Sixth, the ~~stigma~~

481 ~~questionnaire~~SQ directly measured the manifestation of public stigma only, not of ~~; dimensions~~

482 ~~of~~ internalized stigma ~~were only measured indirectly~~. By exhibiting less public stigma, PWSMI

483 may be indicating their disapproval of the social stereotype, which may be interpreted as an

484 indirect way to cope with self-stigma. Seventh, one could consider the possibility of social

485 desirability explaining the difference in score. We discard this possibility ~~for the following~~

486 ~~reasons. W~~because we tested the questionnaire thoroughly~~with a sample of PWSMI as well as~~

487 ~~with controls in the community, and we asked people to explain their response (DeVellis, 2012).~~

488 ~~Most of the time, PWSMI showed empathy that respondents in the control group did not~~

489 ~~necessarily show as well. Furthermore, questions were constructed by Littlewood Jadhav and~~

490 ~~others (2007) in a way to minimize social desirability~~ T: the use of the vignette and the questions

491 without mentioning any mental illness tends to protect against social desirability. Besides,

492 enumerators were trained to never mention mental illness and did not anticipate any specific

493 result as this was uncharted ground ~~and no assumption about the difference in the stigma~~

494 ~~between the two groups had been made~~. ~~When we conducted~~In focus group discussions,

495 ~~sometime after the survey we were struck by the fact~~we found that some ~~of the hospital~~ patients

496 were adamant to fight what they called mockery and discrimination. Finally, we did not collect

497 information about the specific diagnosis of our participants, making it impossible to compare

498 differences in stigma scores between ~~persons with schizophrenia, bipolar disorder, or~~

499 ~~depression~~different conditions. Overall, our findings indicate that personal experience of

500   discrimination or exposure to mental illness may be effective in reducing stigma towards other

501   mentally ill people. Further research is needed to explore to what extent the stigma expressed by

502   PWSMI towards others with mental illness is indicative of self-stigma or whether it is due to

503   other life circumstances or personal attributes.

Conclusion

505   This is the first large-scale study to examine public stigma of SMI assessed using a

506   locally validated stigma scale comparing PWSMI to a matched group of controls randomly

507   selected in the general population. Overall, we conclude that having personal experience or

508   knowledge of mental illness may lead to less stigmatizing attitudes towards PWSMI, particularly

509   among families with higher levels of wealth, reflecting a lower level of internalization of

510   negative societal views about mental illness or self-stigma that could have been expected (P. W.

511   Corrigan et al., 2013; S. Grover et al., 2019; Pal et al., 2017). Having a significantly lower level

512   of expressed stigma towards SMI among cases with mental illness compared to controls and

513   understanding of the forces that promote stigma could have important implications for public

514   health intervention in the sociocultural context of India.

515   National education campaigns and local interventions by increasing mental health literacy

516   have been shown to reduce stigma in LMICs (Deimling Johns, Power, & MacLachlan, 2018;

517   Kadri & Sartorius, 2005; Sartorius & Schulze, 2005). Our main finding highlights the importance

518   of relying on the involvement of PWSMI's themselves in such initiatives to foster changes in

519   discriminatory attitudes and behaviors resulting from stereotypes amidst the general population

520   (Mascayano et al., 2020) and to allow PWSMI's overall social participation, which has been

521   shown to increase self-esteem, lower self-stigma, enhance feelings of self-efficacy and improve

522   quality of life (Dunn, Wewiorski, & Rogers, 2008; Evans-Lacko et al., 2012; Priebe, Warner,

523   Hubschmid, & Eckle, 1998). Engaging persons with SMI in educational programs to fight stigma

524   in the general public can be more effective if they do not themselves endorse the public stigma of

525   mental illness: persons with SMI become an asset in changing perception of the general public as

526   well as mental health professionals if they can deconstruct with them how public stigma plays

527   out.

