



## Accessibility of mental health support in China and preferences on web-based services for mood disorders: A qualitative study

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### ABSTRACT

**Background:** The fast development of mobile technologies provides promising opportunities to fulfill the largely unmet needs of treatment and recovery for mood disorders in China. However, with limited research from China, the development of acceptable and usable web-based mental health services that are based on preference of patients from China still remains a challenge.

**Objective:** The aims of this paper were to (1) understand the experience of patients with mood disorders on current accessibility of mental health support in China; and (2) to get insights on patients' preferences on web-based mental health services, so as to provide suggestions for the future development of web-based mental health services for mood disorders in China.

**Methods:** Semi-structured interviews were conducted with 10 female participants diagnosed with depression and 7 with bipolar disorder (5 female and 2 male) via the audio chat function of WeChat. The interviews were 60–90 min long and were audio-recorded and transcribed verbatim. Thematic analysis was conducted using QSR NVivo 12 to identify and establish themes and sub-themes.

**Results:** Two major sections of results with a total of 5 themes were identified. The first section was participants' treatment and recovery experience, which included three main themes: (1) professional help seeking experience; (2) establishment of self-help strategies; and (3) complex experiences from various source of social support. The second section was focused on preferences for web-based services, which were divided into two themes: (1) preferred support and features, with three sub-themes: as channels to access professionals, as databases for self-help resources, and as sources of social support; and (2) preferred modality.

**Conclusions:** The access to mental health support for personal recovery of mood disorders in China was perceived by participants as not sufficient. Web-based mental health services that include professional, empathetic social support from real humans, and recovery-oriented, personalized self-help resources are promising to bridge the gap. The advantages of social media like WeChat were emphasized for patients in China. More user-centered research based on social, economic and cultural features are needed for the development of web-based mental health services in China.

### 1. Introduction

Mood disorders are common in China, with a lifetime prevalence of 7.4% (Huang et al., 2019). With the episodic nature of these disorders, the risk of relapse is high (Gitlin and Miklowitz, 2017; Hardeveld et al., 2013). Management of subthreshold symptoms by providing adjunctive

personalized psychological interventions appears vital to preventing disability and enhancing quality of life (Bonnín et al., 2012; Mizoue et al., 2015). However, despite the high prevalence, only one fifth of patients with mood disorders have ever been in contact with mental health-care providers in their lifetime (Patel et al., 2016). The reasons for the large, unmet mental health needs in China are abundant, and are often explained by the unbalanced allocation of resources between

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## Abbreviations

None.

major cities and rural areas, limited mental health workforce, especially the lack of professional social workers and psychological therapists (Liang et al., 2018). The lack of medical insurance support also contributed to the high threshold for psychological therapy (Zhang et al., 2017). In recent years, the 686 project, also called the Central Government Support for the Local Management and Treatment of Serious Mental Illness Project, has been benefiting many patients with severe mental diseases, especially schizophrenia, to receive more access to more convenient even free treatment and recovery service (Liang et al., 2018). To achieve better mental health at the population level, much more attention is needed to bridge the gap faced by patients with non-psychotic disorders.

With the development of mobile technology, the Internet has become a common way for patients to search for information, seek mental health resources, or obtain social support (Rahal et al., 2018). Using mobile platforms to provide mental health services has become a feasible way to bridge the gap. Currently, there are many types of web-based mental health services, such as provision of psychological education and self-management strategies based on cognitive behavioral therapy or mindfulness (O'Connor et al., 2018; Rathbone et al., 2017), active or passive symptom monitoring and feedback using smartphone sensors or wearable devices (Simblett et al., 2018), or real-time interaction via chatbots or conversational agents (Vaidyam et al., 2019). A number of reviews have demonstrated that web-based mental health services have the advantages in preventing mental illness, alleviating symptoms and improving quality of life, especially with human support (Ebert et al., 2018; O'Connor et al., 2018). Evidence showed that patients generally have high acceptance of mental health services provided on the Internet, but are prudent about their effectiveness (Apolinario-Hagen et al., 2017; Tan et al., 2020). In addition, there are several challenges worth concerning for future practice and implication, including low engagement, lack of evidence support, limited implication on significant clinical symptoms (Frank et al., 2018; Torous et al., 2018).

There are also numerous qualitative research studies that have demonstrated the importance of mobile technologies to facilitate the treatment and recovery of mood disorders. For instance, several studies have identified the role of mobile app use on helping with patients' social interconnectivity, skill acquisition, access and management of needs, and bridge the disconnection with health professionals (Fulford et al., 2019; Pung et al., 2018). Other studies have revealed factors that might influence the effectiveness or motivation of mobile mental health services usage, such as mental health awareness, appropriate content and medium, functionality, human support, reminders or incentives (Eccles et al., 2020; Simblett et al., 2018). Barriers can be divided into personal barriers, such as lack of time, high stress level, and barriers directly related to the program, such as complex content, functionality and privacy issues (Eccles et al., 2021; Ebert et al., 2018).

However, the vast majority of research on web-based mental health services were conducted in western counties (Lal and Adair, 2014), and there is still a gap in the literature, especially qualitative researches on the needs and preferences of people living in China. How to design more acceptable and usable web-based mental health services that are truly based on patients' needs and effectively promote mental health in China still remains a challenge. Given these gaps, along with the lack of service availability in China, the use of well-designed web-based mental health intervention as auxiliary means to expand the accessibility of existing mental health resources, rather than replacing the traditional face-to-face medical services (Ebert et al., 2018), could be particularly promising in China.

The purposes of this study are to: (1) understand the experience of patients with mood disorders regarding the current accessibility of mental health support, and (2) identify patients' preferences on web-based mental health services, so as to provide suggestions for the future development of web-based mental health services for mood disorders in China.

## 2. Methods

### 2.1. Study design

Single session semi-structured interviews were conducted with participants diagnosed with depression or bipolar disorder via remote audio chat function provided by WeChat. WeChat is one of the most commonly used social media platforms in China (Montag et al., 2018). Audio chat was selected over video conferencing due to the sensitivity of interview content, and belief that patients may feel more comfortable discussing personal stories and feelings in a more anonymous manner. Moreover, the study was conducted during the Coronavirus Disease 2019 (COVID-19) pandemic, which further required the interviews to be remote.

### 2.2. Recruitment

The criteria for recruitment are: (1) age > 18; (2) have a diagnosis of major depression disorder or bipolar disorder for at least 6 months; (3) not currently experiencing suicidal ideation or manic symptoms. Participants were drawn from a pool of individuals who once agreed to participate in a clinical trial and left their contact information for follow-up services. The above-mentioned clinical trials were two studies conducted by two researchers of this study (ZT and CW, who helped with the recruitment but not the interviews in this study), which both focused on the effectiveness of medication, one on major depression and the other on bipolar disorder, and the follow-up services did not include any form of systemic psychological therapy or counseling. The reasons for recruiting this group of patients were that they were likely to have more experience on the course of disease with reliable guidance on treatment, and regular remote communication with follow-up researchers during clinical trials may help provide more insights on web-based mental health services. Consequently, they may be able to provide more comprehensive and reliable perspectives than those who have never sought treatment or have little experience on professional guidance. Participants were recruited through sending text messages to the contact information they left when participating the previously participated clinical trials. 184 text messages were sent, and 17 patients responded, agreed, and qualified for the screening criteria. Since the other 167 individuals did not provide any response, the reasons for declining participation were unable to be acquired. This study has been approved by the ethics committee of the Second Xiangya Hospital of Central South University, and each participant was provided a compensation of 100 RMB (approximately 15 USD) as acknowledgment for their contribution after the interview.

