



# Community Participation Among Individuals with Severe Mental Disorders During COVID-19 Pandemic

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Received: 17 May 2022 / Accepted: 18 September 2022

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## Abstract

Utilizing a sample of 286 community-dwelling adults with severe mental disorders (SMDs) in Beijing, this study examined their social and community participation during COVID-19 pandemic. The descriptive results showed that adults with SMDs living in the pandemic Beijing mostly engaged in social activities, followed by productive and leisure/recreational activities. More than two-thirds of the participants indicated that their participation was not sufficient. The multivariate analyses revealed that higher social support and self-esteem predicted more participation days, higher social support and independent usage of Health Kit were linked to more participation items, while higher social support and stronger self-stigma were associated with lower perceived participation sufficiency. Thus, community mental health professionals need to provide more tailored interventions to people with SMDs to enhance their participation performance and perceived participation sufficiency during the pandemic era.

**Keywords** community participation · severe mental disorder · COVID-19

## Introduction

Severe mental disorders (SMDs) deleteriously affect individuals by substantially interfering with their functioning and life participation (Chronister et al., 2021). Stereotypes of individuals with SMDs as dangerous, helpless, and irresponsible are pervasive and culturally shared (Marcussen et al., 2021). Strong evidence suggests that people with SMDs are among the most excluded in society (Killaspy et al., 2014). Compared with the general population, individuals with SMDs have significantly less community participation

(Nagata et al., 2020). Participation has become a key outcome of psychiatric rehabilitation and mental health programs supporting persons with SMDs (Burns-Lynch et al., 2016; Dijkers, 2010). Existing research shows a variety of individual and environmental factors influencing their community participation, including self-concepts and social support (Chronister et al., 2021; Li & Tian, 2017). China had 5.99 million individuals with SMDs, and approximately 88% were living at home (Li & Ma, 2020; Wang et al., 2020). A handful of studies have explored their participation in one or more specific areas such as employment or community organizations' activities (Song & Liu, 2012; Ye et al., 2021), but few covered wide domains of community participation. Furthermore, correlates of community participation among individuals with SMDs in the Chinese society remain highly understudied.

The COVID-19 outbreak and subsequent pandemic control measures have impacted this category disproportionately (Druss, 2020; Liberati et al., 2022). A key concern is whether their social isolation would be worsened (Costa et al., 2020). After the outbreak of COVID-19 at the end of 2019, China took a series of extremely strict measures and controlled its spread effectively within eight weeks (Feng et al., 2020; Zhou et al., 2021). Since then until the very recent Omicron surge in certain areas, only sporadic daily new

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cases and some small-scale outbreaks were seen in China. To prevent infection resurgence, the Chinese government employed contact tracing apps that automatically collect travel data and self-reported suspect infection of COVID-19 to assign users a red, yellow, or green QR code. The color dictates whether a person should be quarantined or allowed into public spaces such as malls, supermarkets, restaurants, etc. The contact tracing program used in Beijing area is called “Health Kit.” Health Kit is nested in the popular apps WeChat or Alipay as a mini program. People access the program and fill in their full name and identification number or scan their face. When people enter any public place, they need to open Health Kit and scan the facility’s QR code to register their visit. A health code will be automatically generated, and the color of the code indicates users’ health and COVID-19 contact status. Users receiving a green code have unhindered access to public spaces. A yellow code means the person might have been exposed to COVID-19 and must be quarantined at home. Those infected or being suspected of being infected with or having had close contacts with infectious cases are assigned a red code and must be quarantined according to directions of the Center for Disease Control and Prevention. The adoption of Health Kit as a tool to control COVID-19 might add one more challenge to the community participation of people with SMDs during the pandemic era, a topic which appears unexamined. Numerous studies have explored digital social inequality in general (DiMaggio et al., 2004) and digital divide during the pandemic in particular (Beaunoyer et al., 2020; Nguyen et al., 2021). China provides a unique case to further understand the impact of digital technologies and related policies.

This study explored the participation of individuals with SMDs across a variety of life domains during COVID-19 pandemic, including days of participation, total participation items, and sufficiency of participation. We also examined the role of social resources (social support), personal self-concepts (self-esteem and self-stigma), and usage of Health Kit in predicting community participation. The findings enhance our understanding of the community life of individuals with SMDs during COVID-19 pandemic and have important implications for interventions in the pandemic era.

## Literature Review and Hypotheses

### Participation of People with SMDs: Definition and Measurement

The World Health Organization’s (WHO) International Classification of Functioning Disability, and Health model (ICF) has defined participation as a person’s “involvement

in life situations” (WHO, 2001). However, what life situations should be considered is indefinite. Researchers have generally agreed that participation involves role performance at the societal level; it is social in nature; and it happens in broad domains of daily life (Chang & Coster, 2014; Whiteneck & Dijkers, 2009). Further, prior research suggests that subjective evaluation of participation may be conceptually distinct from objective measures of participation performance (Whiteneck & Dijkers, 2009).

