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# Community-based comprehensive intervention for people with schizophrenia in Guangzhou, China: Effects on clinical symptoms, social functioning, internalized stigma and discrimination

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ABSTRACT

Comprehensive interventions including components of stigma and discrimination reduction in schizophrenia in low- and middle-income countries (LMICs) are lacking. We developed a community-based comprehensive intervention to evaluate its effects on clinical symptoms, social functioning, internalized stigma and discrimination among patients with schizophrenia. A randomized controlled trial including an intervention group (n = 169) and a control group (n = 158) was performed. The intervention group received comprehensive intervention (strategies against stigma and discrimination, psycho-education, social skills training and cognitive behavioral therapy) and the control group received face to face interview. Both lasted for nine months. Participants were measured at baseline, 6 months and 9 months using the Internalized Stigma of Mental Illness scale (ISMI), Discrimination and Stigma Scale (DISC-12), Global Assessment of Functioning (GAF), Schizophrenia Quality of Life Scale (SQLS), Self-Esteem Scale (SES), Brief Psychiatric Rating Scale (BPRS) and PANSS negative scale (PANSS-N). Insight and medication compliance were evaluated by senior psychiatrists. Data were analyzed by descriptive statistics, *t*-test, chi-square test or Fisher's exact test. Linear Mixed Models were used to show intervention effectiveness on scales. General Linear Mixed Models with multinomial logistic link function were used to assess the effectiveness on medication compliance and insight. We found a significant reduction on anticipated discrimination, BPRS and PANSS-N total scores, and an elevation on overcoming stigma and GAF in the intervention group after 9 months. These suggested the intervention may be effective in reducing anticipated discrimination, increasing skills overcoming stigma as well as improving clinical symptoms and social functioning in Chinese patients with schizophrenia.

## 1. Introduction

Schizophrenia is a complex mental illness (Jablensky, 2000; Prince et al., 2007) affecting millions of people (Bloomfield et al., 2016) and also is one of the conditions associated with the highest economic burden of health care in the world (Howes and Murray, 2014). Though numerous studies have demonstrated the effectiveness of anti-psychotic medications in controlling positive symptoms (Patel et al., 2007), it is difficult for medication treatments to remit negative symptoms and cognitive impairment effectively, which are correlated with social functioning. Therefore treatment with medication alone is insufficient to promote the rehabilitation of patients with schizophrenia. Treatments for this population should combine medication with psychosocial interventions (Asher et al., 2017). Nowadays, it is recommended a balanced care model between hospital and community, which can provide better mental health services. However, there are several challenges occurred during the delivery of community mental health services, stigma and discrimination have been proved to be an important risk factor in community mental health (Thornicroft et al., 2016a). It is well known that people with schizophrenia often

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experience high levels of stigma and discrimination (Harangozo et al., 2014; Rose et al., 2011; Thornicroft et al., 2009), which often lead to negative consequences, such as poor access to mental and physical health care (Corrigan et al., 2014), low self-esteem, social withdrawal, help-seeking of mental health obstacles (Brohan et al., 2011; Schomerus and Angermeyer, 2008), high rates of unemployment, poverty, suicide and homelessness (Dereje et al., 2012; Link and Phelan, 2006), low literacy and premature death (Thornicroft et al., 2016b). These aspects of stigmatisation are sometimes described by people with schizophrenia as worse than the primary condition.

Programs breaking down stigma and discrimination have been running for several years in Western high-income countries (HICs) (Corker et al., 2016; Henderson and Thornicroft et al., 2009; Knaak and Patten, 2016; Stuart, 2008; Thornicroft et al., 2014), to assert that people with mental disorders should be treated without stigmatization and discrimination (Saxena et al., 2013). Research evidence suggests that approaches aiming to improve mental health related knowledge and modify the negative attitudes and behaviors could effectively reduce stigma (Link, 2001; Pinfold et al., 2003; Thornicroft et al., 2007). However, most of the previous studies are from HICs (Thornicroft et al., 2016b) and studies in low-and middle-income countries (LMICs) remain few. It is necessary to integrate strategies against stigma and discrimination into the community mental health services. Hence, a comprehensive intervention aiming at decreasing clinical symptoms, improving social functioning and reducing stigma and discrimination is desired for patients with schizophrenia who living in community.

Psycho-education is an important approach to educate people with mental health knowledge and erase the misconceptions about mental illness. In China, one of the groups of LMICs, there is a rich literature on the effectiveness of psycho-education in improving general psychopathology and social functioning among people with schizophrenia and their families and relatives (Chien and Thompson, 2014; Ran et al., 2003; Xiang et al., 1994; Xiong et al., 1994; Zhang and Yan, 1993). Cognitive behavioral therapy (CBT) and social skills training (SST) have also been proved to be indispensable ingredients in comprehensive interventions. CBT focuses on reframing psychotic ideas and rebuilding healthy beliefs in the mind of people with schizophrenia (Sarin and Wallin, 2013; Wykes et al., 2008). SST could increase the skills solving problems, improve communication abilities and enhance self-management capabilities (Kang et al., 2016).

A new community model for mental health named SASD (strategies against stigma and discrimination) is supplied by the first author who is expert in community psychiatry and cultural psychiatry. The goals of SASD are to rebuild self-confidence, improve self-esteem, learn self-acceptance and increase skills combating stigma and discrimination. To our knowledge, this should be the first study to carry out such a comprehensive intervention in community in Guangzhou, China. Our hypothesis is that after the comprehensive intervention, we would see a reduction on stigma and discrimination, as well as an improvement on social functioning and clinical symptoms in patients with schizophrenia.