### 2.3. Data collection

Participants completed an online informed consent and were then prompted to fill out a web-based questionnaire to collect demographic information, screen for recruitment criteria, and provide potential interview schedules. The interviews were conducted in Chinese and the duration was about 60 to 90 min. The interview included five main topics, which were (1) treatment and recovery experiences, including a brief review of the fluctuation of symptoms, the comment on professional help, such as medication or psychological therapy; (2) other sources of mental health information and development of self-management strategies, such as search engine, social media, books; (3) experiences with their social support networks, such as support from family members, friends, schools, workplaces or community; (4)

facilitators and obstacles they have faced during the treatment and recovery process; and (5) needs and preferences for web-based mental health services. See supplementary material for the semi-structured interview guide. Interviews were audio recorded with participants' consent for transcription and subsequent analysis. All files were stored in a secured location accessible only to the interviewer.

#### 2.4. Data analysis

Thematic analysis was conducted as two parts: the first part was on participants' experiences during treatment and recovery, the second part was on the preferences on web-based mental health support. Verbatim recordings were transcribed by an independent professional transcription service, and subsequently verified by YT. Researchers utilized a thematic analysis approach to identify and establish core themes and subthemes in accordance with Braun and Clarke's 6 steps of thematic analysis, including transcription and familiarization (YT and YQ), generation of initial codes (YT and YQ), establishment of themes (YT and YQ), review of themes (YT, YQ and JC), deciding the definition and names of meaningful themes (YT, YQ and JC), and lastly production of report (YT, EGL, YQ, HT and JC) (Braun and Clarke, 2006). The data analysis was conducted through QSR International's NVivo 12, which is a frequently used software to facilitate efficient and high-quality qualitative data analysis. It provided key functions such as various forms of coding, visualization, searching, and linking, and is recommended for Braun and Clarke's thematic analysis (QSR, 2021). Data collection stopped when the identified codes start to repeat with what had already been expressed, and could not provide additional meaningful values to the established themes (Ando et al., 2014; Guest et al., 2016). Transcripts and codes were read and discussed by two researchers regularly during the study. The Consolidated criteria for Reporting Qualitative Research (COREQ) checklist was used to guide the data reporting of this paper (Tong et al., 2007). See supplementary material for detailed report of themes and the COREQ checklist.

### 3. Results

As there were two aims of this study - to understanding treatment and recovery experience, and clarify the preference on web-based mental health service, the identified themes were also divided into two major sections. The first section was focused on the treatment and recovery experience and included three main themes: (1) professional help seeking experience, divided into two sub-themes: inadequate support from psychiatric hospitals, limited access to professional psychotherapy or counseling; (2) establishment of self-help strategies divided into two sub-themes: abundant but dubious self-help resources, critical but uneasy to establish self-management strategies; and (3) complex experience from various source of social support. The second section was focused on preferences on web-based services, which divided into two themes: (1) preferred support and features with three sub-themes: as a channel to access professionals, as a database for self-help resources, and as a source of social support; and (2) preferred modality. Below, the results are organized and labeled by the identified themes and sub-themes. See supplementary material for the detailed presentation of themes, sub-themes and codes. For ease of reference, codes are presented in *Italic font* throughout the results section.

#### 3.1. Participants' characteristics

A total of 10 patients once diagnosed with major depression (MDD) and 7 patients with bipolar disorder (BD) participated in this study (Table 1). Most participants (76.5%) were aged 18–25 years and female (88.2%). The history of treating and recovering for mood disorder is mostly above 2 years.

**Table 1**  
Participant characteristics.

	MDD	BD	Totals
Age			
18–25	7	6	13
26–30	2	0	2
31–40	1	1	2
> 41	0	0	0
Sex			
Male	0	2	2
Female	10	5	15
Education			
Elementary school and below	0	0	0
Junior high school	1	0	1
High school	0	1	1
Vocational school	1	2	3
Bachelor's degree	7	4	11
Postgraduate and above	1	0	1
Duration of disease			
0.5–1 year	1	1	2
1–2 years	1	1	2
2–5 years	4	3	7
> 5 years	4	2	6

#### 3.2. Treatment and recovery experience

##### 3.2.1. Professional help seeking experience

**3.2.1.1. Inadequate support from psychiatric hospitals.** Clinical services from hospitals or departments specialized in psychiatry were the main source of professional help for participants, and were generally considered *professional and helpful*. The effectiveness of medication was recognized by participants, and *persistence in taking medicine* was considered as one of the most important promoting factors for recovery, even though it can take a long time to adapt to the *side effects* and see symptom improvements. As emphasized by participant MDD-03: "...the effectiveness definitely outweighs the side effects... don't cut it just because of the discomfort. I think... it's important to persist, because it really helped a lot."

However, there was only very *limited time* for patients to communicate with doctors in psychiatric outpatient departments, especially in crowded provincial hospitals. Consequently, the treatments accessible from medical institutes typically *only target individual patients' symptoms*, and *only using medicine as the solution*, but there was a *lack of education* that was perceived as necessary by patients, such as education on causes of disease, potential side effects of medicine, and how to better recover.

As illustrated by one participant, "I was worried about being misdiagnosed... it just all happened so quickly... and the doctor wasn't able to give me a detailed explanation on the reasons that caused my situation. So I just have to accept the fact that I am sick in panic, start using the medicine in panic, and facing all the unknown side effects in panic.... They won't chat with you, won't listen to your various feelings... just adjust the doses very rationally, but lack of something psychologically." (BD-03) Here, we observe that BD-03 felt significant concerns about her diagnosis and treatment, and while she began taking the prescribed medication, she was worried and felt that she hadn't received appropriate information about her diagnosis or expectations for treatment.

**3.2.1.2. Limited access to professional psychotherapy or counseling.** More than half of participants shared experiences on psychotherapy, and few others tried to seek but were not able to accept one, either due to the *lack of access or arrangement issue*. Many participants inferred that taking medicine was more *convenient* than seeing psychological consultation regularly. As illustrated by participant MDD-02: "I just never got the appropriate chance to do it (seek psychotherapy). But I only need to take medicine before or after the meal, go to hospital like every two months whenever convenient. But I can't do that with psychotherapy."

With regard to different providers of psychotherapy or counseling services, *school counseling centers* (9 participants), *private psychotherapy institutes* (2 participants), and *web-based remote psychological counseling* (2 participants) were three major resources of psychotherapy reflected by participants. None of the participants received *psychotherapy provided in hospitals*. Like MDD-06 recalled the *lack of access*: “I don't think the hospital provides that (psychotherapy), or maybe I just didn't know how to find one.”

School counseling centers were usually the first step for students to “find some comfort” (BD-02), which provides *free* counseling, and provided *transfer advice* to more professional institutes. However, student participants reported complaints about *arrangement issues*, or *required to attend against will* as being “passively arranged to participate” (BD-02). Comments on the effectiveness ranged from *cognitive improvement*, *comforting*, to *limited effectiveness*, such as “cognitively enlightened” (BD03), “felt comfortable” (MDD-01), “didn't help with fundamental problems” (BD-01), to “not that professional” (MDD-02).

