

Designing culturally adapted digital mental health support tool for international students: Qualitative studies with Chinese-speaking international students in Australia

Ling Wu, Chen Zhu, Joshua Paolo Seguin, Jue Xie, Pranav Kulkarni, Mingye Li, Patrick Olivier

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Abstract

Background: International students, especially Chinese-speaking students, who grew up with collectivist values and the linguistic characteristics of the Chinese language - face a higher risk of mental health issues due to the challenges of geographical, linguistic and cultural transitions when studying abroad. While digital technology has shown promise in supporting mental health, few studies have focused on designing tools specifically for Chinese-speaking international students and the challenges they face.

Objective: This study aimed to design and develop a self-directed digital mental health support tool that provides culturally safe and appropriate support for international students.

Methods: A co-design approach was used across two study phases - Phase I: Interviews and Phase II: Co-design Workshops - to explore the design implications of the digital tool. Inductive thematic analysis was conducted to extract design insights and solutions.

Results: Findings revealed that participants faced a wide range of challenges arising from cross-cultural, academic, and daily life demands, which further contributed to a variety of negative emotions. These findings highlight the critical need to improve mental health awareness, literacy, and help-seeking intentions in this vulnerable group. These insights informed the design that emphasized the integration of culturally adapted resources with self-directed learning tools.

Conclusions: Based on the findings, a personalized, self-directed and culturally adapted design has been proposed that creates a bridging pathway linking students' immediate challenges with mental health education and support. This design offers a clear set of implications for enhancing international students' mental health awareness, literacy, and help-seeking behaviors, thereby providing essential support for this population. Clinical Trial: Not applicable, RCTs approach is not included.

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Original Manuscript

Original Paper

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Keywords: mental health digital tool, international students mental health, culturally-adapted resources

Introduction

Over the past two decades, international student mobility has surged, with over 6.8 million international students worldwide as of 2022 [1] and Australia emerging as a popular destination with more than 810,960 international students recorded by May 2024 [2]. Chinese-speaking students account for roughly 20% to 30% of these enrollments, and many face significant challenges in adapting to the new cultural and academic environments, accompanied by varying levels of mental health issues. Specifically, Chinese-speaking international students have reported a higher risk of experiencing mental health issues, such as depression, anxiety and stress compared to Australian domestic students [3, 4].

A wide range of factors, including language barriers, communication challenges, and social difficulties - often influenced by cultural differences, particularly the collectivist values of Chinese-speaking international students and the unique characteristics of the Chinese language- significantly contribute to the development of mental health issues [4-6]. These factors, co-existing with daily living challenges [7, 8], low levels of mental health awareness and literacy [9] and exposure to mental health stigmatization rooted in collectivist values and filial piety in China [10-12], further exacerbate the limited attempts of help-seeking and the underuse of mental health services in Australia.

While universities are typically the first point of contact for international students facing mental health issues, a study revealed that their mental health policies, strategies, and educational initiatives for international students are either lacking or framed as largely a responsibility of the student [13]. This creates significant challenges, especially for high school and undergraduate students who are at a developmental stage (i.e., late adolescence, typically ages 15-19), making them more vulnerable to mental health issues [14]. Although various intervention programs and supportive tools have been explored to address gaps in university students' mental health solutions [15-18], those specifically targeting Chinese-speaking international students remain limited. Concerns have been raised about the lack of culturally adapted resources, appropriate language options, high dropout rates, poor credibility of information, and suboptimal user interfaces [15, 16, 19, 20].

To address gaps in current digital mental health tools and better support international students at risk of or experiencing mental health issues, this study worked with a representative group - Chinese international students in Australia - to design and develop a digital mental health support tool. This study represents the first two phases of a broader co-design initiative, with the ultimate goal of implementing a free and tailored digital mental health tool that provides self-directed and culturally safe support for international students, enabling their decision-making processes and access to professional help. Briefly, Phase I aimed to develop the content of the digital tool based on a qualitative analysis of Chinese students' lived experiences. In Phase II, the goal was to refine both the content and the interface design through feedback from students testing the prototype of digital support tool.