## 2. Methods

### 2.1. Study design and participants

Guangzhou is the capital city of Guangdong province, comprising nearly 8 million registered people with an adjusted lifetime prevalence rate of mental disorders of about 15.8% (Zhao et al., 2009). More than 20,000 of 50,000 people who have been registered in the system of Guangzhou severe mental disorders management database were diagnosed as having schizophrenia. The current study was conducted at Guangzhou Huiai Hospital. We used a stratified cluster random sampling in this study. According to the geographical locations, the 12 administrative regions in Guangzhou City were divided into 2 clusters (6 central districts and 6 suburban districts). Then we randomly selected two central districts (Tianhe and Liwan) and two suburban districts (Huadu and Nansha) from the 2 clusters (Li et al., 2017). Finally, we randomly divided the four districts into two groups: the control group (Liwan and Huadu) and the intervention group (Tianhe and Nansha), so each group contained a central district and a suburban district. The sample size was calculated by the formula in our previous published paper (Li et al., 2015a), assuming a 10% drop-out rate and a significance level of 5% (two sided) and a power of 80%, then 120 participants from each district were randomly recruited.

Participants were included if they: (1) were diagnosed as having schizophrenia according to ICD-10; (2) were aged between 18 and 50 years old; (3) finished primary school education; (4) took anti-psychotic medications with clinical stability; and (5) lived in the local community during the study. Participants were excluded if they: (1) had substance abuse, acute risk of suicide and violence; (2) were unable to understand and fill out the scales and questionnaires; (3) comorbid other serious physical disease, such as cerebrovascular diseases; and (4) were pregnant and / or lactating.

A total of 199 participants were enrolled in the intervention group (109 in Tianhe and 90 in Nansha) and a total of 185 participants were enrolled in the control group (100 in Liwan and 85 in Huadu) at baseline. Most participants were excluded because of the deterioration, being lost to interview (e.g. moving) or refusing to continue the intervention. The details were shown in Fig. 1. Written informed consent was obtained from the participants after the procedure had been fully explained.

Participants in the control group were provided with the face to face interview, which was delivered by the community psychiatrists or general practitioners. The main details contained the assessments of mental state, especially the psychopathological symptoms; daily life; situation of taking medications; and social activities. Participants in the intervention group received the comprehensive intervention, which was delivered by two experienced psychiatrists, one psychotherapist and a social worker.

The main intervention contents included SASD, psycho-education, SST and CBT. Table 1 could differentiate the elements of the intervention, and show how the intervention modalities combined. Both groups received anti-psychotics as usual and operated for an equal amount of time (nine months). Because of the human resource limitations, the intervention was delivered eight times in total: monthly in the first six months and twice in the last three months. Twenty-four modules were included in the comprehensive intervention, and completed in eight phases. Three modules (every modality with one module) were given during every phase for 120 min. Participants attending every phase of this intervention were recorded and some intervention sites were also taken photos when the participants agreed to do these.

There was a manual for the comprehensive intervention, which was formulated according to the manual of WHO Mental Health Gap Action Program (mhGAP), and a series of relative books, such as Mental Health Gap Action Program Intervention Guide (WHO, 2010), Schizophrenia Guideline in China (Shu, 2007), Social Training for Schizophrenia-a-step-by-step Guide (Bellack et al., 2004), Schizophrenia Rehabilitation Instruction Manual in China (Wong, 2009), CBT Skills Workbook: Practical Exercises and Worksheets to Promote Change (Gregory, 2010) and Understanding the Stigma of Mental Illness: Theory and Interventions (Julio and Norman, 2008). The manual also considered a series of practices coping with stigma and discrimination around the world (Corrigan and Watson, 2002; Lasalvia et al., 2013; Link et al., 2004). PowerPoint slides were fabricated during the process.

### 2.2. Interventions

#### 2.2.1. Strategies against stigma and discrimination (SASD)

The main contents were approximately as follows: Introduction about the background of stigma, consequences of stigma, strategies against stigma and related practice training. All these were aimed at