Psychotherapy provided by private institutes was in high demand but difficult to receive considering the *lack of access*, *arrangement issues*, and the *high expenses* of outpatient private psychotherapy, which was not covered by health insurance, as MDD-10 mentioned: “I wanted to find a professional psychotherapist, but I don't believe I can find one... and the fee is too expensive.” Perceived impact from two participants with some experiences from private psychotherapy institutes also varied. For instance, MDD-01 indicated the *comforting* feeling but *limited effectiveness*: “I don't think it worked... maybe helped me to think less for two days...it's actually felt pretty warm...”, while MDD-08 emphasized the *cognitive improvement* she achieved: “I might not have recovered so quickly without those therapists before, which helped me think through something.”

Only very few participants in the sample had experience with web-based psychological counseling, and those who did have experience emphasized that it was *convenient*, and provided some *companionship*. However, there were issues raised, such as the *questionable qualification* of the counselors and the perception of *limited effectiveness*. As BD-03 who received almost 2 years of intermittent web-based counseling explained: “I feel remote counseling is more convenient... but their quality varied, most of them are not professional... it's more like a kind of companionship, but no cognitive breakthrough... I don't think it's worth the money...”.

### 3.2.2. Self-help strategies

**3.2.2.1. Abundant but dubious self-help resources.** Participants reported that *the Internet search engine*, and *multimedia resources* like books or videos have been important ways to access self-help resources, which provided *abundant mental health information*, and *various peer cases for reference*. For instance, BD-02 acknowledged that “...(reading) is like, opened a window for me. You don't have to always lock yourself up in a house. Open the window and you will know there is a lot things that are more mature, more comprehensive... you can train yourself with target... like broaden horizon.” And BD-04 felt “It's like describing myself... A lot of things that were confounding before just got enlightened suddenly... It let me know that it's not just me.”

However, the information acquired from the Internet could be *misleading*, like MDD-08 described: “There are lots of news about depression... like someone will somewhat kill him/herself because of depression...it's just misleading... just really frightened me... it's better to have more authentic or professional scientific education.” Or *fragmented*: “There are lot of scattered information I occasionally encountered, but rarely read them systemically... did not leave much impression.” (MDD-04) The effectiveness was also limited, as BD-06 concluded on self-help resources she sought as *lack of practicality*: “It's easy to understand those principles at a conceptual level, but it is a different thing to really do it.”

Another participant reflected the opinions from the Internet were *prejudiced* and caused hurtful consequences. For instance, “On the Internet there are a lot of people with negative attitude that would dispute others, saying things really one-sided, and attacks other with language violence”. (MDD-07) Or “I once tried to share my own experience trying to get some understanding... but the first response I received was a dispute.” (BD-01).

A few participants reported experience with using *web-based self-help tools* for mental health, which included various kinds of mental health resources, such as meditation, psychological testing, mood recording. These tools were considered *potentially helpful*, but there were *complaints about them being not targeted* and the tools having a *lack of professional support*.

For example, a peer support group that BD-04 was attending on WeChat asked members to use a third-party check-in app “Daylio” to record daily mood and activities, and to report their screenshot to the group chat room everyday as a motivational mechanism. The app combined with the peer group was regarded as helpful, as it not only urged patients to record mood fluctuations but also provided peer support. However, BD-04 complained that: “I hope the recording could target more on bipolar... it would be better if there were some professionals to supervise or help in the peer support group.”

Another self-help app BD-04 once downloaded that included daily mood check-ins and meditation practices for bipolar disorders was considered not helpful because it is *difficult to take the initiative* to use by one's own: “I just put it aside in my phone and never really used it... when I am feeling good, I don't think I need it, when I am not feeling good, I don't think of using it.”

**3.2.2.2. Critical but uneasy to establish self-management strategies.** The establishment of personal behavioral or cognitive management skills in daily life had played critical roles when coping with mood fluctuation, as MDD-03 emphasized: “In the end, it all depends on yourself.”

However, there was only very *limited effectiveness*. Like MDD-05 recalled: “I tried a lot but basically all failed...meditation has no use, exercises like yoga also have very limited effectiveness for me... I usually listen to music, also kind of useless.”

*Behavioral strategies* such as *diverting attention* (e.g., listening to music, watching entertaining TV shows) were commonly mentioned self-help strategies, but only helped to *relieve the mood temporarily* for the moment, and “the excitement or sadness would still come back” (BD-06). Some participants emphasized the importance of *engaging in a healthy lifestyle*, and some were able to establish more *personal coping habits*. For instance, BD-05 noted that: “meandering around the street with my camera while listening to music helped me think through things whenever feeling down.”

In addition, intentionally engaging in *cognitive strategies* were also vital for many participants, including *establishment of hope or confidence*: “Confidence is the most important one (facilitator) ... you have to be confident about yourself, knowing that this is all temporary, don't be restricted by the disease.” (MDD-03). Trying to *analyze and solve the stressor* also provided them with the ability to generate solutions to their current situations. Like MDD-07 recalled: “I like to explore the reasons. I will keep thinking what caused me like this, so that I can find how to solve it.” BD-03 also emphasized the importance of *real acceptance*, and *thinking objectively* helped her to relieve the sadness more efficiently: “Just accept all these things, make yourself a more big-hearted person to face these things... and when I am trying to be more rational, the hard feeling will disappear a lot.”

MDD-05 also emphasized the *difficulty to establish* self-help strategies by one's own, when she's trying to get better but felt helpless: “People dealing with depression really need behavioral support from close ones... I know what is the right thing to do. I just can't do it.” As highlighted in the next section, social support was noted as playing a key role in the recovery from or maintenance of mental health symptoms.



### 3.2.3. Complex experience from various source of social support

In general, with the development of socioeconomic condition and education level, the *improvement of social awareness* was recognized by some participants, but a sense of *stigma and prejudice* from the whole social environment were still commonly experienced, which caused even more stress. For instance, MDD-02 noted that: "...they just act like they didn't see it at all, even though you have the idea to giving up or suicide, they will still think that you just lack the ability to deal with stress... but with more and more people getting higher education, it might gradually get better."

As mentioned before, the feelings of being *helpless and isolated* "like staying in a lonely island" (MDD-02), "don't know anyone that can talk to or able to help" (MDD-08) were common feelings during the journey of recovery. Except for the lack of support, those who were able access to some sort of social support could also experience quite complicated feelings. In terms of specific source of social support, *family, friends, school staff, peer patients and follow-up researchers* all played important roles which exert both positive and negative influences on recovery.

*Companionship and support* from family or friends, and actively taking part in interpersonal activities to avoid self-isolation were critical facilitators to recovery for many participants. But family or friends could also be a *source of stress* due to lack of awareness on the disease, interpersonal conflicts, or poor parenting. MDD-01 reflected: "Maybe they didn't mean it (to hurt me), maybe just don't know (the nature of disease) ... They just think you are being dramatic." MDD-02 also concluded that: "You not only didn't get any help, but felt more stress because of them."

Some participants acknowledged the *attention and support from school staff*. MDD-03 emphasized that: "My tutor kept check in with me... if not for the tutor, I will hold it (an unpleasant conflict with friend) for a long time... I just can't control it at that time." However, some other participants complained about receiving *insufficient of support*, such as "did not have psychological counseling at all (BD-04)", "didn't pay attention to students' mental health, but only their test grades (MDD-09)", or "arbitrarily asked me to get a suspension procedure done (MDD-04)".

When queried about the role of workplace or community, none of the participants indicated that these settings were parts of their social support network for recovery, but rather *worried about misunderstanding*. "I am worried that they will question my ability, won't give me the work chance." (BD-02).