Methods

Recruitment

The current study was approved by the Monash University Human Research Ethics Committees (Project ID: 39583). Participants in Phase I were recruited from August to October 2023 through online advertisements targeting Chinese-speaking international students interested in addressing their mental health concerns while studying in Australia and participating in the development of a digital tool. Potential participants were preliminarily screened based on the information they provided in the interest sign-up form according to the inclusion criteria specified as the following: a) current international students enrolling in higher educations in Australia, b) studying on-shore, and c) native speakers of Chinese. After initial screening, eligible participants were contacted via email for further participation instructions. Exclusion criteria included a) participants under 18 years, and b) participants who were experiencing mental health crisis. Overall, a total of 20 participants recruited from online advertisements, took part in the individual interviews.

Phase II involved a total of seven participants, allocated into two separate design workshops based on individual preferences and availabilities. Participants were drawn from Phase I individuals who expressed interest in further involvement, and from online advertisements targeting Chinese-speaking international students interested in testing the prototype. The same inclusion and exclusion criteria were applied throughout.

Materials

During the semi-structured individual interviews of Phase I, several open-ended questions were proposed to identify the mental health needs and concerns of Chinese-speaking international students. Discussions were conducted on daily life challenges related to academics, living conditions, physical health, and emotional well-being, aiming to identify potential factors or circumstances that might contribute to mental health

problems. The ways in which participants addressed these challenges were further discussed to identify their help-seeking attitudes and self-management capabilities. Topics also included the participants' understanding of mental health issues, strategies for self-management, and avenues for seeking professional assistance, aiming to identify potential stigmas and mental health literacy levels. Lastly, the digital platforms that participants commonly used for mental health information were discussed, to better understand the potential needs and features included in the future digital solution.

Two separate design workshops were conducted in a group format, with three participants in Workshop 1 and four in Workshop 2. Group activities were facilitated using a Miro board[21] to explore the user journey of the digital support tool prototype. Three key aspects were incorporated into the activities: the design of the mental health check-in questions, the recommendation content, and the interface and functionalities. The user flow of the digital support tool prototype is shown in Figure 1. Specifically, a check-in survey was embedded to explore the challenges faced by participants, followed by the short-form version of the Depression anxiety and stress scale (DASS-21)[22] to assess their level of psychological distress from three aspects. Individualized recommendations are then generated based on the responses from the check-in survey, ensuring that each user receives tailored support that addresses their unique needs.

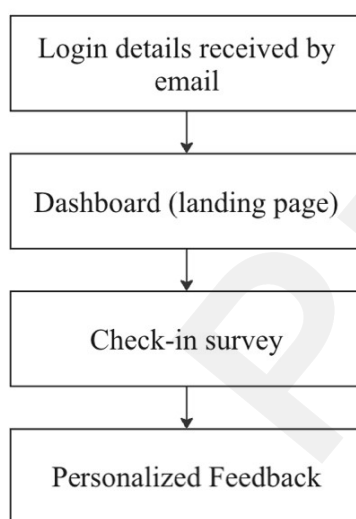


Figure 1. User flow diagram for the digital mental health support tool prototype.

DASS-21[22] is a self-report scale designed to measure the negative emotional states of depression, anxiety, and stress through three subscales. Each statement is rated on a four-point Likert scale ranging from 0 ("Did not apply to me at all") to 3 ("Applied to me very much, or most of the time"), indicating how much the statement applied to the respondent over the past week. The score for each subscale is calculated by summing the item scores and then multiplying the total by 2 to compare with established severity cut-off scores. A higher score indicates a higher level of the corresponding emotional state. Both the English and Chinese versions of the DASS-21 have demonstrated good psychometric properties in university students [23, 24].

Procedure

During registration for both Phase I and Phase II, participants electronically signed a consent form followed by a brief demographic survey (covering age, educational background, gender, and duration in Australia) via REDCap hosted at the University [25, 26]. REDCap is a secure, web-based, and confidential platform for the collection of research data allowing flexible data manipulations and export procedures. Eligible participants were subsequently contacted via email to schedule interviews or workshops. All sessions were conducted via video conference and recorded, with transcripts prepared and translated into English by trusted third party services listed in the Ethics application prior to analysis.

Analysis

The data analysis for the semi-structured interviews and design workshops was conducted in NVIVO [27] using inductive thematic analysis. Two of the authors (L.W. and C.Z.) performed inductive thematic analysis independently followed the six-step analysis pipeline described by Clarke and Braun [28]. An inductive process was adopted in the development of themes. Descriptive statements were made for each code and themes were derived from the descriptive statements. This process was cross-checked and discussed by other members of the research team before the results were finalized.