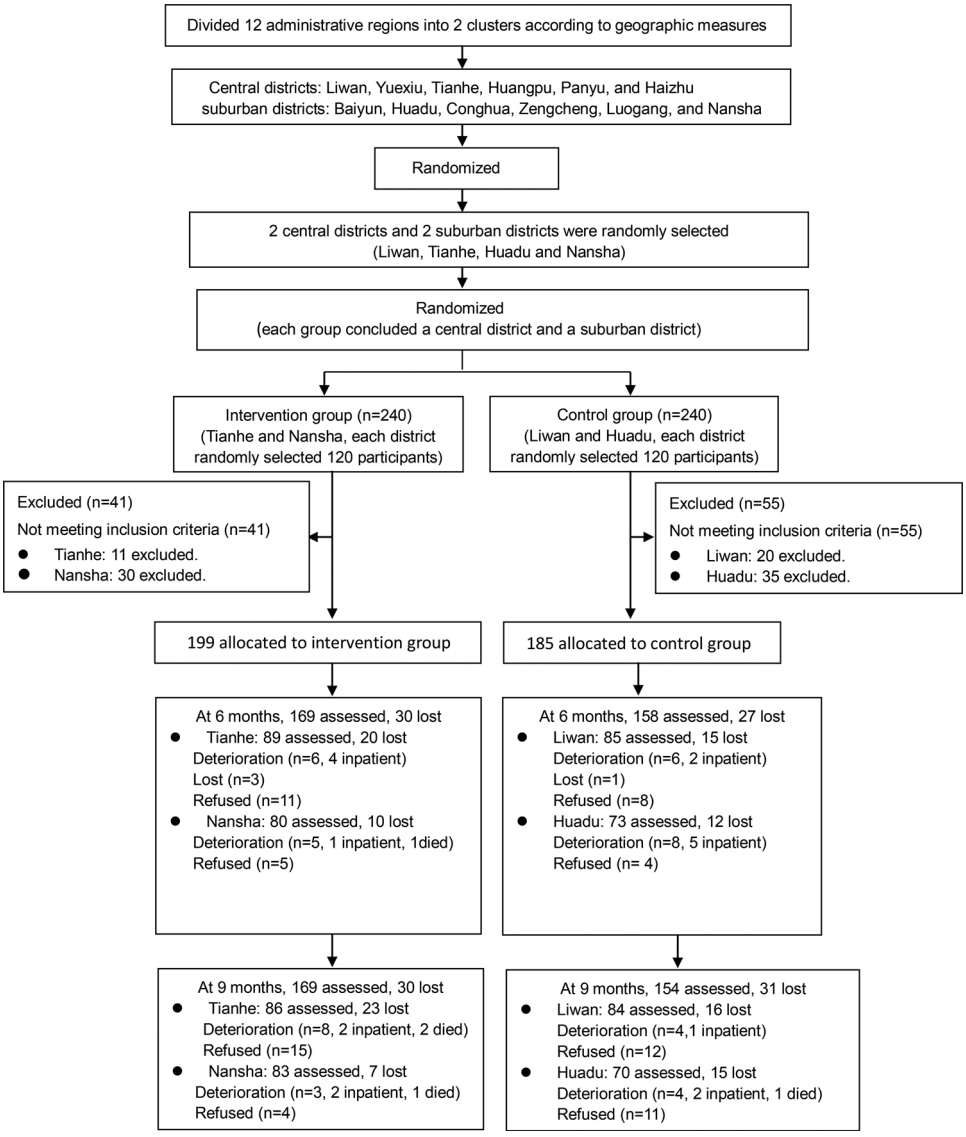


**Fig. 1.** CONSORT (Consolidated Standards of Reporting Trials) diagram.

helping patients to accept this illness and taking a positive attitude to cope with the residual symptoms; rebuilding their self-confidence, strengthening their legal knowledge, educating patients that they had the rights in education, matrimony, employment, etc; helping patients to improve self-esteem to believe that they could make contribution to the society; practicing patients with the social skills and learning skills to build relationship with others. All these strategies were contributed to helping patients increase social interaction. This step was executed by an experienced psychiatrist, who had experienced the training.

### 2.2.2. Psycho-education

The psycho-education for patients with schizophrenia consisted of seven modules: Introduction about the concepts of schizophrenia; Medication treatment of schizophrenia; Side-effects of antipsychotic drugs; Phase review; Rehabilitation of schizophrenia; Preferential policy on schizophrenia in Guangzhou; Review Module. This step was executed by an experienced psychiatrist who had been trained in the intervention procedure.

### 2.2.3. Social skills training (SST)

SST in this study included six modules: Rehabilitation of self-management, learning to live a healthy life; Social communication skills, learning to manage emotion; Vocational skills, learning to show good mental outlook in an interview; Medication self-management skills, learning to understand schizophrenia and its medication treatment and also the side effects; Self-monitoring, learning to assess the treatment, seeking for the useful methods to deal with the persistent symptoms; Reintegration to society skills, encouraging participants to join the social activities, to cultivate the communication skills and build a harmonious atmosphere in the community. This step was executed by the social worker and the psychiatrists who had experienced the unity training.

### 2.2.4. Cognitive behavioral therapy (CBT)

CBT was conducted mainly as three steps. First, built a confidential relationship with participants by listening carefully to them; second, educated patients the knowledge of CBT theories, such as ABC theory of emotion, automatic thinking and positive thinking building, meanwhile, helped the participants to learn cognitive and behavioral coping skills; third, focused on skills to solve problems, discussed the advantages and disadvantages of medication, and learned methods to identify and cope with the warning signs. Homework was assigned after each module to help patients consolidate what they had learned during the therapy. Trainers had to do a review before a new module to ensure

**Table 1**
The contents of the comprehensive intervention.

| Modalities | Modules and contents |
|---|---|
| Psycho-education/SASD | 1.Introduction of the background on schizophrenia |
| | 2.Medical treatment of schizophrenia |
| | 3.Side-effects of antipsychotic drugs |
| | 4.A review of the three modules before |
| | 5.Rehabilitation of schizophrenia |
| | 6.Preherential policy on schizophrenia in Guangzhou, China |
| | 7.Introduction of stigma in schizophrenia |
| | 8.A review of the modules given before |
| SST/SASD | 9.Rehabilitation of self-management |
| | 10.Social communication skills |
| | 11.Vocational skills training |
| | 12.Medication self-management skills |
| | 13.Self-monitoring |
| | 14.Reintegration to society skills |
| | 15.Consequences of stigma and discrimination |
| | 16.Skills against stigma and discrimination |
| CBT/SASD | 17.Build a confidential relationship with patients |
| | 18.Introduction of CBT I: ABC theory of emotion |
| | 19.Introduction of CBT II: Automatic thinking |
| | 20. Introduction of CBT III: Build a positive thinking |
| | 21.Correct the misunderstandings of schizophrenia |
| | 22. Anti-stigma skills training |
| | 23.Self-acceptance learning |
| | 24.A review of the modules given before |

Notes: Abbreviations: SASD = strategies against stigma and discrimination, SST = social skills training, CBT = cognitive behavioral therapy, ABC = Antecedent, Belief, Consequence. Twenty-four modules were included in the comprehensive intervention, and completed in eight phases. Three modules (every modality with one module) were given during every phase for 120 min.

that patients had mastered the skills learned in previous modules. This step was carried out by the psychiatrists and the psychotherapist who had experienced the unity training.

### 2.3. Measurements

#### 2.3.1. Internalized stigma of mental illness scale (ISMI)

We used the Chinese version of ISMI, which has good validity and reliability to assess participants' experience of internalized stigma. This is a self-administered scale including 29 items and uses a Likert scale from 1 = strongly disagree to 4 = strongly agree. A higher ISMI score represents higher internalized stigma (Li et al., 2009).

#### 2.3.2. Discrimination and stigma scale (DISC-12)

We used the Chinese version of DISC-12, which has good validity and test-retest reliability to assess participants' experiences of stigma and discrimination on work, relationships, parenting, housing, social organizations, leisure, and religious activities during the past 12 months. The scale consists of four subscales (Brohan et al., 2013): experienced discrimination, which including 21 items, a higher score indicates greater experienced discrimination; anticipated discrimination, which including 4 items, a higher score indicates greater limitation in their daily life; overcoming stigma, which including 2 items, a higher score indicates knowing more strategies to overcome discrimination; positive treatment, which including 5 items, a higher positive treatment score indicates more positive treatment being reported. For further information about this Chinese version of DISC-12 see Li et al (2016).