528   In LMICs such as India, studies have shown that discrimination primarily comes from

529 community members and even from family and friends (S. Grover et al., 2020); therefore such

530 initiatives should also include family members who are traditionally the primary caregivers and

531 often involved in the support of PWSMI (Seshadri et al., 2019; Shrivastava et al., 2011). Too

532 often, PWSMI tend to hide their mental health status due to the substantiated fear of

533 stigmatization by others, which translates to discrimination and social exclusion (Santosh

534 Loganathan & Murthy, 2008). Although they have higher exposure to mental illness through

535 clinical interaction, such interaction does not take place on equal ground, making contact less

536 effective (Peris, Teachman, & Nosek, 2008). To tackle stigma, PWSMI and their family

537 members need to share their experiences, clarify misconceptions, and create awareness about

538 mental illness in their own local communities. This is of central importance as we know that

539 PWSMI have already lower quality of life than the rest of the population (Srivastava, Bhatia,

540 Sharma, Rajender, & Kumar, 2010) and public stigma only contributes to reinforce this

541 association.

Policy recommendations

543   Mental health professionals ~~such as psychiatrists, psychologists and clinical social~~

544 ~~workers~~ are not exempt of stigmatizing behaviors towards PWSMI which results in the latter

545 avoiding seeking, or dropping out prematurely of treatment and the former not being able of

546 delivering impartial care particularly because of implicit negative attitudes (Kopera et al., 2015;

547 Peris et al., 2008). To address ~~both explicit and implicit~~such stigma ~~among mental health~~

548 ~~professionals and to maximize the likelihood that~~through contact and education (Aberson,

549 Shoemaker, & Tomolillo, 2004; Ashburn-Nardo & Johnson, 2008)~~ effectively modify negative~~

550 ~~attitudes~~, we suggest new strategies ~~could rely on grassroots interventions.~~ engaging ~~Persons~~

551 persons with active SMI ~~should be included~~ in the development of ~~such~~ anti-stigma programs,.

552 They could ~~as~~ share their ~~firsthand~~ experience of navigating the health system, ~~explicitly~~

553 describe ~~their negative~~ troubledexperience and the ensuing feelings while questioning

554 challenging negative views and paternalistic attitudes of those professionals.

555   Mental health policy in India should consider that public stigma among the general

556 population towards mentally ill people is higher than acceptance of social stereotypes among

557 those who are themselves ill. Hence, mental health policy could prioritize public stigma

558 reduction in its health promotion campaigns and fight public beliefs and promote rights of

559 PWSMI (Deshpande, Kaur, Zaky, & Loza, 2013). The Mental Health Care Act 2017 stated

560 reducing stigma as an important goal (Ministry of Law and Justice, 2017). But greater progress is

561 still needed, particularly in terms of increasing available resources and getting States involved

562 (Chadda, 2019). Overall, we hope our findings will help improve the lives of PWSMI in India

563 through the strengthening of public health efforts towards greater social visibility, contact and

564 inclusion to make the public, including mental health professionals, more aware of what mental

565 illness really means in the hope of changing their behavior. Without a change in the public

566 stigma, the path to recovery for PWSMI in India is at risk (Hatzenbuehler, 2017; B. G. Link,

567 Phelan, & Hatzenbuehler, 2017).

Conflict of interest

569 The authors declare that they have no competing interests.

Vignette and questions

Sub-section A: vignette

Here is a short account of a person who became ill. Please answer the questions about him.

This young man is twenty years old. He is not married and lives with his parents. He is friendly and hard working. He works in a local factory. One day he becomes ill and starts imagining things that are not true. He cannot do his job properly and eventually loses it. He spends a lot of time by himself. He hears people talking about him when there is no one there. His parents not become anxious but he does not get better. He starts shouting at the voices which he hears, and he tells his family that they themselves are trying to hurt him. On one occasion he hits his father.