The most frequently used instruments that are relevant to participation include the Community Integration Measure (CIM) (McColl et al., 2001), the Community Integration Scale (CIS) (Aubry & Myner, 1996), and the Social Functioning Scale (SFS) (Birchwood et al., 1990). However, these instruments are flawed when applied to community participation (Chang et al., 2016). CIM assesses the sense of belonging instead of participation. The measurement properties of CIS have not been fully examined. SFS contains irrelevant areas or non-participation items. Furthermore, measuring participation in people with SMDs is still in its infancy (Salzer et al., 2014). For example, the self-efficacy for social participation scale (SESP) used by Amagai and colleagues (2012) focuses on subjective confidence in participation among people with SMDs. The pilot study by Dalin & Rosenberg (2010) proposes five separate scales to measure participation in community life for people with psychiatric disabilities. Their data are collected from staff instead of patients, and the measurement’s reliability and validity have not been established. The Temple University Community Participation (TUCP) measure (Salzer et al., 2014) assesses the participation of people with SMDs in a broad range of activities and their subjective views. This measure demonstrated good test-retest reliability and validity in a sample recruited from Philadelphia (Burns-Lynch et al., 2016). Based on TUCP, Chang and colleagues (2016) further developed the Community Participation Domains Measure (CPDM) that includes three participation domains (productivity, social, and leisure/recreation). CPDM covers most of the community life areas in which a person may participate and is applicable across age, gender, and the severity of symptoms (Chang et al., 2016). Therefore, we adopted CPDM in the current study.

### Participation and Associated Factors: The ICF and Stress Process Models

People with SMDs experience significant stressors associated with poverty, stigma, and isolation (Chronister et al., 2021). The participation performance of people with SMDs is often explained using the ICF model (WHO, 2001), which draws attention to the influence of personal and environmental factors in addition to functional impairments (Whiteneck

& Dijkers, 2009). This model conceptualizes social support as a key environmental factor that influences functioning and role engagement (Farber et al., 2015; WHO, 2001). Consistently, the Stress Process Model (Pearlin, 1989) proposes social support as a key resource to cope with stress and improve people's health and behavior. Social support is a broad term that includes structural bases of social relationship and several functional types (Helgeson, 2003). A number of studies suggest that social relationships facilitate positive mood and provide functional support to cope with stressful events (Chronister et al., 2021; Helgeson, 2003). Particularly, family members of individuals with SMDs usually provide them direct support for community participation, such as planning activities, providing the needed instrumental help (e.g., transportation, money, etc.), accompanying them into the community, sharing their interests and including them in their own social engagements, etc. (Chronister et al., 2021).

Additionally, the Stress Process Model emphasizes the role of self-concepts in predicting behavior outcomes (Pearlin, 1989). For example, it argues that self-esteem represents personal resources and serves as an appreciable barrier to the stressful effects of difficult life conditions (Pearlin, 1989). Research suggests that deficits in self-esteem in people with SMDs are linked to difficulties in decoding social interactions (Lysaker et al., 2009) and poor self-efficacy in social participation (Li & Tian, 2017).

Given the pervading social stigma associated with mental illness, the Modified Labeling Theory (Link et al., 1989) suggests that people with SMDs might develop self-stigma that internalizes the devaluation/discrimination beliefs associated with mental illness. Existing evidence shows that self-stigma is associated with reduced activity (Moriarty et al., 2012). People with high self-stigma tend to withdraw from contacts that they perceive could reject them (Abiri et al., 2016).

Although Chinese people have largely returned to normal life after the COVID-19 pandemic, the government adopted strict COVID-19 control policies through contact tracing apps such as Health Kit to prevent infection resurgence. Considering some groups (e.g., the elderly or disabled) may be incapable of using Health Kit, a few alternative measures were later introduced (Nation Health Commission's Planning office, 2020). For example, they could have a family member use their Health Kit to produce their health code, present a paper proof to show their health condition, or fill in a form to register their name and contact information. Nevertheless, inability to use Health Kit may inconvenience people with SMDs in independently participating in community and social life.

Our study investigated the extent to which social support, self-esteem, self-stigma, and usage of Health Kit influence

community participation among people with SMDs. Specifically, we hypothesized that social support, self-esteem, and independent usage of Health Kit are positively associated with their community participation, while self-stigma is negatively linked to it.

## Methods

### Participants and Procedures

The participants were 286 community-dwelling individuals with SMDs. They were recruited from 13 community health centers in Beijing between October 2020 and July 2021. The study followed the ethical guidelines issued by the first author's university and was monitored by the college ethical review board. During data collection, only sporadic cases of COVID-19 or small-scale outbreaks were reported in China. Most people lived a normal life except that they needed to present their Health Kit status code when entering public places. Mental health workers in these community health centers distributed psychiatric medication to residents with SMDs. Generally, those with SMDs came to the centers to collect their medication on one or a few designated dates monthly, during which our research team visited them. The mental health workers in the center informed eligible clients about this study, including voluntariness of participation and the confidentiality of responses. Those who were willing to participate were referred to our researchers. Those eligible should: (1) be 18 years or older; (2) have a SMD; (3) be in stabilized conditions and be able to communicate; (4) have lived in the community for no less than half a year. Written informed consent was obtained from each participant. Following previous research (Amagai et al., 2012), we primarily used an anonymous self-reported questionnaire. Participants filled in the questionnaire in a meeting room in each health center, and researchers were available on site for any queries. Some voluntary participants did not want to fill in the questionnaire by themselves, largely due to their personal conditions such as presbyopia. Upon their agreement, the questionnaire was administered by our trained researchers. The survey included questions on health and functioning, community participation, social support, self-esteem, self-stigma, recovery, and life satisfaction. Each participant received a bottle of cooking oil (worth about 20 Chinese yuan) as compensation.