#### 2.3.3. Global assessment of functioning (GAF)

We used the Chinese version of GAF, which has good validity and the reliability to assess psychological, social and occupational functioning in schizophrenia. This is an interview-administered questionnaire with a single-item rating from 0 to 100. A higher score represents better psychological, social and occupational functioning (Zhang, 1984).

#### 2.3.4. Schizophrenia quality of life scale (SQLS)

We used the Chinese version of SQLS, which has good validity and reliability to assess participants' quality of life. This is a self-administered scale including 30 items. All items are scored on a 5-point Likert scale (0 = never, 1 = rarely, 2 = sometimes, 3 = often, and 4 = always) except four items are reverse-coded. A lower score represents a better quality of life, while a higher score indicates a poorer quality of life (Li et al., 2003).

#### 2.3.5. Self-Esteem scale (SES)

We used the Chinese version of SES, which has good validity and reliability to indicate the degree of participants' agreement or disagreement with statements about their self-esteem and self-deprecation. This is a self-administered scale. A higher score indicates a lower self-esteem (Wang et al., 1998).

#### 2.3.6. Brief psychiatric rating scale (BPRS)

We used the Chinese version of BPRS, which has been frequently used and has good validity and reliability to assess the severity and change of psychotic symptoms in patients with schizophrenia. This is an interview-administered scale with 18 items. A higher total score represents more severe psychotic symptoms experienced by the participants (Zhang et al., 1983).

#### 2.3.7. Positive and negative syndrome scale for schizophrenia (PANSS)

We used the Chinese version of PANSS negative scale (PANSS-N), which has been frequently used and has good validity and reliability to assess the severity and change of negative symptoms in patients with schizophrenia. This study only used the negative syndrome subscale. The main reason was that PANSS-N was associated with the social function, and PANSS-N could increase the sensitivity to analysis negative symptoms. Another reason was the time needed and burden for participants to complete all scales. This is an interview-administered scale with 7 items relating to negative symptoms. A higher total score represents more serious negative symptoms. (Si et al., 2004).

#### 2.3.8. Insight and medication compliance assessment

Insight and medication compliance were assessed by senior psychiatrists. Both insight and medication compliance assessment were ranked from one to three. The severity of insight was rated as 1 (no insight), 2 (part insight) and 3 (complete insight). The severity of medication compliance rated as 1 (complete medication compliance), 2 (part medication compliance) and 3 (extremely no medication compliance).The proportion of every grade was calculated to assess the situation of insight and medication compliance in patients with schizophrenia.

### 2.4. Procedure

The trial was conducted from April 2015 to April 2016. The study protocol was approved by Research Ethics Committee of Guangzhou Huiai Hospital (Number 012, 2015). This study was registered as a Randomized Controlled Trial, number ChiCTR-IPR-15006246. The interviewers (two experienced psychiatrists, one psychotherapist and a social worker) received one day of intensive training on how to do the implementation of this intervention. The raters (three experienced psychiatrists, one psychotherapist and one psychological consultant) were also trained in another day to ensure the inter-rater reliability during the whole assessment. Both interviewers and raters were trained by the research conductor (the first author) who was experienced in

illustrating the PowerPoint slides and conducting these scales and questionnaires. They were also supervised by the research conductor during the whole trial. All modules were conducted at the participants' local community health service center.

### 2.5. Data collection

Data were collected at 3 points: 1) baseline: pre-intervention; 2) 6 months: mid-intervention; and 3) 9 months: end-intervention. BPRS, PANSS-N, GAF, insight and medication compliance were completed by three experienced psychiatrists via face to face interview. DISC-12 was completed by one psychotherapist and one psychological consultant via reading the items to the participants and participants showed them the answers. ISMI, SQLS and SES were completed by the participants themselves.

### 2.6. Statistical analysis

All statistical analyses were performed using IBM SPSS Statistics 20.0 (IBM Corporation, USA). Descriptive statistics, including the mean, standard deviation (SD), frequency, and proportion were used to describe the demographics and the outcomes of study participants at baseline, 6 months and 9 months (the primary endpoint). Differences between the participants' demographics by interventions were assessed by the *t*-test for continuous variables or the chi-square test or Fisher's exact test for categorical variables.

The analyses of outcomes were based on the intention to treat principle. Linear Mixed Models were used to show intervention effectiveness on BPRS, PANSS-N, GAF, SQLS, SES, ISMI, DISC-12 subscales. General Linear Mixed Models with multinomial logistic link function were used to assess the effectiveness on medication compliance and insight. Regression coefficients (*b*) or odds ratio (*OR*) with 95% confidence intervals (*CI*), and intra-class correlation (*ICC*) resulting from clusters (districts) were calculated. Participants' demographics were not adjusted because there were no significant differences between intervention and control groups. All statistical tests were two-tailed with a significance level of 0.05.

## 3. Results

### 3.1. Recruitment and sample characteristics

A total of 199 participants were recruited to the intervention group and 185 to the control group at baseline. At 6 months, 169 participants (85%) in the intervention group and 158 participants (85%) in the control group completed the intervention. At 9 months, 169 participants (85%) in the intervention group and 154 participants (83%) in the control group completed the intervention. The results of the chi-square test revealed that there was no significant difference between the two groups at the three time points ($p = 0.985$). Non-participation was mainly the results of deterioration, lost or refusal (see CONSORT chart at Fig. 1). The final analyses of outcomes were based on the intention to treat principle.

Tables 2 and 3 showed the demographic and clinical characteristics of the intervention group and control group at baseline. There were no significant differences in age, gender, years of education, race, marital status, occupations, number of hospitalizations and duration of illness. However, participants in the intervention group had significantly lower scores in BPRS and PANSS-N scales than those in the control group at baseline ($p < 0.05$), apart from the two variables, the two groups were well matched and there were no significant differences identified in other baseline clinical characteristics ($p > 0.05$).