The family are very distressed and frightened and do not know what is happening. They ask their neighbours: nobody thinks this is any sort of religious experience. The family take him to the local doctor who tells them the young man is ill, and gives him some tablets. The tablets do not help him. He does not eat properly. He seems puzzled by what is happening. He does not dress himself properly and is often dirty. He wanders about saying embarrassing things to people whom he meets in the streets.

His parents do not know what he is talking about. His doctor sends him to hospital where he stays for two months. He gets better on some new tablets but he still needs to take them when he leaves hospital. He does not hear the voices any more, nor does he have the strange ideas, but he is very quiet and stays alone for much of the time. He occasionally talks to himself but is usually polite to his family. He goes often to see his doctor to get his tablets, and wishes to go back to work.

Sub-section B: questions

Here are some questions about this person. Each one must be answered by whether you agree with the question. Remember this is not a test of knowledge but about how you really feel personally.

		Yes, very much	Yes, a little	No, not much	No, not at all
801	Would you be frightened if this man came to live next door to you?	1	2	3	4
802	Would you be content if he was to work together with you in	1	2	3	4

	your workplace? (If you do not have a job, answer as if you did).				
803	Do you think he will get ill again even if he takes the doctor's medicine?	1	2	3	4
804	Should he take part in meetings of his family which are to make important decisions?	1	2	3	4
805	Would you be happy if he married your sister?	1	2	3	4
806	Could he suddenly become physically violent?	1	2	3	4
807	If he was your brother would it be important not to let other people know that he had been ill, to avoid shame for your family?	1	2	3	4
808	If your local hospital opens a clinic for people like him in your neighbourhood would you hope the local council would object?	1	2	3	4
809	Is the cause of this sort of illness something passing down in the family?	1	2	3	4
810	Should the doctors tell him not to have any children in case he passes the illness on to them?	1	2	3	4
811	Should the doctors have let him out of the hospital?	1	2	3	4
812	Is his illness something he might have brought on himself?	1	2	3	4
813	Should the doctors only let him leave hospital on condition he goes to see them regularly?	1	2	3	4
814	Do you think a sympathetic family and friends can stop him becoming ill again?	1	2	3	4
815	Will a sympathetic family be more help to him than regularly taking medicine?	1	2	3	4
816	Would it be wise for this man to inherit his parents'	1	2	3	4

	property?				
817	If he becomes ill again do you think it would be better to call the police first rather than the doctor?	1	2	3	4
818	Would you be happy if this person became the teacher of your children?	1	2	3	4
819	Will he be able to return to a completely normal life?	1	2	3	4
820	Should he stay in hospital for his whole life?	1	2	3	4
821	Would you eat food which he has cooked?	1	2	3	4
822	Would you avoid talking to him if possible?	1	2	3	4
823	Might he have any special powers (to heal, to predict future events, to cause illness)?	1	2	3	4
824	Could this illness be caused by some spirits or an enemy harming him?	1	2	3	4
825	Has any person you know personally ever had a similar illness?				
				Yes	1
				No	2
826	Could you give a name to this illness?				