## Measures

### Community Participation

Drawing on the CPDM (Chang et al., 2016), this study adopted a 20-item Chinese measure of community participation that covered productive (e.g., work for pay), social (e.g., going to a party), and leisure/recreational (e.g., going to gym) activities. Most items were retained and translated into Chinese. Several were adapted to the Chinese context. One item “Go to watch a sports event” was deleted because it is an uncommon leisure activity for Chinese people. Expert review was utilized in the development of the participation scale by consulting with doctors at the hospital affiliated to the first author’s university. The items were also tested on three individuals with SMDs, and revisions were made accordingly.

For each of the items, respondents reported the number of participation days in the past 30 days. They also reported their perceived sufficiency of participation for each item with answer options of “not enough,” “enough,” and “more than enough.” Accordingly, three participation constructs were calculated (Burns-Lynch et al., 2016; Salzer et al., 2014). First, the total number of days of participation was computed as the sum of participation days across all items. Possible scores ranged between 0 and 600 (30 days x 20 items). Second, we aggregated the items in which a person participated at least once in the past 30 days to obtain the measure of total participation items, which captures the breadth of participation. Possible scores ranged between 0 and 20. The third construct was the level of perceived participation sufficiency. We calculated the percentage of items where people indicated adequate participation (i.e., “enough” or “more than enough”). Perceived participation sufficiency was measured by three levels: 1-low sufficiency (50% or lower), 2-moderate sufficiency (higher than 50% but lower than 100%), and 3-full sufficiency (100%).

### Recovery and life Satisfaction

Research consistently demonstrates a relationship between participation of people with SMDs and their recovery and quality of life (Burns-Lynch et al., 2016). Hence, we utilized this empirical association to verify the validity of our participation scale. The survey included the widely used Recovery Assessment Scale (RAS) (Corrigan et al., 2004) and the Satisfaction with Life Scale (SWLS) (Diener et al., 1985). Both scales were translated into Chinese and validated in the Chinese context (Huang, 2009; Mak et al., 2016). RAS included 24 items such as “I have goals in life that I want to reach” ( $\alpha=0.94$ ). RAS was measured by the mean of all items. Higher scores represented higher levels of recovery (Mak

et al., 2016). SWLS included five items such as “In most ways, my life is close to my ideal” ( $\alpha=0.87$ ). The scores were summed and divided into three categories reflecting satisfaction levels (level 1 = 20 or below; level 2 = 21–29; level 3 = 30 or above) (Pavot & Diener, 1993).

### Social Support, self-esteem and self-stigma, and Usage of Health Kit

Social support is a broad concept with multiple dimensions. Researchers distinguished two aspects of social support: structural bases of social relationship (i.e., existence of social relationship and network) and their functional elements (Hakulinen et al., 2016). Additional dimensions such as perceived and received support as well as availability of support and actual utilization of support were also addressed in prior studies (Lin et al., 1999; Tardy, 1985; Winemiller et al., 1993). Drawing upon the literature, Xiao (1994) developed Social Support Rating Scale (SSRS) for the Chinese context. SSRS has 10 items and examines social support in three aspects: (1) availability of social networks measured by living arrangement and number of support resources in times of need; (2) perceived supportiveness of friends, neighbors, colleagues, and family members; and (3) utilization of social support, for example, “how do you seek help when having trouble?” with answer options ranging from “rely on myself and decline help from others” to “often ask family, friends, or community for help”. The SSRS scale has been widely used in Chinese studies and exhibited good validity and reliability (Huang et al., 2021). Hence, we adopted it to measure social support in the current study. The original measure of living arrangement had four options: (a) living alone and far away from family, (b) no stable living places and often living with strangers, (c) living with classmates/colleagues/ friends, and (d) living with family. To fully capture all possible living arrangements of individuals with SMDs, we added one more option of living alone but with family member(s) living nearby. The scores of the 10 SSRS items were aggregated ( $\alpha=0.87$ ). Higher scores indicated higher levels of social support.

The Chinese version of the Rosenberg Self-Esteem Scale (RSES) (Rosenberg, 1965) was adopted to assess self-esteem. RSES contains 10 items and has showed satisfactory reliability and validity in earlier research (Qu et al., 2020). All item scores were summed ( $\alpha=0.83$ ). Higher scores indicated higher self-esteem.