Participants reflect that in-person or web-based peer-to-peer interactions can also be precious opportunities to *mitigate loneliness*, and *build a sense of hope* by sharing experience. While these online peer-to-peer interactions could be very positive, they could also *trigger concerns about illness progression and personal safety* when participants were faced with graphic images of self-harm on social media. BD-01 recalled: "I was so frightened by those photos of cut waists... makes me imagine I might become like that too."

Additionally, 9 participants specifically identified the help from follow-up staff of scientific research studies in which they participated as an important promoting factor for recovery. By participating in clinical research studies, participants were able to keep in contact with a professional, "*receive reminders for follow-up visits*" (MDD-05), get access to "*reliable mental health knowledge*" (BD-05) by asking questions or reading posts of researchers on WeChat, or *get help in crisis situation* when having suicidal ideation. The remote *companionship* from follow-up research staff were recognized as having fostered recovery, as MDD-01 emphasized "It's really helpful having a person supervise you, accompanies you... I think the help I got from the follow-up staff is no less than the doctor."

### 3.3. Preference on web-based services

After participants shared their experiences with receiving professional mental health support, establishing self-help strategies, and engaging with their social support networks, they were prompted to share ideas and preferences on potential web-based mental health

services.

#### 3.3.1. Preferred support and features

In accordance with participants' past experiences, the preference on support from web-based mental health service was identified as containing three aspects: professional guidance, self-help resources, and social support. Fig. 1 described the relationship between participants experience and preferred support from web-based services, which indicated the potential ability of web-based services to satisfy the unmet needs for the recovery of mood disorder.

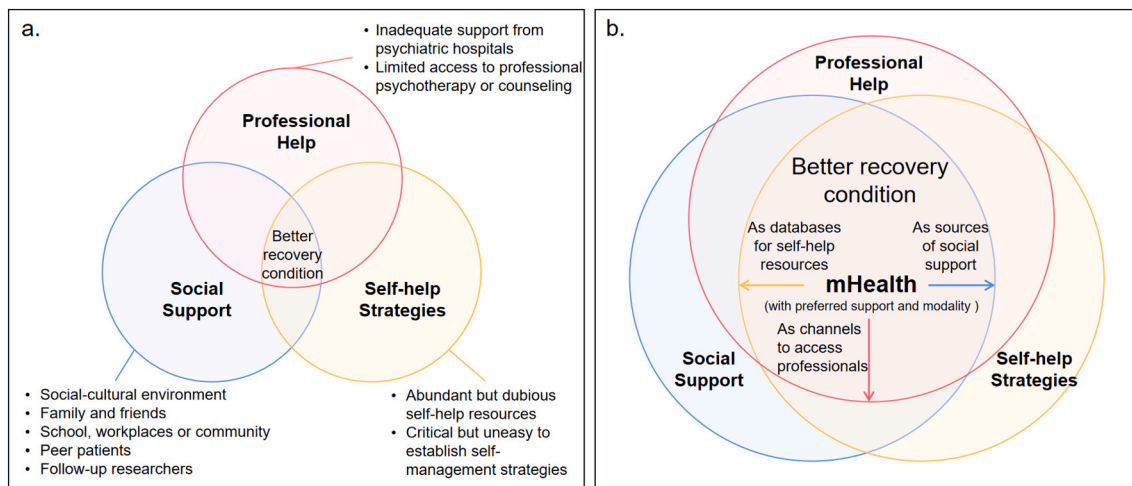
**3.3.1.1. As channels to access professionals.** Receiving *professional advice on personal questions* regarding disease or medicine was regarded as quite important to participants. This could be remote communication that was similar to follow-up visits, like BD-05 explained: "I hope there could be doctors that I can access online and pay directly... Not only for follow-up visits, but as a personal doctor that I can ask any question I have got." MDD-08, who suffered from multiple somatic symptoms and side effects during recovery, also emphasized the perceived value of more *timely and fluent communication channels* between doctor and patients: "... such as an app that helps manage medical record, monitor side effects, and can generate reports to doctors during revisits... so that doctors could have a more well-founded knowledge base to facilitate the treatment."

**3.3.1.2. As databases for self-help resources.** Participants also identified a desire for *collections of educational materials* such as "lectures delivered by famous professors" (MDD-06), or "articles on basic knowledge of bipolar" (BD-01). MDD-10 recalled her resistance to taking medicines at first, and emphasized that "more clarification on how the medicine works, and the pros and cons can help people better accept it". In addition, it was also considered helpful to provide *collections of accessible mental health service resources* such as information of professional institutes and available doctors, crisis intervention hotlines, and insurance policies.

*Recommendations on self-management strategies* for recovery were also commonly needed, which were similar to those promotion factors that were regarded important for recovery from participants' personal experience, such as mood management, problem solving, interpersonal relationships, and cognitive improvement on self-esteem. For example, BD-02 noted that "I would love to learn some knowledge... maybe I can't control other aspects, but on self-adjustment skills... I think if someone could provide some guidance on it would be pretty good." MDD-05 also advised: "...could be like a training coach... to comprehensively improve the ability to live a life, including the ability to control your mood...".

*Personalization* was a commonly requested feature that should be prioritized for web-based mental health services. The above-mentioned human support and knowledge delivery requests should be based on personalized strategies considering individual differences and preference, rather than "too many theoretical empty gestures that would make patients feel not being understood" (MDD-07), or "turn out to be burdensome tasks that have to be completed" (BD-02). However, this was also acknowledged as a dilemma considering the "massive need from patients and scarce doctors" (BD-06) in China. Other requirements or preference on educational material includes *practical, interesting, systemic and cover various topics*.

*Reminders for medication* was viewed as somewhat controversial by participants. Some participants recalled the difficulty to remember taking medicine every day and believed a reminder helpful, but others thought this can be easily remembered, or can be solved by a simple alarm in the phone or an intelligent pill box. On the other hand, intrinsic motivation was more important in terms of medication, like MDD-08 explained: "If someone just doesn't want to take medicine, any reminder is useless". Thus, reminders alone are unlikely to solve



**Fig. 1.** Visualization of themes and subthemes from participants' experience (a.) and potential of web-based mental health services (b.). Notes: the arrows on the right image represent how mobile technologies might help expand the access to three domains of mental health support, as well as the overlapped area of better recovery condition.

problems with medication adherence.

*Recording mood fluctuations* is usually recommended by professionals for patients with mood disorders, especially for bipolar disorder. Many participants recognized the importance of recording their mood and reflecting on it, along with receiving professional feedback or help in time according to the fluctuation. However, some participants like BD-02 believed that "Mood is complicated, it is a struggle to contemplate and decide whether I was happy or not", and MDD-04 emphasized "It would be frustrating to keep recalling those bad feelings." In comparison, recording achievement or "actual things to make life more fulfilling" (BD-02) instead of focusing on one's presumed mood might be more acceptable.

**3.3.1.3. As sources of social support.** When asked specifically about ideas for designing web-based mental health services, the most mentioned need was the *companionship and empathy from human support*, which can be the communication with a professional or merely a reliable listener. Several participants emphasized the difficulty to access crisis intervention hotline and the eager for companionship, for example, MDD-09 noted: "A convenient online channel like customer service that provides emergency intervention... or just chat regularly like friends would be good, as long as it could provide something relevant and trustworthy."