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3   Figure 1 Standardized % bias across covariates, Nearest Neighbor Matching estimator.
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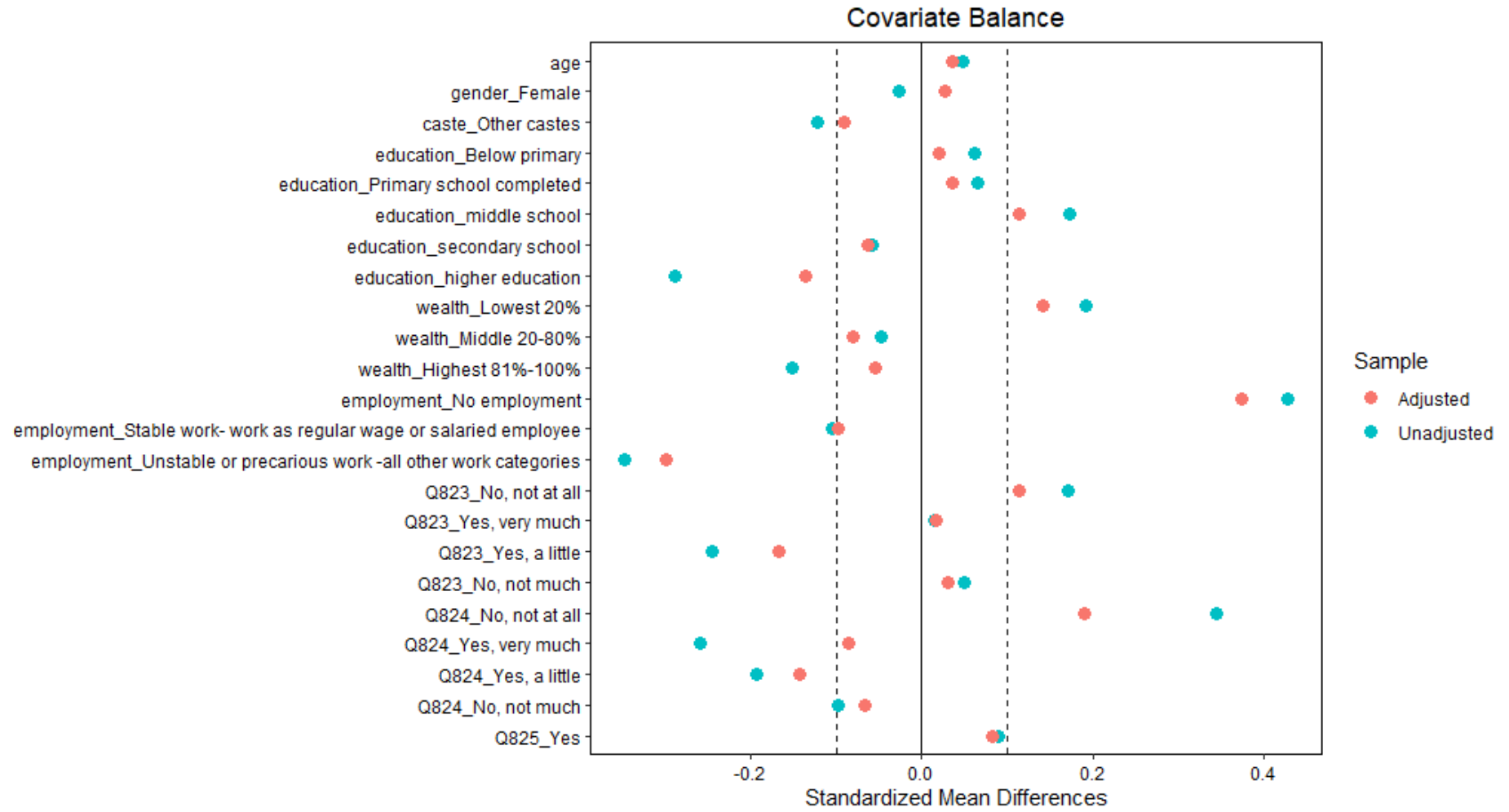
Table 1 Demographic and perception of stigma of PWSMI and control

Characteristics	Control	PWSMI	χ2 /t/Z	p Value
	mean(sd)/n(%)	mean(sd)/n(%)		
Stigma score (mean, SD)	29.44 (6.08)	22.74(5.26)	20	<0.01
Age (mean, SD)	36.21(12.64)	36.80(12.49)	-0.79	0.40
Employment				
No employment	123(20.3%)	220(41.3%)	61.49	<0.01
Stable work (work as regular wage or salaried employee)	167(27.6%)	123(23.1%)		
Unstable or precarious work -all other work categories)	316(52.1%)	189(35.5%)		
Gender				
Female	387(63.9%)	333(62.6%)	0.20	>0.05
Male	219(36.1%)	199(37.4%)		
Caste				
Scheduled Casts/Scheduled Tribes/Other Backward Casts (SC, ST, OBC)	229(37.8%)	233(43.8%)	4.24	0.04
Other castes	377(62.2%)	299(56.2%)		
Assets index				
Lowest 20%	92(15.2%)	124(23.3%)	14.66	<0.01
Middle (21%-80%)	372(61.4%)	314(59.0%)		
Highest (81% -100%)	142(23.4%)	95(17.7%)		
Education				
Below primary	82(13.5%)	84(15.8%)	23.03	<0.01
Primary school completed	35(5.8%)	40(7.5%)		
Middle school	209(34.5%)	229(43.0%)		
Secondary school	125(20.6%)	98(18.4%)		
Higher education	155(25.6%)	81(15.2%)		
Belief in PSMI having special powers				
No, does not believe in special powers at all	32(5.03)	35(5.55)	4.28	p=0.233