We adopted the Chinese version of the Internalized Stigma of Mental Illness (ISMI) to measure self-stigma. ISMI is a 4-point Likert scale consisting of 29 items grouped into 5 subscales: Alienation, Stereotype Endorsement, Discrimination Experience, Social Withdrawal, and Stigma Resistance (Ritsher et al., 2003). Li and colleagues

(2009) adapted ISMI to the Chinese context. Through a series of translations, testing in SMD individuals, expert reviews, and revisions, the Chinese-version ISMI they yielded included 23 items and demonstrated good reliability and validity. Three subscales (Stereotype Endorsement, Discrimination Experience, Social Withdrawal) in the original ISMI remained. The other two subscales were adapted to the Chinese culture and renamed as Feeling of Meaningless and Self-deprecation. This adapted Chinese-version ISMI (Li et al., 2009) has been widely utilized in China (Liu & Zhu, 2014; Sun et al., 2018), and hence our project adopted it. We carried out pilot testing to ensure participants understood all questions. Survey responses to the 23 items were aggregated, and higher sum scores represented higher levels of internalized stigma. The scale proved to have a high internal consistency ( $\alpha = 0.94$ ).

Regarding usage of Health Kit, we asked respondents whether they could use the mobile app program independently. A dichotomous variable was created (0 = no; 1 = yes).

### Diagnoses, Functional Conditions, and Sociodemographic Controls

Diagnoses of mental illnesses are categorized into three groups (schizophrenia, bipolar disorder, and others), with schizophrenia as the reference group. Functional conditions were assessed with two measures. First, participants were asked if they needed to be reminded to take psychiatric medication. The response included three options: (1) taking psychiatric medication and need little or no reminding; (2) taking psychiatric medication and often or always need reminding; and (3) not currently taking psychiatric medication. Option (1) served as the reference group. Second, participants were asked if they experienced the following functional difficulties or problems during the past month: taking care of themselves such as brushing their teeth, doing work or household chores, concentrating or memorizing, body aches or discomfort, lack of energy, and feeling low. The Likert-scale responses for each item ranged from 1 (*none*) to 5 (*extremely difficult/severe*). All item scores were summed ( $\alpha = 0.85$ ), with higher scores indicating higher levels of functional difficulty.

The demographic factors that were controlled for were age, sex (female as the reference group), education level (junior high school or below as the reference group), and marital status (married as the reference group). Additionally, economic situation was measured by self-rated economic adversity. Participants were asked “How do you think of your family economic situation compared to others?” The Likert-scale responses ranged from 1 (*much better than others*) to 5 (*much worse than others*). Higher scores represented higher economic adversity.

### Analysis

As mentioned earlier, the aim of this study was to examine a wide domain of community participation instead of one or a few dimensions such as productive or social activities. Prior literature also supported analyzing CPDM as an aggregated scale of community participation among individuals with SMDs (Burns-Lynch et al., 2016). Therefore, our analyses focused on the comprehensive participation measured by CPDM. Descriptive analysis was used to report basic sample characteristics and respondents’ participation in 20 activities. Multivariate analyses examined environmental, personal, and socio-demographic correlates of community participation, which was measured by three variables: total participation days, total participation items, and perceived participation sufficiency. The variable of total participation days was square-root transformed to reduce kurtosis and skewness. Ordinary least squares (OLS) linear regression was applied to the models wherein the transformed total participation days and the total participation items were dependent variables. The perceived participation sufficiency was a categorical variable with three orders, and ordinal logistic regression was adopted after testing the proportional odds assumption ( $\chi^2 = 14.921$ ,  $p = .457$ ). Tolerance and variance inflation factor indicated that there was no multicollinearity problem. All statistical analyses were conducted with SPSS Version 26.

## Results

### Sample Characteristics

Table 1 presents descriptive statistics for the 286 participants. 44.1% of them were male; the average age was 51.4 years; 52.1% were married; 43.0% achieved junior high school education or below; 30.4% completed senior high school or equivalent technical school; and 26.6% had tertiary education. 58.7% of the sample were diagnosed with schizophrenia; 19.9% with bipolar disorder; and 21.3% with other SMDs. Most participants (83.6%) could take medication by themselves without being reminded. Participants reported mild functional difficulties in the past month. The average rating of economic conditions was between “almost the same with others” and “a little worse than others.” 48.3% of participants could independently use Health Kit.

### Community Participation: Descriptive Results

Table 2 shows descriptive statistics of participation variables. The average participation days for the sample was 60.8. The average number of items in which individuals participated



**Table 1** Sample characteristics (N = 286)

Variables	Mean/%	Range	SD
Married	52.1%		
Male	44.1%		
Age	51.4	22.0–81.0	11.4
Education			
Junior high school or less	43.0%		
Senior high school/equivalent technical school	30.4%		
Tertiary education or higher	26.6%		
Diagnosis			
Schizophrenia	58.7%		
Bipolar disorder	19.9%		
Others	21.3%		
Taking medication			
Do not or rarely need reminding	83.6%		
Often or always need reminding	8.4%		
Not taking medication	8.0%		
Functional difficulty (range = 6–30, none - extreme difficulty)	10.5	6.0–29.0	4.3
Economic adversity (range = 1–5, much better than others-much worse than others)	3.4	1.0–5.0	1.0
Social support	34.0	13.0–57.0	7.4
Self-esteem	28.1	13.0–40.0	4.8
Self-stigma	47.0	23.0–81.0	15.3
Usage of Health Kit (ref=No)	48.3%		

at least once was 6.5. The total participation days varied across activity types, the highest being in social activities ( $M = 34.3$ ), followed by productive activities ( $M = 17.5$ ) and leisure/recreation activities ( $M = 9.1$ ). Regarding productive activities, the largest average number of participation days was reported for caring for children or loved ones ( $M = 9.4$ ), while participation in paid jobs was much lower ( $M = 3.7$ ).