*Interaction with real human beings* rather than robots was commonly emphasized, considering that robots "have no soul" (BD-06), "are not intelligent enough" (MDD-10) and messaging with them "feels weird" (BD-05). *Experienced and trustworthy* were two mainly identified requirements for the human supporters. However, with regard to limited professional human resources, one participant (BD-01) noted that "using automatic replies like customer service of shopping apps could be acceptable... when searching for basic facts like side effects of a medicine."

*Web-based peer support* communities or forums for patients or family members were also mentioned by most participants but often with some hesitance. Participants recognized the potential helpfulness from peers such as mutual understanding and reference on others' useful experience. However, as noted above in the section on participants' experiences with peer-to-peer interactions, most participants were concerned about potential negative emotional impacts from unstable patients, and believed more professional guidance and supervision or content moderation in those web-based communities were highly necessary.

### 3.3.2. Preferred modality

Participants were also asked about preferred platforms for receiving mental health services. Compared to apps that are specially designed to provide web-based mental health services, the *convenience of social media like WeChat* were emphasized by most participants, like BD-04 explained: "Phone calls and text messages are not commonly used any more. Apps need to be downloaded separately. WeChat feels closer."

WeChat is one of the most popular social media platforms in China with 1.2 billion monthly active users. It is not only a convenient interpersonal communication platform, but also supports mini programs that function like apps with no need to download, as well as public accounts subscriptions that allow access to various kinds of information and knowledge (Tencent, 2020). The popularity of WeChat could help service providers efficiently access to target audiences, and "easily enable customers to find and use with already established habits" (MDD-02). In contrast, downloading a new app would cause extra cognitive burden, and notification functions of apps can be easily turned off. Consequently, as the example MDD-05 took, "the reminders for medication would be buried in the sea of various other notifications". Using WeChat to deliver mental health services appears to meet people where they are already spending much of their online lives.

However, a few participants also mentioned that apps have the advantages as being more specialized, professional and formal, while communication with professionals on WeChat, may seem like communicating with friends, and be perceived to be "too casual" (MDD-10), and MDD-04 personally preferred more distance to "avoid too much attachment". In addition, MDD-09, who had some experience on remote service design, pointed out that "mini programs on WeChat are more convenient, which is a current trend, but apps are also necessary and more appropriate for fixed users in the long run."

With regard to communication forms with human support, some participants preferred text-based communication with professionals, while some preferred synchronous audio or video chat. When asked about ways to receive educational materials, participants noted that it could be provided by *subscriptions with regular pushes* to users, or be provided as *searchable databases* that can be looked up whenever needed. Allowance of *optional media and communication forms* for interaction or learning were highlighted, since "patients in different recovery phases might have different needs" (MDD-01), and "the right to choose should be left to patients" (MDD-03).

## 4. Discussion

This study generated insights into experiences of patients with mood disorders on current accessibility of mental health support in China; and on patients' preferences on web-based mental health services, so as to provide suggestions for the future development of web-based mental health services for mood disorders in China. Below, we expand on the unmet needs for personal recovery and explore design considerations for web-based mental health services.

### 4.1. Unmet needs for personal recovery

Through comparing the positive and negative experience from participants' treatment and recovery experience, the unmet needs for personal recovery were revealed during the journey of recovery from mood disorders among patients from China.

Recovery of mental disorders includes clinical recovery and personal recovery (Richardson and Barkham, 2020). Clinical recovery emphasizes the decrease of symptoms and improvements in quality of life and function. With the development of biomedical sciences, the efficacy of pharmacological therapies for clinical recovery is widely established and readily available in health care systems. Participants from this study also recognized the persistence with medicine as one of the most important positive factors of recovery.

In comparison, the definition of personal recovery highlights the positive change of attitudes, values, emotions, goals, skills and/or roles, which contains multiple elements including social support, optimism, hope, self-identity, meaning, empowerment (Leamy et al., 2011). Participants in this study inferred these aspects as critical facilitators to recovery, after doing the work to integrate these elements as their own behavioral or cognitive self-management strategies.

However, clinical recovery is generally prioritized by professionals, while patients emphasize more on personal recovery (Demyttenaere et al., 2015; Richardson and Barkham, 2020). The results of this study also reflected the prioritization of medication from mental health institutes which emphasized clinical recovery, and reflected a lack of more personalized, effective psychological education or support for personal recovery.

Even though the abundant information and remote peer support accessible from the Internet could play complementary roles, it was still difficult for patients to obtain practical help to establish effective self-management strategies, or receive timely intervention from professionals (Chen et al., 2020). Social support was also deemed to be highly influential but sometimes detrimental due to systematic discrimination and lack of awareness on mental illness in China. These above-mentioned unmet needs all restricted the possibility to realize a full personal recovery within the social-cultural environment of China.

The lack of accessible help calls for more efficient mental health services in Chinese healthcare system, especially services provided outside hospitals like primary care in community. In comparison, collaborative care is increasingly applied in the management and recovery of mental illness in primary health care systems in western countries, including case management based on multidisciplinary cooperation, regular follow-up and enhanced professional communication (Gunn et al., 2006). Many research studies have demonstrated its effectiveness on clinical recovery and personal recovery by increasing acute phase response and preventing relapse (Camacho et al., 2018; Gunn et al., 2006; Moriarty et al., 2020).

However, a recent review included only one collaborative care service for the elderly with depression in China, which has proved to be effective (Moriarty et al., 2020). Participants' lack of experience with community health care resources in this study also reflected the lack of recovery services from primary care system in China. Although community level management of severe mental illness has made great progress in recent years (Ma, 2012), there is still an obvious lack of systematic psychosocial services for mental health disorders with higher

prevalence and requirements for more personal recovery, such as mood disorders (Chen et al., 2018; Huang et al., 2019).

Collaborative care might provide a valuable reference for the future development of better mental health service, in order to facilitate the connection with professionals, provide more practical educational resources, and more empathetic social support. The acknowledge of support from follow-up researchers in this study, which to some extent was similar to collaborative care, also indicated its potential to help patients in China. Further exploration is needed for the cross-cultural application and local adaptation of this kind of services.

In summary, the in-depth divergent attitudes towards recovery between physicians and patients, coupled with the lack of health care resources in disease management and psychotherapy, may have jointly led to the apparent unmet needs for recovery in China, including the need for psychological education, psychotherapy and social support, even though timely and effective pharmacotherapy were more accessible. Much effort is required to bridge the gap between the systematic lack of resources, and the largely unmet needs for personal recovery of mood disorder.

### 4.2. Design considerations for web-based mental health services

Mobile technologies provide important opportunities for the treatment and recovery of mental health issues by improving the coverage and accessibility of mental health services beyond the limitation of space and time (Wang et al., 2018). Web-based mental health services are promising in bridging the gap of mental recovery in low- and middle-income countries. However, most current existing studies on web-based mental health are from English speaking countries (Martínez et al., 2018). The development of web-based mental health services that meet the needs and preferences of patients from China still await exploration. Based on participants' unmet needs during their recovery from mood disorder, this study acquired more understanding on the preference of web-based mental health services from Chinese population. Below are the design recommendations for the development of web-based mental health services for mood disorders in China.

Firstly, human support should be included as one of the most important elements. Smooth access to professional guidance, and receiving companionship and empathy from real human were identified as two most preferred support strategies to integrate with web-based services. Communication with professionals can provide reliable and trustworthy social support, while avoids negative impact from unprofessional peer patients or passive anonymous interactions from the Internet. These needs also corresponds to the limited access crisis intervention, social support and the feeling of helplessness from participants' past experience.