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No, does not believe much in special powers	127(19.97)	99(15.69)		
Yes, does believe a little in special powers	17(2.67)	21(3.33)		
Yes, does believe very much in special powers	460(72.33)	476(75.44)		
Belief in SMI caused by some spirits or an enemy				
No, does not believe it is caused by spirits or enemy at all	65(10.22)	54(8.54)	5.48	p=0.140
No, does not believe much it is caused by spirits or enemy	127(19.97)	121(19.15)		
Yes, does believe a little it is caused by spirits or enemy	13(2.04)	26(4.11)		
Yes, does believe very much it is caused by spirits or enemy	431(67.77)	431(68.2)		
Has any person you know personally ever had a similar illness?			172.01	< 0.001
Yes, knows someone	174(27.44)	410(64.06)		
No, does not know someone	460(72.56)	230(35.94)		

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Table 2 Stigma score per stigma item for Persons with SMI and controls in the general population

Stigma items	controls in the general population					Persons with SMI				
	Mean	Median	Max	Min	Standard deviation	Mean	Median	Max	Min	Standard deviation
Would you be frightened of this man came to live next door to you?	1.72	1	4	1	1.01	1.24	1	4	1	0.67
Do you think he will get ill again even if he takes the doctor's medicine?	2.47	3	4	1	1.04	2.19	2	4	1	1.11
Should he take part in meetings of his family which are to make important decisions?	1.98	2	4	1	1.14	1.51	1	4	1	0.92
Would you be happy if he married your sister?	3.44	4	4	1	0.94	2.86	3	4	1	1.17
Could he suddenly become physically violent?	2.99	3	4	1	0.94	2.62	3	4	1	1.05
If he was your brother would it be important not to let other people know that he had been ill, to avoid shame for your family?	1.90	1	4	1	1.19	1.50	1	4	1	0.97
Should the doctors tell him not to have any children in case he passes the illness on to them?	2.40	2	4	1	1.28	2.11	1	4	1	1.32
Should the doctors let him out of the hospital?	1.80	1	4	1	1.01	1.52	1	4	1	0.88
Would it be wise for this man to inherit his parent's property?	1.81	1	4	1	1.06	1.51	1	4	1	0.88
Would you be happy if this person become the teacher of your children?	2.55	2	4	1	1.20	2.01	2	4	1	1.14
Will he be able to return to a completely normal life?	1.61	1	4	1	0.73	1.29	1	4	1	0.56
Would you eat food which he has cooked?	2.04	2	4	1	1.14	1.36	1	4	1	0.75

Would you avoid talking to him if possible?	2.74	3	4	1	0.89	1.0	1	3	1	0.09
Sum of 13 stigma items	29.4	30	49	14	6.08	22.7	22	42	13	5.25