### 3.2. Outcomes at 6 months and 9 months

Participants' psychological and clinical changes were measured at 6 months and 9 months with the following scales: ISMI, DISC-12, GAF, SQLS, SES, BPRS and PANSS-N. Baseline differences in BPRS and PANSS-N scores were controlled when examining any of the outcomes. Table 3 showed the changes of the two groups at the two time points.

**Table 2**
Socio-demographic characteristics (baseline).

| Characteristics | Intervention Group (n = 199) | Control Group (n = 185) | *t*-value/ $x^2$-value | *p*-value |
|---|---|---|---|---|
| Age, years: mean (SD) | 40.21 (7.57) | 39.70 (7.83) | 0.65 | 0.52 |
| Education, years: mean (SD) | 10.31 (2.51) | 9.92 (2.69) | 1.46 | 0.15 |
| Race (Han) n(%) | 198 (99.5) | 182 (98.4) | | 0.36 |
| Sex n(%) | | | 0.70 | 0.40 |
| Male | 98 (49.2) | 99 (53.5) | | |
| Female | 101 (50.8) | 86 (46.5) | | |
| Marital status n(%) | | | 3.31 | 0.35 |
| Single | 103 (51.8) | 95 (51.4) | | |
| Married | 76 (38.2) | 70 (37.8) | | |
| Divorce/Widowed | 20 (10.1) | 20 (10.8) | | |
| Occupation n(%) | | | 2.46 | 0.12 |
| Yes | 65 (32.7) | 47 (25.4) | | |
| No | 134 (67.3) | 138 (74.6) | | |
| Duration of illness, years: mean (SD) | 14.11 (7.49) | 15.00 (8.45) | −1.09 | 0.28 |
| Number of hospitalizations, times: mean (SD) | 2.60 (2.50) | 2.36 (3.51) | 0.76 | 0.45 |

Notes: Data were indicated by mean, standard deviation (SD), frequency and proportion.

#### 3.2.1. Changes in stigma and discrimination

As shown in Table 3, there was no statistically significant reduction on ISMI total scores in the intervention group when compared with the control group after 9 months intervention ($p = 0.440$). However, some primary outcomes in DISC-12 subscales were noteworthy. We noted a significant elevation in the subscale of overcoming stigma in the intervention group when compared with the control group after the intervention and there was a significant interaction between intervention and time (95% CI 0.18–0.67, $p = 0.001$). At 6 months and 9 months, mean scores of overcoming stigma in intervention group were significantly higher than the control group (both $p < 0.001$). What's more, the anticipated discrimination score in the intervention group was significantly lower than the control group after 9 months intervention and there was a significant interaction between intervention and time (95% CI −0.59 to −0.01, $p = 0.046$).

There was no significant difference by the end of the intervention on experienced discrimination in the intervention group when compared with the control group after 9 months intervention ($p > 0.05$). At 9 months, though the *t*-test result showed there was a significant decrease on positive treatment in the intervention group when compared with the control group ($p = 0.04$), Linear mixed model showed that there was no significant difference by the end of the intervention on positive treatment comparing the two groups ($p > 0.05$). Details were shown in Figs. 2 and 3 and Table 3.

#### 3.2.2. Changes in functioning and quality of life

As shown in Table 3 and Fig. 4, GAF total score in intervention group was significantly higher than the control group after the intervention and there was a significant interaction between intervention and time (95%CI 6.88–11.46, $p < 0.001$). At 6 months and 9 months, GAF total scores in intervention group were significantly higher than the control group (both $p < 0.001$). There were no significant differences on SQLS between the two groups after 9 months intervention ($p > 0.05$).

**Table 3**
Effectiveness of the comprehensive interventions at baseline, 6-month and 9-month.

| Intervention | Intervention Group (n = 169) | | | Control Group (n = 158) | | | *b*(95%*CI*)/*OR*(95%*CI*) | *p*-value | *ICC* |
|---|---|---|---|---|---|---|---|---|---|
| | Baseline | 6-month | 9-month | Baseline | 6-month | 9-month | | | |
| BPRS total score: mean (SD)[#] | 26.60 (6.39) | 22.75 (4.19) | 21.92 (3.44) | 28.12 (7.84) | 24.65 (5.77) | 25.65 (6.72) | −3.79(−4.92 to −2.67) | < 0.001 | 0.2511 |
| PANSS-N total score : mean (SD)[#] | 16.40 (5.28) | 10.73 (3.42) | 9.71 (3.06) | 17.96 (5.43) | 12.14 (4.23) | 13.06 (4.53) | −3.49(−4.31 to −2.67) | < 0.001 | 0.1248 |
| GAF total score : mean (SD)[#] | 63.76 (10.59) | 73.46 (10.19) | 77.98 (8.91) | 61.61 (12.27) | 67.22 (11.88) | 67.70 (10.62) | 9.17(6.88 to11.46) | < 0.001 | 0.2280 |
| SQLS total score : mean (SD) | 31.64 (15.74) | 29.61 (13.54) | 30.60 (14.10) | 31.95 (15.97) | 31.71 (16.90) | 31.24 (16.00) | −0.06(−3.53 to 0.65) | 0.973 | 0.1989 |
| ISMI total score : mean (SD) | 2.30 (0.38) | 2.21 (0.40) | 2.24 (0.37) | 2.30 (0.40) | 2.28 (0.39) | 2.30 (0.39) | −0.04(−0.14 to0.06) | 0.440 | 0.1235 |
| DISC-12 subscales: mean (SD) | | | | | | | | | |
| Experienced discrimination | 0.20 (0.26) | 0.18 (0.23) | 0.16 (0.23) | 0.21 (0.29) | 0.22 (0.31) | 0.21 (0.29) | −0.05(−0.12 to 0.03) | 0.205 | 0.2520 |
| Anticipated discrimination[#] | 0.79 (0.72) | 0.51 (0.65) | 0.52 (0.68) | 0.79 (0.72) | 0.62 (0.68) | 0.84 (0.86) | −0.30(−0.59 to −0.01) | 0.046 | 0.2898 |
| Overcoming stigma[#] | 0.73 (0.67) | 1.16 (0.83) | 1.09 (0.83) | 0.78 (0.71) | 0.72 (0.64) | 0.63 (0.62) | 0.43(0.18 to 0.67) | 0.001 | 0.3578 |
| Positive treatment[#] | 0.75 (0.66) | 0.65 (0.62) | 0.50 (0.45) | 0.70 (0.60) | 0.53 (0.56) | 0.61 (0.48) | −0.11(−0.30 to 0.07) | 0.220 | 0.2298 |
| SES total score : mean (SD) | 22.95 (3.92) | 22.51 (3.68) | 22.89 (3.61) | 23.34 (3.88) | 23.56 (3.88) | 23.23 (3.77) | −0.14(−1.25 to 0.97) | 0.805 | 0.2168 |
| Medication compliance n (%) | | | | | | | 0.33(0.10 to 1.15) | 0.082 | 0.4152 |
| Complete compliance | 155(77.9) | 160(94.7) | 163(95.9) | 137(74.1) | 138(87.3) | 138(89) | | | |
| Part compliance | 42(21.1) | 8(4.7) | 7(4.1) | 46(24.9) | 17(10.8) | 13(8.4) | | | |
| No compliance | 2(1.0) | 1(0.6) | 0(0.0) | 2(1.0) | 3(1.9) | 4(2.6) | | | |
| Insight n (%) | | | | | | | 1.39(0.90 to 2.15) | 0.134 | 0.4723 |
| Complete insight | 22(11.1) | 80(47.3) | 92(54.1) | 24(13.0) | 60(38.0) | 70(45.2) | | | |
| Part insight | 134(67.3) | 85(50.30) | 75(44.1) | 104(56.2) | 91(57.6) | 74(47.7) | | | |
| No insight | 43(21.6) | 4(2.40) | 3(1.8) | 57(30.8) | 7(4.4) | 11(7.1) | | | |