Regarding perceived participation sufficiency, 31.8% of the participants reported sufficient participation in all activity items, and 68.2% considered their participation as insufficient in at least one item. In each activity item, most participants reported sufficient participation (i.e., “enough” or “more than enough”). Meanwhile, the “not enough” responses accounted for 11–32% for each item. Approximately 30% of participants reported insufficient participation in “attending an event with family or friends,” “community activities organized by residential committee/street office or relevant organizations,” “social groups, community clubs/organizations or their activities,” and “going to a movie, theater, or other places of show/performance” during COVID-19 pandemic.

To test the validity of our participation scale, we examined the correlation between the three participation constructs

and measures of recovery and life satisfaction. Largely consistent with former research (Burns-Lynch et al., 2016; Whiteneck & Dijkers, 2009), our two objective measures of participation (i.e., the total participation days and the total participation items) were positively correlated with the recovery scale RAS ( $r = .233$ ,  $p < .01$ ;  $r = .215$ ,  $p < .01$ ). The Chi-square test revealed a significant association between our subjective measure of participation (i.e., perceived participation sufficiency) and the SWLS scale of life satisfaction ( $\chi^2 = 11.947$ ,  $p < .05$ ).

### Correlates of Participation: Multivariate Results

Multivariate analyses were conducted to investigate the role of social resources (social support), personal self-concepts (self-esteem and self-stigma), and usage of Health Kit in predicting community participation among the SMD individuals. Three dependent variables were the square rooted total number of participation days, the total number of participation items, and the perceived participation sufficiency. A series of four models were run for each of them. Model 1 included only diagnosis and functional conditions and demographic controls. Model 2 added the environmental factor of social support. Self-esteem and self-stigma were added into Model 3. Model 4 included usage of Health Kit.

Table 3 presents OLS regression results for the square root of total participation days. As shown in Model 1, education levels were positively associated with participation days when only functional and sociodemographic variables were controlled. After social support was entered in model 2, both senior high school education and higher levels of social support predicted more participation days. Among self-concept variables added in model 3, higher levels of self-esteem were associated with more participation days. The coefficient of self-stigma was not significant. Meanwhile, the effects of senior high school and social support remained significant. In model 4, when the usage of Health Kit was entered, senior high school, social support and self-esteem were still significant predictive factors. The usage of Health Kit demonstrated no significant association with participation days.

Table 4 shows the OLS regression results for the total participation items. Model 1 included the demographic and functional variables. Tertiary or higher education was linked to more participation items. Social support was entered in model 2. Higher levels of social support were associated with a greater variety of participation items. Model 3 indicated that self-esteem was positively correlated with the number of participation items, while self-stigma was not. Model 4 showed that independently using Health Kit predicted a greater variety of participation items. Meanwhile, the coefficient of social support remained significant.

**Table 2** Descriptive statistics of participation measures (N = 286)

	Total days of participation (M/SD): (60.8/49.7)		Total items of participation (M/SD): (6.5/3.8)		
	Mean	S.D.	Perceived sufficiency: low sufficiency 21.0%, moderate sufficiency 47.2%, full sufficiency 31.8%		
			Not enough	Enough	More than enough
Participation days in productive activities	17.5	20.6			
Work for pay	3.70	8.76	23.4	75.9	0.7
Go to school to earn a degree or certificate	0.26	2.58	16.1	83.2	0.7
Go to class for leisure or life skills or participate in other learning activities	3.16	7.13	25.2	73.8	1.0
Participate in volunteer activities	0.92	3.71	28.7	70.3	1.0
Care for children or a loved one	9.43	13.27	16.8	79.7	3.5
Participation days in social activities	34.3	30.6			
Get together in the community for talking or other activities	8.13	11.26	26.9	72.4	0.7
Attend an event with family or friends	2.59	5.87	32.2	66.4	1.4
Entertain family or friends at home or visit them	1.43	3.92	28.3	70.6	1.0
Participate in community activities organized by residential committee/street office or relevant organizations	1.32	2.68	30.4	68.2	1.4
Keep in touch with family by phone or internet	11.78	12.28	11.5	86.0	2.4
Keep in touch with friends by phone or internet	6.32	10.10	19.6	79.0	1.4
Go to parties, go out to lunch/dinner or other social activities	1.25	2.84	26.6	73.1	0.3
Participate in social groups, community clubs/organizations or their activities	1.49	4.32	30.4	69.2	0.3
Participation days in leisure/recreation activities	9.1	13.7			
Go to a restaurant/coffee shop/tea shop/beverage shop	1.45	3.77	25.9	72.7	1.4
Go to church/temple	0.55	3.35	22.0	76.6	1.4
Go to the movie/theaters/other places of show or performance	0.45	2.05	30.1	69.2	0.7
Go to a park/zoo/botanical garden/museum	2.50	5.90	29.7	68.5	1.7
Go to a library	0.23	1.24	25.5	74.1	0.3
Go to a gym/community playground for physical exercises	3.09	7.93	25.2	74.1	0.7
Go to a barber shop/beauty salon/nail salon/massage parlor	0.78	2.49	19.2	80.1	0.7

Furthermore, we noted that the coefficients of tertiary school and self-esteem became insignificant when the Health Kit usage was entered in Model 4. Prior research suggests that persons with higher self-esteem and higher SES are more likely to make problem-solving efforts when faced with stressors (Pearlin & Schooler, 1978; Thoits, 2006). Hence, we examined the interaction effects between Health Kit usage with education and self-esteem. The results (available upon request) showed that the effects of Health Kit usage on participation items were stronger among individuals with higher education. It suggested that people with higher education reaped more participation benefits from independently using Health Kit. The interaction between self-esteem and independent usage of Health Kit was not significant.