Figure 2: Distribution of cases with SMI and controls according to stigma score.
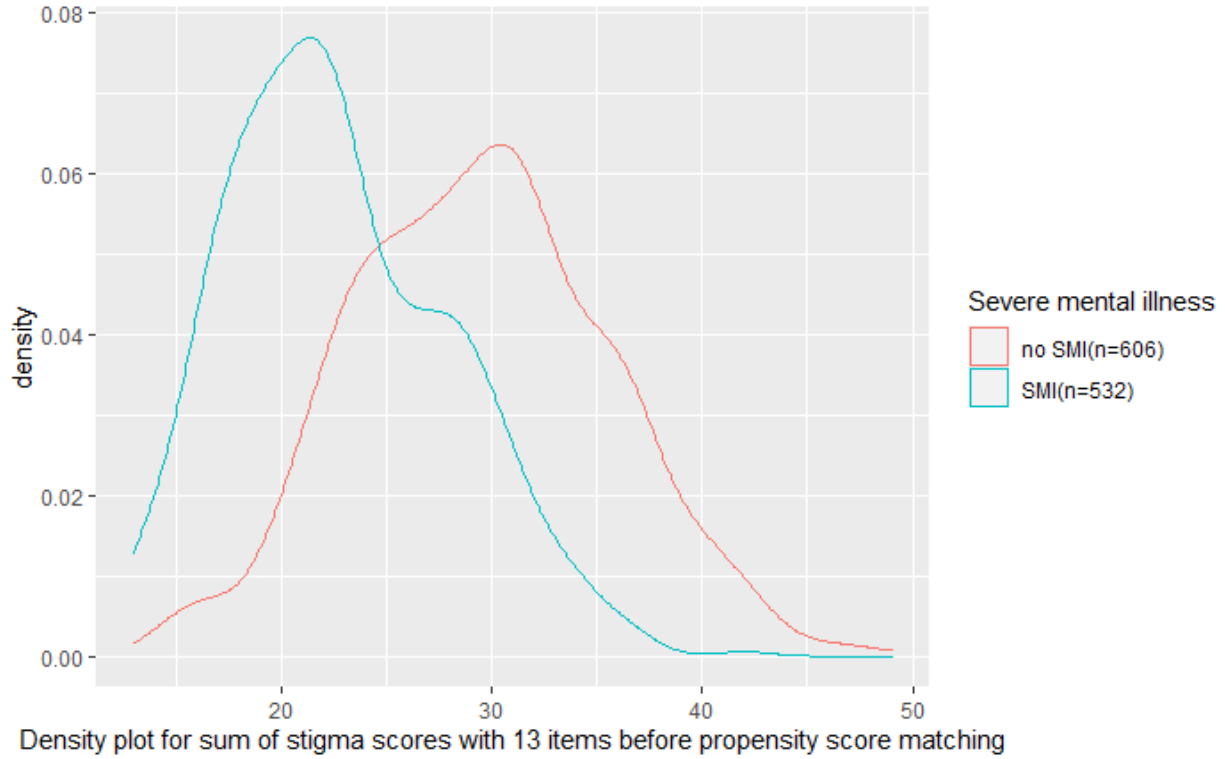
Density plot for sum of stigma scores with 13 items before propensity score matching

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Table 3: Standardized lLoading estimates on factor 1 from the confirmatory factorial analysis

Items	Factor loading	SE	Z	p-value	Beta
Would you be frightened of this man came to live next door to you?	1	0			0.44
Do you think he will get ill again even if he takes the doctor's medicine?	0.712	0.098	7.275	<0.001	0.263
Should he take part in meetings of his family which are to make important decisions?	1.371	0.119	11.478	<0.001	0.517
Would you be happy if he married your sister?	1.623	0.133	12.22	<0.001	0.59
Could he suddenly become physically violent?	1.012	0.103	9.841	<0.001	0.397
If he was your brother would it be important not to let other people know that he had been ill, to avoid shame for your family?	0.771	0.102	7.59	<0.001	0.277
Should the doctors tell him not to have any children in case he passes the illness on to them?	0.508	0.111	4.583	<0.001	0.155
Should the doctors let him out of the hospital?	0.557	0.086	6.495	<0.001	0.229
Would it be wise for this man to inherit his parent's property?	0.89	0.097	9.179	<0.001	0.358
Would you be happy if this person become the teacher of your children?	1.877	0.15	12.519	<0.001	0.626
Will he be able to return to a completely normal life?	0.756	0.071	10.602	<0.001	0.448
Would you eat food which he has cooked?	1.557	0.126	12.343	<0.001	0.604
Would you avoid talking to him possible?	1.379	0.121	11.381	<0.001	0.509