Results

Phase I interview

For Phase I, a total of 23 participants registered their interests, and 20 were included in the interviews and analysis. Three participants withdrew from the interview process. Demographic information was displayed in Table 1. From inductive thematic analysis, three themes and 27 subthemes were derived from 152 codes. Detailed descriptions and reference frequency of themes and codes are shown in Table 2.

Table 1. Demographic information of participants involved in Phase I (N^a=20)

Demographic variable		N(Mean±SD ^b)
Age		19 (23.79±2.44)
Gender	Female	13
	Male	7
	Non-binary	0
Education	Bachelor/diploma	9
	Master	7
	Doctoral	4
Study areas	Commerce	4
	Public health	8
	Computer science	4
	Social science	3
Years in Australia	Less than 1 year	3
	1 to 3 years	6
	3 to 6 years	8

More than 6 years

2

^aN: total number of participants.^bSD: Standard Deviation.**Table 2.** Summary table of themes and sub-themes derived from semi-structured interview

THEMES	Sub-themes	Frequency
A. STUDY LIFE CHALLENGES		209
1. Coursework challenges		65
• Heavy coursework load and difficult learning content or class activity lead to negative mental health state		40
• Peer comparisons and future uncertainty lead to stressful feelings		16
• Study transition challenges (e.g., different study mode or paradigm)		7
2. Cross-cultural challenges		59
• Different values, beliefs, and habits lead to perceived discrimination, misunderstanding, and negative impact on mental health		16
• Language barriers lead to poor academic performance, in-class interactions, and negative mental state		43
3. Daily life challenges		85
• Developmental stage related challenges (e.g., struggles related to self-efficacy and autonomy, self-regulation or management skills, facing judgement)		23
• Logistical challenges (e.g., transportation, accommodation) lead to negative mental state		29
• Socializing difficulties lead to boring and loneliness thus affecting mental health		33
B. LIVED EXPERIENCE OF MENTAL HEALTH ISSUES		221
4. Common attitudes toward mental health issues		114
• Attitude towards mental health is more open and positive in the host country (i.e., Australia), which encourages help-seeking		35
• Attitude towards mental health is less open and negative in the home country (i.e., China), which discourages the help-seeking		70
• Personal view of mental health is mixed, but changed to be more positive since arriving to Australia		9
5. Common mental health issues		66
• 'EMO' ^a , anxiety, depression, and stress are common		52
• The above issues having significant influences on daily life		14
6. Mental health resources		41
• Interested in exploring self-management and help-seeking options		17
• Limited resources to learn about mental health		24
C. COPING AND MANAGING STRATEGIES		338
7. Concerns and perceptions about clinical services		127
• Limited help-seeking intentions for professional help		88
• Limited knowledge related to local healthcare systems		19
• Worries and negative perceptions about clinicians or services can discourage help-seeking		20
8. Different views on seeking support from peers (preferably) and parents (limited attempts and varies across individuals)		63
9. Perception and experiences of online resources		52
• Negative perception of (e.g., not trusting) online resources, highlights the need of reliable resources		29
• Positive perceptions of online resources (e.g., immediacy, convenience and efficiency)		23
10. Some lifestyle strategies or activities reflect maladaptive coping		47

11. Some self-management strategies or tools are inappropriate, reflecting poor mental health literacy	49
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^aEMO refers to the equivalent of mood swings in English, encompassing sudden feelings of sadness (often occurring at night) or emotional responses during specific days or times, sometimes accompanied by anxious and depressive thoughts and feelings.

Study life challenges

The most impactful and prevalent challenge faced by Chinese-speaking international students is cultural transition, including acute cultural adaptation issues, language barriers, and identity conflicts. These challenges can happen in various forms of lived experiences, such as perceived discrimination resulting from different cultural expectations, communication difficulties, perceived social exclusion and isolation. These experiences tend to lead to feelings of isolation and a sense of “*I don’t belong here*” (Participant 8; P8). In addition, students tend to perceive that they have inadequate proficiency in English that affect their academic performance and interpersonal interactions in social and studying settings. The consequence of this perceived inadequacy, together with the cultural differences, can lead to self-dissatisfaction, stress and frustration, with no clear solutions to address these issues.