Previous studies demonstrated that although self-help interventions have some positive effect, it is more effective to combine support from trained professionals (Barak et al., 2009; Scholten et al., 2017). In this study, various support from research staff played important roles for recovery. The receipt of personalized medical explanations, professional mental health knowledge and occasional emotional support in addition to receiving medication appeared to function similarly to the role of care manager or coach in previous studies that included human support (Mohr et al., 2011; Moriarty et al., 2020). This indicates that human support is a key aspect of web-based mental health services for patients in China, but the standardization, training, and cultural adaptation of such a role still needs further research.

Chatbots or conversational agents are technologies that mimic human communication behavior using artificial intelligence methods, which has been continuously developing in the domain of web-based mental health services (Vaidyam et al., 2019). However, in this study, all participants explicitly indicated the unwillingness to use robots as emotional support, except for asking simple questions that can be automatically answered like customer service on shopping websites. Compared to former research (Vaidyam et al., 2019) that demonstrated



high satisfaction and beneficial potentials in psychoeducation and self-adherence, participants from this study were more concerned about the incapability of robots to actually empathy and understand the subtleties of communication. Consequently, chatbots seem to be difficult to provide the empathy and companionship that are urgently needed by participants. This may also be due to the lack of mature conversational agents-based products for mental health at present in China, let alone the experience of using one. Therefore, the acceptability and application of chatbots for patients with mood disorders still requires further exploration in China.

Peer support is also a form of human support that has been widely adopted for the recovery of mental illnesses, which might also help improve the engagement of web-based mental health services (Biagianni et al., 2018; Torous et al., 2018). Participants in this study believed that the share of experience and mutual understanding from peer patients would indeed be beneficial, but they were also concerned about the impact of negative emotions from unstable patients. This may be due to the limited access, and lack of experience from professional guided peer support organizations among participants. Acceptable forms of peer support provided through web-based mental health services still need further research on Chinese population.

Secondly, the provision of recovery-oriented individualized content is critical for patients with mood disorders. Even though symptom tracking provides important data for clinical recovery of mood disorders, the continuous reminders of being sick are not commonly desired or perceived as helpful (Ancker et al., 2015). In comparison, users tend to seek more individualized emotional support and help on more immediate, real life problems, rather than focus on the fluctuation of symptoms (Alva et al., 2015). Indeed, personal recovery involves improvement of many aspects in real life, including supportive interpersonal relationships, a better sense of personal identity, and positive life attitudes such as optimism and hope (Leamy et al., 2011). Participants from this study also emphasized similar behavioral and cognitive factors that have stimulated their recovery, which closely relate to personal real-life problems and personal preference. Considering the variety of personal recovery goals and previous knowledge, web-based mental health interventions that target various aspects of personal recovery and help solve real life issues may be more conducive to the continuous participation and benefit (Torous et al., 2018). Therefore, allowing customizable intervention based on personal recovery needs is another critical design element.

Thirdly, when looking at web-based mental health tools for specific population, more attention should be paid to social media and cultural differences. At present, most web-based mental health tools that are available around the world are provided via specially designed apps, text messaging or teleconference platforms (Hilty et al., 2018). The advantages of WeChat as a delivery platform from this study informed service providers to pay more attention to social, economic and cultural differences when developing services in different countries or populations. Another quantitative survey on the potential of mobile mental health service also supported this preference for social media (Tan et al., 2020).

As one of the mainstream social media platforms in China, WeChat is widely used for interpersonal communication, information acquisition and various public services (Shen et al., 2019; Wang and Liu, 2016; Zhang and Jung, 2019). Compared with new apps which will increase the cognitive burden, social media possess the advantage of reaching large number of target users quickly, and users will be more likely to use new services based on their existing habits. However, there are also limitations such as the reliance on existing functions of the third-party company, and the sense of being too casual or not professional enough. Therefore, if service providers want to design web-based mental health services via social media, it is important to balance user preference and feasibility of designs on a third-party platform. The improvement of credibility by cooperating with trustworthy institutions, and provision of professional knowledge from reliable sources are also

critical considerations when providing service on platforms like social media.

#### 4.3. Limitations

This study is not without limitations. First, the sample size is relatively small, and most of the participants are young females. While young females may be a large target population for web-based mental health services, it is unclear how well their preferences are transferable to males and to older segments of the population. Second, participants were recruited from a sample who had previously engaged in scientific research. This sampling was deliberate, as the recruited participants were likely to have experience with treatment, and have experience with communicating remotely with researchers, which could help provide more insights on web-based mental health services. However, their past experience in mental health research studies likely indicated a relatively stronger desire to seek help or more motivation for change relative to the general population. It is difficult to infer the experience and needs of populations with less motivation, limited access to professional help or other demographic characteristics. In addition, participants of this study were recruited from the psychiatry department of a large teaching hospital in a medium-sized city, so their ideas and experiences may not be transferable to those of individuals in more rural areas, or individuals served by community level health institutes. However, considering that the current imperfect hierarchical health system in China, large hospitals still are the preferred choices for professional treatment. Thus, this study can still, to a large extent, reflect the status quo of mental health services in China. Finally, the role of the researchers as mental health providers from professional institutes, with the pre-existing intention to reveal the insufficiency of current resources and explore the application of web-based mental health technologies, might have influenced the data analysis. As suggested by previous studies, we tried to minimize the interviewer characteristic by using an experienced interviewer with similar age and ethnic origin as the participants, and who demonstrated agreeable, open attitudes throughout the interviews (Lavrakas, 2008).

#### 5. Conclusions

To date, there has been minimal research on the needs and preferences of web-based mental health services among Chinese population. This study aimed to provide insights and suggestions on the development of web-based mental health services for mood disorder in China based on patients' personal treatment and recovery experience. Although psychotropic medication played important roles in treatment and recovery, the results revealed that services like psychological counseling and personalized education on recovery are still lacking. Patients reported needing to go through an arduous process of exploration by themselves in order to achieve personal recovery. The preference on web-based mental health services emphasized the importance of support from real humans, and personalized psychological knowledge focused on real life problems. In addition, harnessing commonly used social media platforms like WeChat may be more advantageous among the Chinese population. To fulfill the largely unmet mental health needs in China, additional research that integrates the social, economic and cultural factors of the Chinese healthcare system is needed.

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## CRedit authorship contribution statement

YT drafted the manuscript and analyzed the data. EL helped with the study design and revised the manuscript. YQ, ZT and CW helped with recruitment and data analysis. HT helped with the study design. JC supervised and assisted with the entire process.

## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.invent.2021.100475>.