Notes: The analyses of outcomes were based on the intention to treat principle. Data were indicated by mean, standard deviation (SD), frequency and proportion. Abbreviations: ICC = intra-class correlation, ICC is the proportion of variance in the outcome that can be accounted for by differences among districts. BPRS = Brief Psychiatric Rating Scale. PANSS-N = PANSS negative scale. GAF = Global Assessment of Functioning. SQLS = Schizophrenia Quality of Life Scale. ISMI = Internalized Stigma of Mental Illness scale. SES = Self-Esteem Scale. DISC = Discrimination and Stigma Scale. [#]: the interaction between intervention and time was significant ($p < 0.05$).

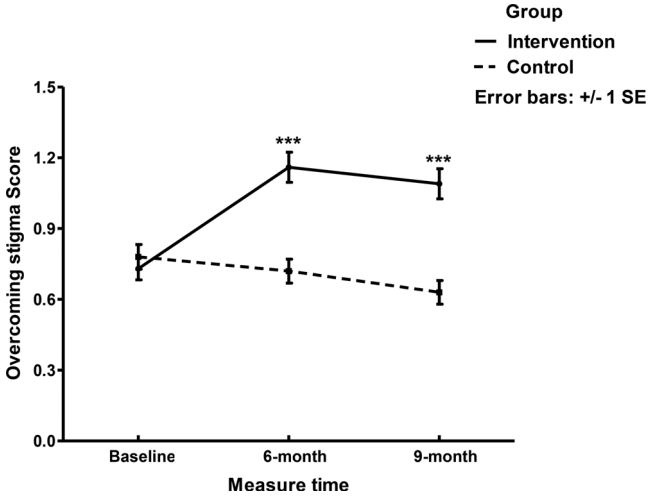


**Fig. 2.** DISC Overcoming stigma scores of the intervention group and control group by time point. Data were indicated by mean (standard error). ***$p < 0.001$.

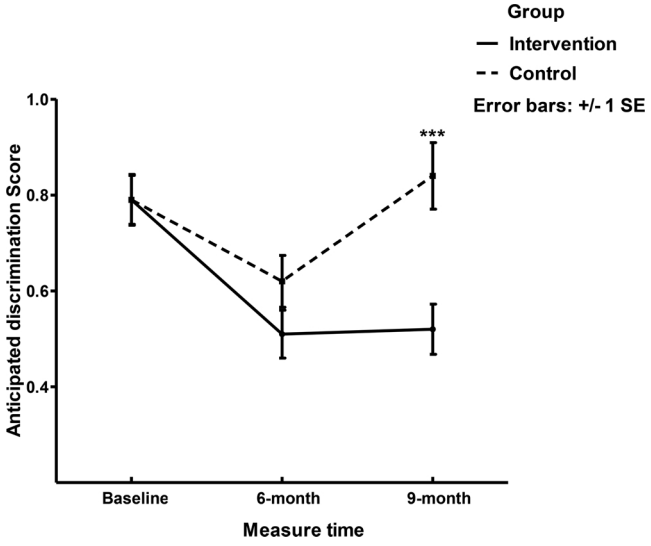


**Fig. 3.** DISC Anticipated discrimination Scores of the intervention group and control group by time point. Data were indicated by mean (standard error). ***$p < 0.001$.

### 3.2.3. Changes in psychotic symptoms

As shown in Table 3 and Fig. 5, we noted that BPRS total score in the intervention group was significantly lower than the control group after the intervention and there was a significant interaction between intervention and time (95%CI -4.92 to -2.67, $p < 0.001$). At 6 months and 9 months, there was a significant reduction on BPRS total score in the intervention group when compared with the control group (both $p < 0.05$), after adjustment for baseline BPRS total scores. At the same time, we noted that PANSS-N total score in intervention group was significantly lower than the control group at the end of the intervention and there was a significant interaction between intervention and time (95%CI -4.31 to -2.67, $p < 0.001$) (Table 3 and Fig. 6), after adjustment for baseline PANSS-N total scores. At 6 months and 9 months, there was a significant reduction on PANSS-N total score in the intervention group when compared with the control group (both $p < 0.05$).