“As a non-native English speaking international student, you feel a bit discomfort, a bit difficult to fit in...for example, when they tell jokes, you completely don't get their laughing points, and you just can't really fit in their culture...Then, you feel a sense of being marginalised.”[P12]

“I feel very frustrated because my spoken language is really poor.... I’m just very dissatisfied with myself, and in such cases, there is a lot of psychological pressure.”[P6]

Participants identified heavy study workload as a major challenge faced by international students. The language and cultural barriers often exacerbate these issues and make managing and coping with workload significantly difficult, with P12 describing the situation as “*I might have to put in many times more effort than they (native English speaking students) do to cover the gap (caused by language barriers)*”. They articulated many other difficulties in managing and coping with the demands of participating in group discussions, adapting to new learning environments, passing subjects, completing assignments, and understanding class content. They have also identified some perceived psychological impacts. For example, they can feel behind with their academic performance, resulting from peer pressure and constant comparison with their peers (P2), which further increased their anxiety about future educational and career plans. Other participants shared that a sense of uncertainty often led to negative feelings, such as confusion, stress, self-doubt, and anxiety.

“After starting university, I feel extremely stressed. The teaching model here, although the tutorials

are only two hours, it actually requires more than five hours of preparation and review outside the class time...I often feel on the verge of breaking down and regret choosing this major.” [P21]

“There would be feelings of inferiority. It might include comparisons with peers. It could be comparisons of abilities, academic performances, and maybe even appearances, possibly. Family backgrounds, financial conditions, all sorts of comparisons stemming from peer pressure.” [P2]

The most commonly shared daily life challenge is difficulty with socializing. Common problems include worries about, or challenges in, establishing intimate relationships, making new friends, or formulating a social network. Alongside academic challenges, these social and interpersonal issues are seen as significant sources of stress, which can further exacerbate feelings of loneliness and isolation, significantly impacting their wellbeing in everyday life. Challenges related to logistical life management are another primary cause of negative feelings as many of the participants did not have adequate prior experience living independently in their home country to prepare themselves. These challenges vary and may include financial burdens, lengthy transportation, homesickness, accommodation issues, and unfamiliarity with social rules or systems. Specific problems, such as living in a remote area due to cost of living concerns (P8), sleep deprivation due to accommodation issues (P21), inefficient transportation system (P19), not able to understand and meet cultural expectations (P16), can lead to feelings of stress, anxiety, and depression. These difficulties can be particularly challenging for new international students due to the drastically different living arrangements between their home country and the host country, especially with no immediate support or solutions available to address them.

“I often feel very lonely, especially since I feel like many students here might not be very eager to make friends, I think it is a kind of pressure to make new friends.” [P8]

“The noise problem where I lived had a significant impact on my life. I didn't know how to communicate about it, and I really wished someone had guided me on how to handle the situation. My parents (who were in China) didn't know what to do, and neither did I, as I was only 15 years old at the time.” [P21]

Perceptions and lived experience of mental health issues

Participants expressed varied views and attitudes toward mental health issues from their home and host cultures. They described that they see a more open attitude towards mental health and that mental health is more normalized in their host country. They perceived attitudes toward mental health was that it is ‘common in daily life’ (P1), and people are ‘open to talking with others’ (P16), and ‘having access to more professional mental health services’ (P18). In contrast, participants’ perceptions of attitudes toward mental health in their

home country is that there was stigma around it. They perceived that this attitude led to ‘mental health issues are not taken seriously’ (P9), people ‘feeling shame over having mental health issues’ (P14), and that people are ‘unlikely to seek or talk about support with others’ (P18), and more likely to be ‘at risk of facing discrimination’ (P16). In general, the perception is that mental health, especially issues and disorders are something that people tend to keep to themselves, sometimes not even shared within their family.

“Under the influence of their parents, they might feel that it is shameful or difficult to speak about...but I've found that many Chinese people are willing to share about their mental health issues once they are abroad. However, if they are in China, speaking out might lead to discrimination or being viewed differently. Therefore, they might be afraid to express themselves, and they also might not dare to talk to their parents about it, or if they do, they might receive a negative response.” [P12]

When asked about their own experience of mental health, most participants stated that they think certain signs and symptoms related to mental health are prevalent among Chinese international students including themselves. The most frequently reported issue (16 out of 20 participants) the participants articulated was *emo* - the equivalent of mood swings in English, including sudden feelings of sadness (often happen at night) or emotional responses during specific days or times, some followed by anxious and depressive thoughts and feelings. These experiences were often attributed to homesickness (P16), stress related to assignments and exams (P22), as well as social isolation (P18) and sometimes uncertainty associated with their future plans. For some participants, these temporary negative moods impacted their daily functioning, resulting in symptoms like insomnia and reduced appetite (P14), or a desire to be alone (P4).