## References

- Alva, F.E.M.de, Wadley, G., Lederman, R., 2015. "It feels different from real life": users' opinions of mobile applications for mental health. In: The Annual Meeting of the Australian Special Interest Group for Computer Human Interaction, pp. 598–602. <https://doi.org/10.1145/2838739.2838806>.
- Ancker, J.S., Witteman, H.O., Hafeez, B., Provencher, T., de Graaf, M.V., Wei, E., 2015. "You get reminded you're a sick person": personal data tracking and patients with multiple chronic conditions. *J. Med. Internet Res.* 17, e202 <https://doi.org/10.2196/jmir.4209>.
- Ando, H., Cousins, R., Young, C., 2014. Achieving saturation in thematic analysis: development and refinement of a codebook1,2,3. *Compr Psychol.* 3 <https://doi.org/10.2466/03.cp.3.4.03.CP.3.4>.
- Apolinario-Hagen, J., Kemper, J., Stuermer, C., 2017. Public acceptability of e-mental health treatment services for psychological problems: a scoping review. *JMIR Mental Health* 4 (2), e10. <https://doi.org/10.2196/mental.6186>.
- Barak, A., Klein, B., Proudfoot, J.G., 2009. Defining internet-supported therapeutic interventions. *Ann. Behav. Med.* 38, 4–17. <https://doi.org/10.1007/s12160-009-9130-7>.
- Biagianni, B., Qurashi, S.H., Schlosser, D.A., 2018. Potential benefits of incorporating peer-to-peer interactions into digital interventions for psychotic disorders: a systematic review. *Psychiatr. Serv.* 69, 377–388. <https://doi.org/10.1176/appi.ps.201700283>.
- Bonnin, C.M., Sánchez-Moreno, J., Martínez-Arán, A., Solé, B., Reinares, M., Rosa, A.R., Goikolea, J.M., Benabarre, A., Ayuso-Mateos, J.L., Ferrer, M., Vieta, E., Torrent, C., 2012. Subthreshold symptoms in bipolar disorder: impact on neurocognition, quality of life and disability. *J. Affect. Disord.* 136, 650–659. <https://doi.org/10.1016/j.jad.2011.10.012>.
- Braun, V., Clarke, V., 2006. Using thematic analysis in psychology. *Qual. Res. Psychol.* 3, 77–101. <https://doi.org/10.1191/1478088706qp0630a>.
- Camacho, E.M., Davies, L.M., Hann, M., Small, N., Bower, P., Chew-Graham, C., Baguey, C., Gask, L., Dickens, C.M., Lovell, K., Waheed, W., Gibbons, C.J., Coventry, P., 2018. Long-term clinical and cost-effectiveness of collaborative care (versus usual care) for people with mental-physical multimorbidity: cluster-randomised trial. *Br. J. Psychiatry* 213, 456–463. <https://doi.org/10.1192/bjp.2018.70>.
- Chen, S., Conwell, Y., Cerulli, C., Xue, J., Chiu, H.F.K., 2018. Primary care physicians' perceived barriers on the management of depression in China primary care settings. *Asian J. Psychiatr.* 36, 54–59. <https://doi.org/10.1016/j.ajp.2018.06.019>.
- Chen, M., Li, M., Wan, J., Zhou, S., 2020. Suicide intervention in China [WWW document]. URL: [https://www.thepaper.cn/newsDetail\\_forward\\_5580154](https://www.thepaper.cn/newsDetail_forward_5580154) (accessed 10.20.21).
- Demyttenaere, K., Donneau, A.-F., Albert, A., Anseau, M., Constant, E., van Heeringen, K., 2015. What is important in being cured from depression? Discordance between physicians and patients (1). *J. Affect. Disord.* 174, 390–396. <https://doi.org/10.1016/j.jad.2014.12.004>.
- Ebert, D.D., Daele, T.V., Nordgreen, T., Karekla, M., Compare, A., Zarbo, C., Brugnera, A., Overland, S., Trebbi, G., Jensen, K.L., Kaehlke, F., Baumeister, H., Taskforce, E.E.H., 2018. Internet- and Mobile-based psychological interventions: applications, efficacy, and potential for improving mental health a report of the EFPA E-health taskforce. *Eur. Psychol.* 23, 167–187. <https://doi.org/10.1027/1016-9040/a000318>.
- Eccles, H., Nannarone, M., Lashewicz, B., Attridge, M., Marchand, A., Aiken, A., Ho, K., Wang, J., 2020. Perceived effectiveness and motivations for the use of web-based mental health programs: qualitative study. *J. Med. Internet Res.* 22, e16961 <https://doi.org/10.2196/16961>.
- Eccles, H., Nannarone, M., Lashewicz, B., Attridge, M., Marchand, A., Aiken, A., Ho, K., Wang, J., 2021. Barriers to the use of web-based mental health programs for preventing depression: qualitative study. *JMIR Form. Res.* 5, e16949 <https://doi.org/10.2196/16949>.
- Frank, E., Pong, J., Asher, Y., Soares, C.N., 2018. Smart phone technologies and ecological momentary data: is this the way forward on depression management and research? *Curr. Opin. Psychiatry* 31, 3–6. <https://doi.org/10.1097/ycp.0000000000000382>.
- Fulford, H., McSwiggan, L., Kroll, T., MacGillivray, S., 2019. Exploring the use of mobile information and communication technologies by people with mood disorders. *Int. J. Ment. Health Nurs.* 28, 1268–1277. <https://doi.org/10.1111/inm.12632>.
- Gitlin, M.J., Miklowitz, D.J., 2017. The difficult lives of individuals with bipolar disorder: a review of functional outcomes and their implications for treatment. *J. Affect. Disord.* 209, 147–154. <https://doi.org/10.1016/j.jad.2016.11.021>.
- Guest, G., Bunce, A., Johnson, L., 2016. How many interviews are enough? *Field Methods* 18, 59–82. <https://doi.org/10.1177/1525822x05279903>.
- Gunn, J., Diggins, J., Hegarty, K., Blashki, G., 2006. A systematic review of complex system interventions designed to increase recovery from depression in primary care. *BMC Health Serv. Res.* 6, 88. <https://doi.org/10.1186/1472-6963-6-88>.
- Hardeveld, F., Spijker, J., Graaf, R.D., Hendriks, S.M., Licht, C.M.M., Nolen, W.A., Penninx, B.W.J.H., Beekman, A.T.F., 2013. Recurrence of major depressive disorder across different treatment settings results from the NESDA study. *J. Affect. Disord.* 147, 225–231. <https://doi.org/10.1016/j.jad.2012.11.008>.
- Hilty, D.M., Sunderji, N., Suo, S., Chan, S., McCarro, R.M., 2018. Telepsychiatry and other technologies for integrated care: evidence base, best practice models and competencies. *Int. Rev. Psychiatry* 30, 292–309. <https://doi.org/10.1080/09540261.2019.1571483>.
- Huang, Y., Wang, Y., Wang, H., Liu, Z., Yu, X., Yan, J., Yu, Y., Kou, C., Xu, Xiufeng, Lu, J., Wang, Z., He, S., Xu, Y., He, Y., Li, T., Guo, W., Tian, H., Xu, G., Xu, Xiangdong, Ma, Y., Wang, Linhong, Wang, Limin, Yan, Y., Wang, B., Xiao, S., Zhou, L., Li, L., Tan, L., Zhang, T., Ma, C., Li, Q., Ding, H., Geng, H., Jia, F., Shi, J., Wang, S., Zhang, N., Du, Xinbai, Du, Xiangdong, Wu, Y., 2019. Prevalence of mental disorders in China: a cross-sectional epidemiological study. *Lancet Psychiatry* 6, 211–224. [https://doi.org/10.1016/s2215-0366\(18\)30511-x](https://doi.org/10.1016/s2215-0366(18)30511-x).
- Lal, S., Adair, C.E., 2014. E-mental health: a rapid review of the literature. *Psychiatr. Serv.* 65, 24–32. <https://doi.org/10.1176/appi.ps.201300009>.
- Lavrakas, P., 2008. Encyclopedia of survey research. *Methods.* <https://doi.org/10.4135/9781412963947>.
- Leamy, M., Bird, V., Boultier, C.L., Williams, J., Slade, M., 2011. Conceptual framework for personal recovery in mental health: systematic review and narrative synthesis. *Br. J. Psychiatry* 199, 445–452. <https://doi.org/10.1192/bjp.bp.110.083733>.
- Liang, D., Mays, V.M., Hwang, W.-C., 2018. Integrated mental health services in China: challenges and planning for the future. *Health Policy Plan.* 33, 107–122. <https://doi.org/10.1093/heapol/czx137>.
- Ma, H., 2012. Integration of hospital and community services-the '686 Project'-is a crucial component in the reform of China's mental health services. *Shanghai Arch. Psychiatry* 24, 172–174. <https://doi.org/10.3969/j.issn.1002-0829.2012.03.007>.
- Martínez, P., Rojas, G., Martínez, V., Lara, M.A., Pérez, J.C., 2018. Internet-based interventions for the prevention and treatment of depression in people living in developing countries: a systematic review. *J. Affect. Disord.* 234, 193–200. <https://doi.org/10.1016/j.jad.2018.02.079>.
- Mizoiu, S., Tsitsipa, E., Moysidou, S., Karavelas, V., Dimelis, D., Polyzoidou, V., Fountoulakis, K.N., 2015. Psychosocial treatment and interventions for bipolar disorder: a systematic review. *Ann. General Psychiatry* 14, 19–11. <https://doi.org/10.1186/s12991-015-0057-z>.
- Mohr, D.C., Cuijpers, P., Lehman, K., 2011. Supportive accountability: a model for providing human support to enhance adherence to eHealth interventions. *J. Med. Internet Res.* 13 <https://doi.org/10.2196/jmir.1602>.
- Montag, C., Becker, B., Gan, C., 2018. The multipurpose application WeChat: a review on recent research. *Front. Psychol.* 9, 2247. <https://doi.org/10.3389/fpsyg.2018.02247>.
- Moriarty, A.S., Coventry, P.A., Hudson, J.L., Cook, N., Fenton, O.J., Bower, P., Lovell, K., Archer, J., Clarke, R., Richards, D.A., Dickens, C., Gask, L., Waheed, W., Huijbregts, K.M., Cornelis, C., van der F., Gilbody, S., McMillan, D., 2020. The role of relapse prevention for depression in collaborative care: a systematic review. *J. Affect. Disord.* 265, 618–644. <https://doi.org/10.1016/j.jad.2019.11.105>.
- O'Connor, M., Munnally, A., Whelan, R., McHugh, L., 2018. The efficacy and acceptability of third-wave behavioral and cognitive eHealth treatments: a systematic review and meta-analysis of randomized controlled trials. *Behav. Ther.* 49, 459–475. <https://doi.org/10.1016/j.beth.2017.07.007>.
- Patel, V., Xiao, S., Chen, H., Hanna, F., Jotheeswaran, A.T., Luo, D., Parikh, R., Sharma, E., Usmani, S., Yu, Y., Druss, B.G., Saxena, S., 2016. The magnitude of and health system responses to the mental health treatment gap in adults in India and China. *Lancet* 388, 3074–3084. [https://doi.org/10.1016/s0140-6736\(16\)00160-4](https://doi.org/10.1016/s0140-6736(16)00160-4).
- Pung, A., Fletcher, S.L., Gunn, J.M., 2018. Mobile app use by primary care patients to manage their depressive symptoms: qualitative study. *J. Med. Internet Res.* 20, e10035 <https://doi.org/10.2196/10035>.
- QSR, 2021. How to approach thematic analysis [WWW document]. URL: <https://www.qsrinternational.com/nvivo-qualitative-data-analysis-software/resources/resource-library/how-to-approach-thematic-analysis> (accessed 10.12.21).
- Rahal, Z.A., Vadas, L., Manor, I., Bloch, B., Avital, A., 2018. Use of information and communication technologies among individuals with and without serious mental illness. *Psychiatry Res.* 266, 160–167. <https://doi.org/10.1016/j.psychres.2018.05.026>.