The predictive variables for perceived participation sufficiency depicted a different picture (Table 5). As shown in model 1, younger respondents, those with tertiary or higher education, and those having higher functional difficulty reported significantly lower levels of participation

sufficiency. Model 2 showed that higher levels of social support were associated with lower levels of perceived participation sufficiency. Model 3 indicated that stronger self-stigma predicted lower levels of perceived participation sufficiency. The independent usage of Health Kit, which was introduced into model 4, had no significant effects on respondents' evaluation of their participation sufficiency. When additional independent variables were added into the model step by step, the predictive strength of age and tertiary school remained significant, and the effect of functional difficulty became nonsignificant. Further, people diagnosed as having other mental illness demonstrated higher levels of sufficiency compared to those with schizophrenia.

## Discussion

This study examined the participation among community-dwelling adults with SMDs from both objective and subjective perspectives during COVID-19 pandemic. Consistent

**Table 3** OLS regression of total participation days (N = 286)

	Model1		Model 2		Model 3		Model 4	
	<i>b</i>	<i>se</i>	<i>b</i>	<i>se</i>	<i>b</i>	<i>se</i>	<i>b</i>	<i>se</i>
Constant	8.81***	1.37	0.13	1.77	-4.63	2.37	-4.75*	2.36
Age	-0.01	0.02	0.00	0.02	-0.01	0.02	0.00	0.02
Sex (ref= female)	-0.20	0.39	0.07	0.36	0.07	0.35	0.09	0.35
Marital status (ref=married)	-0.61	0.43	0.48	0.43	0.55	0.42	0.49	0.42
Education (ref= junior high school or less)								
Senior high school or equivalent technical school	1.13*	0.46	0.90*	0.43	0.98*	0.42	0.89*	0.42
Tertiary school or higher	1.22*	0.50	0.77	0.46	0.75	0.45	0.51	0.48
Diagnosis (ref= schizophrenia)								
Bipolar disorder	0.48	0.51	0.65	0.47	0.52	0.46	0.49	0.46
Others	0.51	0.55	0.53	0.50	0.66	0.50	0.60	0.50
Taking medication (ref= no need or occasionally need reminding)								
Often/always need reminding	-0.57	0.74	-0.56	0.68	-0.42	0.67	-0.30	0.67
Not taking medication	0.81	0.79	0.41	0.73	0.36	0.72	0.35	0.72
Functional difficulties	-0.10	0.05	-0.06	0.05	-0.02	0.05	-0.02	0.05
Self-rated economic adversity	-0.25	0.20	0.02	0.18	0.08	0.18	0.09	0.18
Social support			0.19***	0.03	0.18***	0.03	0.18***	0.03
Self-esteem					0.16**	0.05	0.15**	0.05
Self-stigma					0.01	0.01	0.01	0.01
Health kit usage (ref= no)							0.57	0.38
<i>R</i> <sup>2</sup>	0.09		0.22		0.26		0.27	
<i>Adjusted R</i> <sup>2</sup>	0.05		0.19		0.22		0.22	

\**p* < .05, \*\**p* < .01, \*\*\**p* < .001**Table 4** OLS regression of total participation items (N = 286)

	Model1		Model2		Model3		Model4	
	<i>b</i>	<i>se</i>	<i>b</i>	<i>se</i>	<i>b</i>	<i>se</i>	<i>b</i>	<i>se</i>
Constant	9.98***	1.57	-1.51	1.98	-5.18	2.68	-5.36*	2.67
Age	-0.04	0.02	-0.03	0.02	-0.03	0.02	-0.03	0.02
Sex (ref= female)	-0.48	0.45	-0.12	0.40	-0.12	0.40	-0.09	0.40
Marital status (ref=married)	-0.90	0.50	0.54	0.48	0.59	0.48	0.51	0.48
Education (ref= junior high school or less)								
Senior high school or equivalent technical school	1.01	0.53	0.71	0.48	0.77	0.48	0.64	0.48
Tertiary school or higher	1.89**	0.57	1.28*	0.51	1.28*	0.51	0.93	0.54
Diagnosis (ref= schizophrenia)								
Bipolar disorder	0.12	0.59	0.34	0.53	0.28	0.53	0.23	0.52
Others	0.37	0.63	0.38	0.56	0.45	0.56	0.36	0.56
Taking medication (ref= no need or occasionally need reminding)								
Often/always need reminding	-1.31	0.85	-1.30	0.76	-1.17	0.76	-0.99	0.76
Not taking medication	-0.21	0.91	-0.73	0.82	-0.73	0.82	-0.75	0.81
Functional difficulties	-0.08	0.06	-0.03	0.05	-0.02	0.06	-0.03	0.06
Self-rated economic adversity	-0.23	0.22	0.12	0.20	0.15	0.21	0.18	0.20
Social support			0.25***	0.03	0.25***	0.03	0.24***	0.03
Self-esteem					0.11*	0.05	0.10	0.05
Self-stigma					0.02	0.02	0.02	0.02
Health kit usage (ref= no)							0.87*	0.43
<i>R</i> <sup>2</sup>	0.11		0.29		0.30		0.31	
<i>Adjusted R</i> <sup>2</sup>	0.07		0.25		0.26		0.27	