“I think it might last for a long time. The feeling of being ‘emo’ is like having small bouts of negativity, where life seems to lack hope... Life feels pretty dull, with no motivation... and this feeling can actually last for quite a while. Sometimes, it might even last the whole winter.” [P23]

When sharing their perceptions and experience of mental health, participants voluntarily mentioned a variety of sources to help understand their mental health related experiences, including books, friends, university coursework, and informational sheets. A few participants also indicated a need to acquire this knowledge but were not sure about the ideal sources. Among the types of knowledge they were interested in, self-management strategies were most commonly mentioned (10 out of 20). Participants were keen to learn how to manage negative moods, create study plans, and obtain personalized support. A small number of participants expressed interest in finding systematic guidelines because they had not interacted with a professional before.

“Topics related to psychology, like mental health and how to manage emotions, are the ones I am

interested in. I've always been very interested in how a person can maintain a positive attitude continuously.” [P23]

“Because I haven't seen a psychologist myself, most of my knowledge comes from what I've heard from others. I might not be clear on some of the details. If there were a systematic guideline, I believe it would be more helpful.” [P1]

Coping and managing strategies

Participants discussed several strategies they use to manage their challenging feelings and moods, and the use of online resources is reported by all participants. They frequently turn to social media platforms and websites for assistance. For the students, these online platforms provide immediate and helpful information in allowing them to learn from others' experiences, identify people with similar issues, better understand their own symptoms, and explore topics of interest. Social media platforms, alongside other information sources, while participants found them helpful to some degrees, they also articulated a concern that it is hard to judge if the information is reliable and trustworthy. Consequently, some participants expressed that if possible, they would use university-authorized web pages or online platforms as they perceive a higher likelihood of trustworthy information there.

“Because you don't understand the symptoms, you definitely need to observe yourself first. We don't know what these symptoms could indicate—what disease or behavior. But you can start by searching online to see if there are similar symptoms. That's how you might begin to understand what the issue could be. Then, you can further your understanding by listening to discussions on platforms like Rednote (a Chinese-based social media platform that enables users to share personal posts, like Instagram, reading comments, or learning about similar experiences and how others have resolved their issues.” [P7]

“Because it lacks a certain level of professionalism, most of it is just individuals sharing their personal experiences, so it might not be very prominent in terms of professionalism. It's really just sharing personal experiences. Yes, I understand that as an individual, I'm still looking for a more authoritative academic resource to learn about psychological knowledge.” [P1]

Other than online resources, participants also explored various off-line management options, majority of the strategies used are mostly of a self-directed or self-organized nature. The most frequently used strategies included self-regulated strategies, engaging in conversations with friends and family, adopting lifestyle strategies, and joining entertaining or outdoor activities. Self-regulation strategies included ‘*just accept it*’ (P8), ‘*befriending negative moods*’ (P5), better time management or listening to lecture recording when

negative moods were linked to academic pressures, improving language skills to overcome language-related stress, or employing mental health techniques such as shifting attention, practicing mindfulness, or meditation. A few participants mentioned that being alone and processing emotions internally is their preferred way to cope. In relation to lifestyle adjustment, participants listed various lifestyle changes and activities they use to manage their negative moods. These strategies cover ‘getting more sleep’ (P4), ‘engaging in physical activities’ (P3), ‘writing in a diary’ (P16), ‘watching videos’ (P17), ‘hanging out with friends’ (P7), and ‘eating favorite foods’ (P11). However, some participants also mentioned coping strategies like playing video games and drinking alcohol.

“Like drinking and playing video games, I think these are ways of escaping from reality.” [P8]

Participants views on seeking social support within their circle are divided. Some participants felt that discussing their feelings with parents would not be appropriate or helpful, especially since many parents were located in China and may not fully understand their experiences. Moreover, a desire to be independent, to avoid worrying others, and not wanting to burden others were cited as reasons why some participants preferred not to discuss their issues. In contrast, many participants articulated that talking with friends (P12; P23; P5) or parents (P14; P22; P3) could be beneficial, as it provides opportunities to express and release negative emotions, feel being understood, receive support, and relax, particularly when peers are experiencing similar issues related to academic stress. These findings suggest that, if available, students tend to primarily seek help from within their social circles. When this social circle is not available or not trusted by the participants, they tend to turn to a self-support approach where they manage things alone.