### 3.2.4. Changes in insight and medication compliance

In addition, we measured participants' medication compliance and insight. We found there were no significantly differences on insight and medication compliance between the two groups at the end of the intervention (both $p > 0.05$). Details were shown in Table 3.

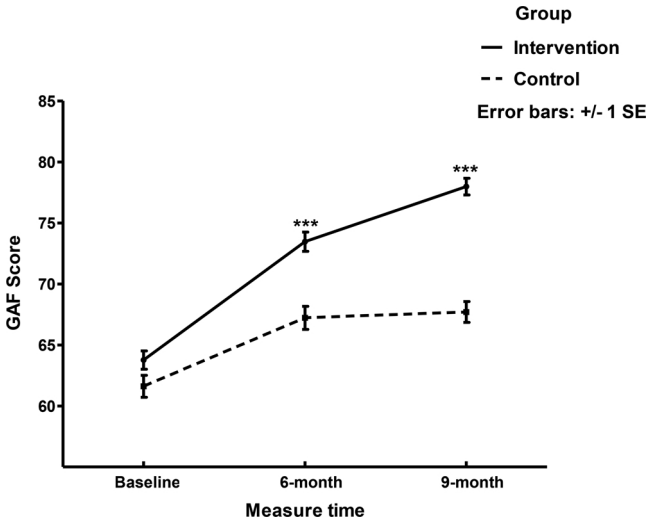


**Fig. 4.** GAF Scores of the intervention group and control group by time point. Data were indicated by mean (standard error). GAF = Global Assessment of Functioning. ***$p < 0.001$.

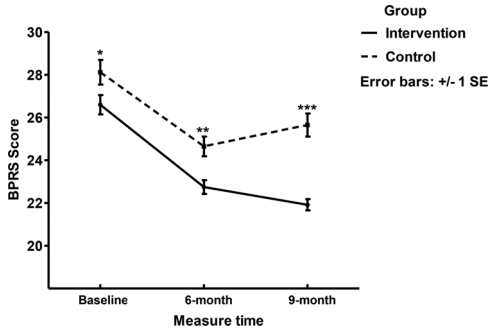


**Fig. 5.** BPRS Scores of the intervention group and control group by time point. Data were indicated by mean (standard error). BPRS = Brief Psychiatric Rating Scale. *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

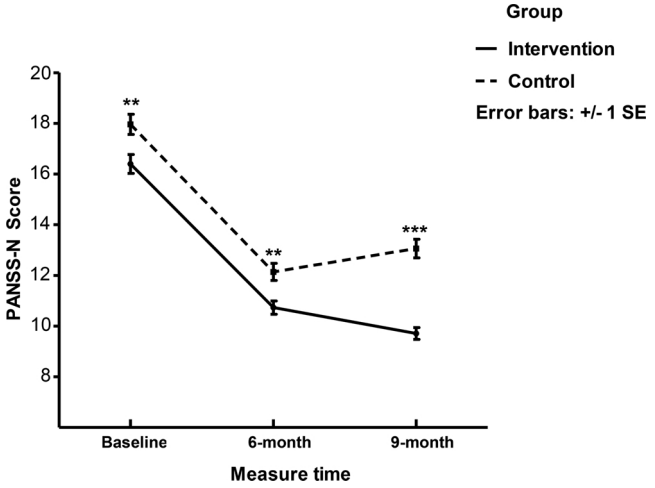


**Fig. 6.** PANSS-N Scores of the intervention group and control group by time point. Data were indicated by mean (standard error). PANSS-N = PANSS negative scale. **$p < 0.01$, ***$p < 0.001$.

### 3.2.5. Changes in self-esteem

What's more, the outcome of SES showed that there was no significant difference between the two groups at the end of the intervention ($p = 0.805$). At 6 months, SES total score in intervention group was significantly lower than the control group ($p = 0.01$). Details were shown in Table 3.

## 4. Discussion

To our knowledge, interventions related with stigma among people with mental illness are still in their infancy in China (Xu et al., 2017). This is the first study to conduct a comprehensive intervention among patients with schizophrenia who living in community in Guangzhou, China and to assess its effects on clinical symptoms, social functioning, internalized stigma and discrimination. Few effective programs have integrated with strategies against stigma and discrimination in the Chinese community mental health services. Generally speaking, the findings in this study indicate that the comprehensive intervention may be effective for people with schizophrenia, especially on discrimination reduction, clinical symptoms lessening and social functioning improvement.

The results of this study suggested that internalized stigma in patients with schizophrenia has not been reduced after this intervention program. This is similar to the study of Chatterjee et al (2014), who also found no additional contribution in reducing stigma after a community-based intervention (Chatterjee et al., 2014). Stigma is a complicate psycho-social issue, which can be emerged when amounts of components interact. Self-stigma occurs when an individual with mental illness internalizes the negative stereotypes, adopts prejudice and loses self-esteem and self-efficacy. It is an internalized and consolidated performance of negative thoughts and experience, which is pervasive and difficult to eradicate. Interventions from one level or one facet could not change it effectively. Patients' attitudes and behaviors towards the illness can be influenced by the family members and the public, which can hinder or increase difficulties for patients to fight with the internalized stigma. Hence, these may indicate that interventions towards the family members and the public to correct the misunderstandings of mental disorders and rebuild a positive thinking are necessary. Though there were no significant differences found between the two groups, we could see the reduced trend appeared in the intervention group, we assume that the effect of interventions against internalized stigma could be significantly improved when combing with strategies combating public stigma.

We found some positive results in relation to discrimination, which may have some positive effects on erasing discrimination and stigma in the future. This study showed that the skills of overcoming stigma in the intervention group were significantly improved at both 6 months and 9 months, and there was a significant interaction between intervention and time, this suggested that the comprehensive intervention could educate participants to be familiar with more skills to reduce discrimination. The anticipated discrimination in the intervention group was significantly lower after the comprehensive intervention, indicating that fewer participants stopped themselves from starting relationships and they would not avoid or shun others who knew they had mental illness.