\**p* < .05, \*\**p* < .01, \*\*\**p* < .001

with former research (Salzer et al., 2014), our study found that people with SMDs engaged in a wide range of activities at varying levels; the highest level of participation

was reported in social activities, followed by productive activities and leisure/recreational activities. Nevertheless, participation appeared relatively low in working for



**Table 5** Ordinal logistic regression of perceived participation sufficiency (N = 286)

	Model1		Model2		Model3		Model4	
	OR	95%CI	OR	95%CI	OR	95%CI	OR	95%CI
Threshold								
Low sufficiency	1.54	0.31–7.66	0.23	0.02–2.19	0.03*	0.00–0.68	0.03*	0.00–0.66
Moderate sufficiency	15.99**	3.10–82.51	2.42	0.25–23.41	0.32	0.01–7.37	0.31	0.01–7.16
Age	1.04**	1.02–1.07	1.04**	1.02–1.07	1.04**	1.02–1.07	1.04**	1.02–1.07
Sex (ref=female)	1.11	0.70–1.75	1.04	0.65–1.64	1.02	0.64–1.62	1.02	0.64–1.62
Marital status (ref=married)	0.82	0.49–1.36	0.64	0.37–1.10	0.62	0.36–1.08	0.63	0.36–1.09
Education (ref=junior high school or less)								
Senior high school or equivalent technical school	0.64	0.37–1.11	0.67	0.39–1.16	0.65	0.37–1.13	0.66	0.38–1.15
Tertiary school or higher	0.40**	0.22–0.72	0.43**	0.24–0.78	0.42**	0.23–0.77	0.44*	0.23–0.82
Diagnosis (ref=schizophrenia)								
Bipolar disorder	1.75	0.95–3.21	1.71	0.93–3.16	1.65	0.89–3.06	1.66	0.89–3.07
Others	1.86	0.98–3.56	1.88	0.98–3.59	1.98*	1.02–3.82	1.99*	1.03–3.86
Taking medication (ref=no need or occasionally need reminding)								
Often/always need reminding	1.54	0.65–3.67	1.57	0.66–3.76	1.45	0.60–3.49	1.42	0.59–3.44
Not taking medication	0.52	0.21–1.32	0.58	0.23–1.48	0.53	0.20–1.35	0.53	0.21–1.35
Functional difficulties	0.94*	0.89–1.00	0.93*	0.88–0.99	0.95	0.89–1.02	0.95	0.89–1.02
Self-rated economic adversity	1.19	0.95–1.50	1.14	0.90–1.44	1.14	0.90–1.45	1.14	0.90–1.45
Social support			0.96*	0.93–0.99	0.95**	0.92–0.99	0.95**	0.92–0.99
Self-esteem					0.97	0.91–1.02	0.97	0.91–1.03
Self-stigma					0.98*	0.96–1.00	0.98*	0.96–1.00
Health kit usage(ref=no)							0.91	0.55–1.50

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ 

pay or attending school, which are typically identified as important (Thomas et al., 2017). Furthermore, only 31.8% of participants evaluated their participation in all activities as sufficient. This indicated that infrequent participation is not necessarily due to lack of interest or motivation (Salzer et al., 2014). As mentioned earlier, the existing research on community participation of China's SMD population is extremely limited. We failed to identify studies that would allow a comparison between our findings with the pre-COVID-19 participation among this special population. Nevertheless, our survey asked participants whether their daily routines were influenced by the pandemic. About half of the participants reported "yes", while the other half indicated no or almost no influence.

Filling a major gap in the literature, we investigated the influential factors for social participation among Chinese adults with SMDs. Multivariate analyses showed that social support consistently predicted total participation days, total participation items, and perceived participation sufficiency. This added to existing evidence that support from family, friends, and community are important external resources for social participation and life quality of individuals with SMDs. We found higher social support was associated with more participation days and broader participation activities, but better self-evaluation of participation sufficiency was reported by those with lower social support. Distinct from actual participation, perceived participation sufficiency was

more influenced by personal expectations, aspirations, and comparison standards (Hansson, 2006). As suggested by the Motivational Theory of Life-Span Development (Heckhausen et al., 2010), when people fail to attain a goal due to personal or contextual constraints, they adjust their expectations and values to protect themselves from the undermining effects of failure. Thus, we may speculate that individuals with SMDs with limited social support may have low participation expectation, especially during COVID-19. Therefore, they may be more likely to report participation sufficiency than those with ample social support.