“I feel like they (parents) don’t understand a lot of things. Especially about life abroad—if you tell them what happens overseas, it’s completely unhelpful as they are utterly unaware and know nothing about the various situations and life conditions abroad. Telling them, I feel, has no effect at all.” [P23]

“I won’t tell others everything, but the most likely time I might share these feelings is at night. At night, when I really feel overwhelmed and can’t bear it, I might think about talking to others. However, I don’t know why—perhaps it’s my independent and strong-willed nature that prevents me from actually doing so, and I end up preferring to endure it on my own.” [P18]

While a few participants expressed interest in seeking professional support, most shared resistance and concerns towards taking action on seeking help. The most common concerns include language and cultural barriers and worries about fees, followed by appointment availability, the cultural and professional

background of the clinicians, and the location of the services. Moreover, many participants indicated that they would seek help from clinical services only if they experienced obvious mental health issues, they (11 out of 20) also noted that they have very limited knowledge about the Australian healthcare system, international student health insurance policies and accessing general practitioners (GPs). There was also the perception that help seeking is more applicable when someone has severe mental health problems, and a few of them expressed concerns of accessing these services, indicating distrust and resistance towards clinicians and healthcare services.

“Some of the available counselors speak only English, and I would prefer to speak with a Chinese person because there are many specific terms that are unique to our culture. Right now, I can’t think of any specific examples, but terms like Neihao (internal friction, self-sabotage, or mental and emotional exhaustion caused by internal conflicts or overthinking), wuligan (a feeling of powerlessness or helplessness), I wouldn’t even know how to explain these to them. That’s why I would prefer to find a counselor with a similar cultural background.” [P15]

“So I feel that my symptoms are not severe enough to seek this treatment. I think it’s only when the illness is at its worst that I would consider it.” [P7]

“But my concern is that, after I speak up, I worry about the psychologist’s opinion of me because the things that trouble me are quite private. I’m also worried about the judgments from others. Even though I know that psychologists are professionally trained not to judge their clients, I still feel a bit anxious about this.” [P21]

Phase II design workshop

For Phase II, a total of seven participants were included in the design workshops and thematic analysis, with three and four participants allocated to two separate design workshops, respectively. Among them, four had participated in Phase I and three were recruited through online advertisement. Table 3 shows the design points generated from three different topics of discussion: question development, feedback content, and functionality and interface design.

Table 3. Design considerations derived from group design workshops in Phase II

Areas to improve		Current strengths
<i>Question development</i>		
• Wordings of the survey questions • Questions from other scales/incorporating different dimensions of mental health issues • Questions covering career/study planning, collaboration skills, financial management, family commitment, and visa		• DASS-21^a is a reliable tool • Questions cover a range of different daily life circumstances

issues

Functionality/interface design

- | | |
|--|---|
| <ul style="list-style-type: none"> • Language option for the resources from external link • Online forum to share experiences or thoughts • Option of follow-up check-in survey • Updated news about university enrollment, visa policy, or activities • AI-supported tool (e.g. chatbot) • User profile • More introductions on dashboard page | <ul style="list-style-type: none"> • Easy to navigate the feedback and complete the check-in questions • Easy to switch language • Good page design (e.g. color) |
|--|---|

Feedback content

- | | |
|--|---|
| <ul style="list-style-type: none"> • More instructions on how to read/use the recommendations • Recommendations could be more specific | <ul style="list-style-type: none"> • Feedback is comprehensive • Recommendations provided is useful |
|--|---|

^aDASS-21: Depression anxiety and stress scale – 21 items.

From the design workshops, participants indicated that the platform's strengths lie in addressing cross-cultural challenges by offering questions and recommendations that cover many of the daily life issues faced by Chinese-speaking international students, along with language selection options. However, areas for improvement include covering a broader and more diverse range of daily challenges, providing more individualized and specific recommendations, and incorporating interactive features such as an AI chatbot and discussion forum.