Table 4: Linear regression models following propensity score matching for stigma score

Variables	Coefficient (SD)
Intercept	29.84 (0.86)***
Mental Health Status (ref = No illness)	-6.63 (0.36)***
Age	0.01 (0.01)
Gender (ref = Male)	-0.08 (0.42)
Caste (ref = SC/ST/OBC)	-0.53 (0.36)
Middle School (ref = Primary or lower)	-0.09 (0.50)
Secondary or higher (ref = Primary or lower)	-0.02 (0.53)
Stable Employment (ref = Unemployed)	0.54 (0.47)
Unstable Employment (ref = Unemployed)	-0.03 (0.46)
Assets index (ref = wealth <20%)	-0.61 (0.46)
Belief in person has Special Powers (ref = No belief)	-1.93 (0.81)*
Belief Diseases Caused by Spirits or Enemy (ref = No belief)	2.34 (0.69)***
Know Someone with Similar Illness (ref = Does not know)	-0.13 (0.35)
R^2	0.27
Adj. R^2	0.26

Variables	Standardized Coefficient (SD)	95% Confidence Intervals	p-value	Effect size - Eta2 (partial)[a]	95% CI for Eta2 (partial)
Intercept	0.10 (0.09)	[-0.07, 0.27]	0.2437		
Mental Health Status (ref = No illness)	-0.50 (0.03)***	[-0.56, -0.45]	<0.001	0.26	[0.22, 1.00]
Age	0.02 (0.03)	[-0.03 ,0.08]	0.4045	6.58e-04	[0.00, 1.00]
Gender (ref = Male)	-0.01 (0.03)	[-0.07, 0.05]	0.8539	2.73e-05	[0.00, 1.00]
Caste (ref = SC/ST/OBC)	-0.07 (0.05)	[-0.18, 0.04]	0.2036	2.64e-03	[0.00, 1.00]
Middle School (ref = Primary or lower)	-0.00 (0.08)	[-0.15, 0.15]	0.9900	2.21e-03	[0.00, 1.00]
Secondary or higher (ref = Primary or lower)	-0.02 (0.08)	[-0.17, 0.14]	0.8458	1.50e-04	[0.00, 1.00]

Stable Employment (ref = Unemployed)	0.06 (0.07)	[-0.08, 0.20]	0.3676	9.24e-04	[0.00, 1.00]
Unstable Employment (ref = Unemployed)	-0.01 (0.07)	[-0.15, 0.13]	0.9036	9.85e-06	[0.00, 1.00]
Assets index (ref = wealth <20%)	-0.08 (0.07)	[-0.22, 0.05]	0.2308	2.21e-03	[0.00, 1.00]
Belief in person has Special Powers (ref = No belief)	-0.05 (0.03).	[-0.11, 0.00]	0.0575	5.05e-04	[0.00, 1.00]
Belief Diseases Caused by Spirits or Enemy (ref = No belief)	0.10 (0.03)***	[0.05, 0.16]	0.0001 ***	0.01	[0.00, 1.00]
Know Someone with Similar Illness (ref = Does not know)	-0.01 (0.03)	[-0.06, 0.04]	0.6643	1.79e-04	[0.00, 1.00]
R^2	0.27			0.01	
Adj. R^2	0.26			1.79e-04	
Num. obs.	1064				

Note: P value***$p < 0.001$; **$p < 0.01$; *$p < 0.05$, . $p<0.01$;

[a]: we reported the effect size by showing the partial version of Eta-squared (☐) with one sided confidence interval, which means upper bound fixed at 1.00. The treatment variable explains most of

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the variance in the 13-item stigma index.

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