Consistent with previous research, our analyses supported the relationship between self-concepts and behavior outcomes among the SMD population. The results revealed that higher self-esteem was associated with more participation days. This indicates that self-esteem is an important internal factor that buffers stress, helps cope with challenges, and leads to better outcomes (Pearlin, 1989). Meanwhile, individuals with stronger self-stigma reported significantly lower subjective participation sufficiency. Higher internalized stigma usually implies higher perception of public devaluation/discrimination and higher perceived stigma-related rejection experiences (Hunter et al., 2017), which contribute to higher awareness of participation reduction due to mental illness.

This study's uniqueness is its novel examination of the linkage between the COVID-19 tracking app usage and

social participation among individuals with SMDs. We found that independently using Health Kit predicted more participation items but not more participation days. Those individuals who cannot independently use Health Kit need to either have a family member or friend check and show the health code for them, or prepare a proof letter, or fill in a hardcopy registration form when entering public places; some individuals may not be able to handle these requirements easily. Hence, they may avoid participating in certain activities in some public spaces. However, it is possible that they spent more days in activities that did not require Health Kit, and their total participation time did not drop much.

Moreover, we found that the positive effects of independent Health Kit usage on the total participation items were stronger among individuals with higher educational levels. This result is consistent with many findings in the digital inequality literature that people with different socioeconomic backgrounds are subject to divergent benefits and drawbacks resulted from unequal access to and differentiated use of digital technology (DiMaggio et al., 2004; Van Deursen et al., 2017). Those in higher socioeconomic status are usually advantaged in exploiting new technology, while the vulnerable groups tend to be further disadvantaged.

Regarding controlled variables of demographics and functional conditions, age was significantly associated with participation sufficiency, consistent with former research (Chang et al., 2016; Thomas et al., 2017). Older participants were more likely to perceive their participation as sufficient. A possible explanation is that younger individuals may have stronger desires to participate in social and community activities (Chang et al., 2016; Thomas et al., 2017). Education level predicted both objective participation days and subjective evaluation of sufficiency. People with higher education reported more participation days but lower levels of perceived participation sufficiency. Further, diagnosis of mental illness was related to subjective evaluation of participation sufficiency, implying that heterogeneity of the SMD population should be considered in service practice.

This study contributes to our understanding of the social and community participation among individuals with SMDs during COVID-19 pandemic, but it does have some noteworthy limitations. First, cautions are needed with generalizing the findings of the current study. The demographic profile of our participants was largely consistent with prior studies of SMD individuals in Beijing. For instance, about half were married; around half were females; the average age and the mode of age group both fell into the middle age range (Liu et al., 2020; Wang & Xie, 2018). As such, our results may be illustrative for the SMD population in Beijing. However, our sample was recruited in Beijing, the capital and one of the largest cities in China, and the findings cannot be generalized to smaller cities and rural areas.

Considering China's remarkable geographic variations, future research could explore the SMD population's participation and its predictive factors in different community settings (Chang et al., 2016; Townley et al., 2017). Second, our study was based on a cross-sectional survey and was conducted in a relative short period in Beijing when neighborhood lockdowns rarely happened. However, this situation is dynamic; the COVID-19 control measures, rules, and policies change frequently. Thus, longitudinal studies are needed to fully understand the participation of individuals with SMDs in the social context of COVID-19. Finally, China's practice and experience of COVID-19 is highly unique. Comparative work is needed to inform policy and practice targeting the SMD population in the pandemic era.

To conclude, this study makes a unique contribution by unravelling community participation of people with SMDs and its correlates in China during COVID-19 pandemic. We examined both the objective participation performance and the subjective sufficiency evaluation and found different predictive factors for them. The results supported the conceptual distinction of the objective and subjective participation measures (Whiteneck & Dijkers, 2009). Social support and self-concepts were found to be significantly associated with objective and/or subjective participation. The findings have important practical implications. Community mental health service providers must improve social support and self-esteem of people with SMDs to boost objective participation. Meanwhile, we must attend to their internalized stigma and take age- and education-related expectations into consideration to improve participation sufficiency. Policies and interventions that target specific forms of community participation, such as employment, education, and leisure/recreational activities, could be improved to meet individual's needs and improve perceived sufficiency (Brusilovskiy et al., 2020). Further, our results suggest that the pandemic control policy based on the mobile app did not affect people with SMDs equally. When adopting such new technology, more attention should be given to special population, especially those with less education. New technology has been increasingly integrated into community health and social care in China and many other countries, especially in a public health crisis like the COVID-19 pandemic (Liu et al., 2020; Shinn & Viron, 2020). The access and equity issues in technology-based services for people with SMDs need to be fully studied and addressed to generate an enduring impact on the participation and recovery of this population.

**Acknowledgement** Research reported in this paper was supported by Beijing Social Science Fund (19SRB004). The authors are grateful to all community mental health workers who assisted with the project and individuals who participated in the study. We also thank Dr. Winnie W. S. Mak for permitting the use of the Chinese version of the Recovery Assessment Scale.

**Funding** Research reported in this paper was supported by Beijing Social Science Fund (19SRB004) awarded to the first author Ying Li.

## Declarations

**Conflict of interest:** None.

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