These results are consistent with the findings of Shin and Lukens (2002), who found greater coping skills in Korean Americans with a diagnosis of schizophrenia (Shin and Lukens, 2002). The reasons can be explained from the contents of the comprehensive methods. There are eight modules in the intervention related with stigma and discrimination, which means SASD is educated to the patients during most of the interventional period, which therefore can ensure patients to contact with these strategies in most of their time. SASD aims at rebuilding patients' confidence by encouraging them to communicate with others and training patients with skills to face with stigma and deal with some related problems. The effects of other three methods should not be ignored. At the same time the stigma reduction intervention was not directly based upon the principle of interpersonal contact, and so the results indicate that such interpersonal contact can be usefully employed in future intervention studies intended to reduce stigma (Thornicroft et al., 2016b)

Psycho-education could give participants a greater understanding and knowledge of schizophrenia (Armijo et al., 2013). SST could improve their social functioning and interpersonal relations and give them hope (Yildiz et al., 2004). The format of CBT could attract patients to attend the program, reduce social withdraw and the regular contact with psychiatrists could consolidate the attitude and behavior change (Kersten et al., 2016). All these may contribute to reducing discrimination. Linear mixed models showed that there were no significant changes on the subscales of experienced discrimination or positive treatment. These indicated this intervention might not play a role on the two parameters, or its effects were influenced by the external-environment.

Lastly, this study indicated a significant improvement in social functioning, which was assessed by GAF. GAF score in the intervention group was greatly increased at both 6 months and 9 months, and there was a significant interaction between intervention and time. Our results were consistent with Temple and Ho (2005), who found an improvement of global psychosocial functioning in patients with schizophrenia (Temple and Ho, 2005). Pena et al (2016) also stated a similar result of social function in patients with schizophrenia who participated in the integrative cognitive remediation program (Pena et al., 2016). Some possible reasons may be that participants in this study not only received professional psycho-education but practiced social skills training. What is more, a large number of researchers have proved that the format and specific strategies of CBT can improve global and social functioning (Li et al., 2015b; Sarin and Wallin, 2013; Wykes et al., 2005).

Another interesting finding was the significant improvement of self-esteem at 6 months and an increased trend at 9 months though with no significant differences. This indicates that the intervention improves self-esteem to some extent, and may be because of the reduced frequency in the last three months that we do not get the expected results in 9 months. So a higher frequency and intensity of interventions are needed in future research. Furthermore, we noted a significant reduction of BPRS and PANSS-N scores in the intervention group after 9 months intervention, which were consistent with previous studies (Fujita et al., 2010; Shin and Lukens, 2002; Tempier et al., 2012). These findings reflect the comprehensive intervention can reduce psychotic symptoms, especially some negative symptoms in patients with schizophrenia. It's worth noting that participants in the study have a median duration of about 14 years of illness and symptoms were moderate in severity. For this group of people with long-term and severe symptoms, these improvements in BPRS and PANSS-N could be viewed as important outcomes.

In conclusion, although our intervention has no directly significant effects on self-stigma, it still has implications for the peers for its effects on discrimination reduction, clinical symptoms lessening, and social functioning improvement. The frequency of the intervention can be more intensive in order to improve self-esteem and approaches to reduce self-stigma are needed to be identified.

### 4.1. Strengths and limitations of the study

Several limitations in this study should be taken into consideration. First, the intervention was conducted only eight times during 9 months because of the human resource limitations. Second, all the evaluation researches have the subjective bias, it's also difficult for this study to eliminate this bias. Third, there may have a synergy effect among the four components of this intervention. It is difficult to calculate the contribution of each component in this study. Further explorations are needed to examine the effectiveness of each intervention component. Fourth, this study only showed the effects of the program at the moment of intervention end-point, the effectiveness of the follow-up is undergoing. Fifth, the intervention to reduce stigma was not directly based upon the principle of inter-persona contact. Despite these limitations, we believe that our study also has some clear advantages. First, this study was under the overall guidance of the World Psychiatric Association's Global Anti-stigma program. Second, this is the first study about comprehensive intervention, which including strategies against stigma and discrimination, conducted among people with schizophrenia in the community in China. Third, the scales used in this study have good psychometric properties in their Chinese versions.

### 4.2. Implications of the study

This study suggests that the comprehensive intervention package used, (including SASD, psycho-education, SST and CBT) could have some positive impacts in patients with schizophrenia in community in Guangzhou, China, such as reduction on discrimination, improvement on social functioning and the clinical symptoms, especially the negative symptoms. However, schizophrenia may be a long-term condition, and a longer duration of follow-up is needed to show any additional benefits of the comprehensive interventions (Ran et al., 2015). What's more, family intervention was included in our design originally, however, we didn't do it in the later study, two reasons can explain this problem. First, because of the inconvenience of the family members, it's hard for us to gather them together. Second, because of the long duration of this illness in the patients, family members may not show too much care on them. It's indicated the importance of interventions on family members and the public. Additionally, the biggest challenge in this study may be the manpower for delivery of essential mental health interventions. "Task-shifting" is an effective approach to relieve the limitations of manpower, mental health specialists can via brief training and appropriate supervision of non-specialist health professionals to strengthen human resources. In this study, participants in the control group were cared by the community psychiatrists or general practitioners. There was a support policy in China that general practitioners could achieve the license of psychiatry if they passed the psychiatric training, which could make up for the shortage of human resources in mental health.

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## Authors' contributions

JL designed and led the study. JL and YF drafted the manuscript. YGH helped to coordinate the whole investigation and WC conducted the main data analysis. MSR was involved in the data analysis and editing the manuscript. GT and SEL contributed to the scale support and critically appraised the manuscript. All authors read and approved the final manuscript.

## Declaration of interests

SEL has received consulting fees from Lundbeck unrelated to this work. The other authors declare no conflicts of interest.

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