Design insights and strategies

Design insights and solutions derived from Phase I and II are shown in Figure 2. Findings demonstrated that participants experience a wide range of challenges stemming from cross-cultural, coursework, and daily life demands. Specifically, language barriers, different cultural values, heavy coursework load, logistical and social challenges that international students are navigating are the main sources of various challenging feelings and emotions. Specific emotions reported include feelings of withdrawal or self-isolating, self-dissatisfaction, depression, anxiety, mood swing, and a sense of being discriminated against, feeling overwhelmed, confused, and uncertain. It is important to note that while not reported by the students, some of these feelings (e.g., withdrawal, confusion, anxiety, depression) are recognized as “early warning signs” of mental illness [29]. This underscores the importance of nurturing students' mental health awareness by identifying challenges and signs of negative emotional states at the early stage, which forms the basis of the design insights.

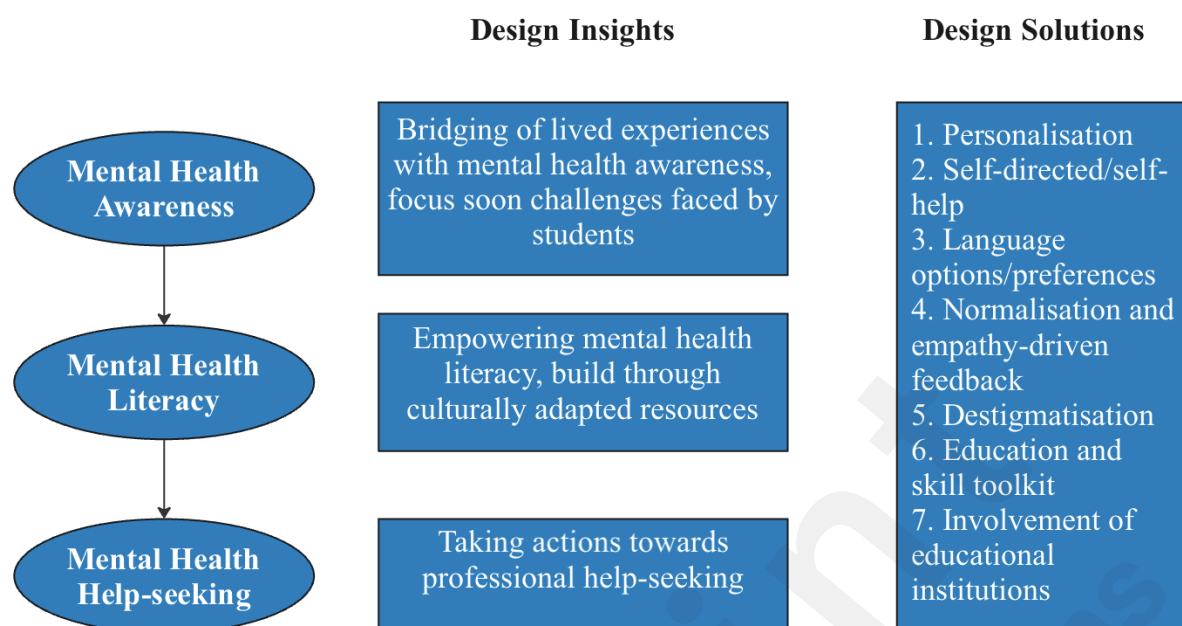


Figure 2. Design insights and solutions derived from Phase 1 qualitative interviews.

Although a range of negative feelings and emotions have been reported, participants often lacked the necessary resources to identify suitable support options and preferred a do-it-yourself approach—likely influenced by the stigma around mental health in their home culture. Despite perceiving that the host country has a more open attitude toward mental health, they generally did not articulate how they have utilized this openness. Chinese international students most commonly rely on themselves for coping, turning to online platforms or self-regulation techniques; however, some strategies, such as gaming and drinking, can be counterproductive, particularly given their increased risk. Moreover, they are hesitant to seek professional help due to language and cultural barriers, financial concerns, fear of judgment, and a lack of familiarity with the local healthcare system. These findings highlight the critical need to improve mental health literacy and help-seeking intentions so that appropriate, evidence-based coping strategies and support options can be identified and accessed. Recognizing that culture significantly influences mental health literacy and help-seeking intentions, the design insights draw heavily on the integration of culturally adapted resources with self-directed supportive tools.