- Rathbone, A.L., Clarry, L., Prescott, J., 2017. Assessing the efficacy of Mobile health apps using the basic principles of cognitive behavioral therapy: systematic review. *J. Med. Internet Res.* 19, e399 <https://doi.org/10.2196/jmir.8598>.
- Richardson, K., Barkham, M., 2020. Recovery from depression: a systematic review of perceptions and associated factors. *J. Ment. Health* 29, 103–115. <https://doi.org/10.1080/09638237.2017.1370629>.
- Scholten, M.R., Kelders, S.M., Gemert-Pijnen, J.E.W.C.V., 2017. Self-guided web-based interventions: scoping review on user needs and the potential of embodied conversational agents to address them. *J. Med. Internet Res.* 19 <https://doi.org/10.2196/jmir.7351>.
- Shen, L., Wang, S., Chen, W., Fu, Q., Evans, R., Lan, F., Li, W., Xu, J., Zhang, Z., 2019. Understanding the function constitution and influence factors on communication for the WeChat official account of top tertiary hospitals in China: cross-sectional study. *J. Med. Internet Res.* 21, e13025 <https://doi.org/10.2196/13025>.
- Simblett, S., Greer, B., Matcham, F., Curtis, H., Polhemus, A., Ferrao, J., Gamble, P., Wykes, T., 2018. Barriers to and facilitators of engagement with remote measurement Technology for Managing Health: systematic review and content analysis of findings. *J. Med. Internet Res.* 20 <https://doi.org/10.2196/10480>.
- Tan, Y., Teng, Z., Qiu, Y., Tang, H., Xiang, H., Chen, J., 2020. Potential of Mobile technology to relieve the urgent mental health needs in China: web-based survey. *JMIR Mhealth Uhealth* 8, e16215. <https://doi.org/10.2196/16215>.
- Tencent, 2020. Tencent Announces 2020 Third Quarter Results.
- Tong, A., Sainsbury, P., Craig, J., 2007. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *Int. J. Qual. Health Care* 19, 349–357. <https://doi.org/10.1093/intqhc/mzm042>.
- Torous, J., Nicholas, J., Larsen, M.E., Firth, J., Christensen, H., 2018. Clinical review of user engagement with mental health smartphone apps: evidence, theory and improvements. *Evid. Based Ment. Health* 21, 116–119. <https://doi.org/10.1136/eb-2018-102891>.
- Vaidyam, A.N., Wisniewski, H., Halamka, J.D., Kashavan, M.S., Torous, J.B., 2019. Chatbots and conversational agents in mental health: a review of the psychiatric landscape. *Can. J. Psychiatr.* <https://doi.org/10.1177/0706743719828977>, 706743719828977.
- Wang, W., Liu, Y., 2016. Discussing mental illness in chinese social media: the impact of influential sources on stigmatization and support among their followers. *Health Commun.* 31, 355–363. <https://doi.org/10.1080/10410236.2014.957376>.
- Wang, K., Varma, D.S., Prosperi, M., 2018. A systematic review of the effectiveness of mobile apps for monitoring and management of mental health symptoms or disorders. *J. Psychiatr. Res.* 107, 73–78. <https://doi.org/10.1016/j.jpsychores.2018.10.006>.
- Zhang, L., Jung, E.H., 2019. WeChatting for health: an examination of the relationship between motivations and active engagement. *Health Commun.* 34, 1764–1774. <https://doi.org/10.1080/10410236.2018.1536942>.
- Zhang, A., Wang, Z., Huang, X., 2017. Current situation of fee of counseling and psychotherapy in China. *Chin. Ment. Health J.* 31, 40–45.