Discussion

This study explored needs and challenges for developing a digital tool to support the mental health of Chinese-speaking international students based on interviews and workshops conducted over two phases. Overall, findings revealed significant gaps in the students' mental health awareness, literacy, and help-seeking intentions, while experiencing limited access to reliable, culturally tailored resources. Various study-and-life challenges, including language barriers, communication difficulties, accommodation, and financial issues, compound these gaps. In response, the study proposes design considerations tailored to address these

challenges, integrate self-help techniques, and offer culturally relevant, evidence-based resources aimed at raising mental health awareness and building literacy, thereby improving decision-making processes and encouraging proactive help-seeking and access to health services among international students (refer to Figure 2).

Bridging of lived experiences with mental health awareness: interpreting challenges with mental health in mind

The current study shows that students are likely to recognize daily life challenges created by the geographical transition, they have identified challenges associated with cross-cultural adaptation, demanding and often overwhelming course workloads, and navigating a new social and independent lifestyle. While students articulated the negative emotions and mood changes ('emo') associated with these challenges, they did not seem to interpret these experiences and feelings as possible warning signs of mental health illness [29]. Recognition of early warning signs and symptoms of mental health issues is considered fundamental in mental health awareness, which aid identification, management and prevention of mental health issue [30, 31]. A lack of recognition of early warning signs is consistent with previous literature [32, 33] reporting that lacked awareness is a key barrier in university students seeking help, which could then lead to serious consequences, including the development of severe mental health disorders [34] and suicidal behaviors [35].

To address this challenge, a mental health support system for international students should adopt an extended approach that starts with increasing mental health awareness. This would entail well-established through self-directed methods for learning mental health-related knowledge [36-39] acknowledging and making apparent students' current circumstances (e.g., visualizing and enabling their understanding of various challenges that could be warning signs), and actively engaging them in building mental health awareness. As self-directed/guided strategies have indicated promising effects on increasing the awareness of mental health issues particularly in young people through improved self-efficacy [40-43], a potential design approach can combine a self-assessment tool to enable the self-directed exploration and clear identification of the challenges and the feelings evoked. Since the personalization strategies have shown significant benefits in digital mental health interventions [44], the systems can then provide a visualization of the challenges each student have experienced and the associated feelings, in the form of feedback that provides a personalized view of a challenges map specific to their individual circumstances.

To effectively engage student and raise their mental health awareness in digital mental health interventions, it is also essential to address language barriers with a culturally sensitive adaptation approach [45], where measurement tools validated in Chinese contexts and mindful symptoms description is used to engage students. Consistent with prior research [46-50], our findings show that language barrier is a significant barrier that affects most domains of international students life, including adapting to local environment,

communication difficulties and course work challenges. To address the challenges of language barriers, incorporating language preferences and is essential. Language selection options have been identified as crucial in digital mental health services and interventions to effectively serve diverse user populations [51], which could be potentially adopted as an approach to enhance user engagement and consequently increase the chance of being aware of potential mental health issues. A previous study on digital mental health platforms for Chinese-speaking international students found that offering both simplified and traditional Chinese options significantly improved student engagement with the programs [19]. However, adapting an evidence-based digital tool to a new language often requires appropriate cultural appropriations instead of a direct translation [52]. For example, using validated Chinese versions of scales/intervention programs (e.g., Chinese Short Version of Depression Anxiety and Stress Scale [53] to assess/manage students' mental health conditions can be the first step to cultural adaptation.

Mental health literacy building through culturally adapted resource

In addition to a less-than-ideal awareness of early warning signs, the current study identified a common lack of knowledge regarding the causes, recognition, duration, and severity of various mental health conditions, as well as limited access to educational resources and, at times, reliance on ineffective self-management strategies to cope with negative emotions in international students. This reveals limited mental health literacy (MHL), which has been defined as “both knowledge and beliefs about mental disorders, assisting in their recognition, management, or prevention” [54], and plays a significant role in detecting mental health problems, enhancing mental well-being, and contributing to better decision-making abilities, thereby increasing help-seeking behaviors [55-57]. Moreover, this study showed that students' perception of the host country's (i.e., Australia) attitude is one that is more open and understanding. This perceived openness led them to believe that there are more resources and services available, however, they did not mention how they would make use of these resources, largely due to the language barriers, cultural concerns (e.g., worries of not being understood) and negative perceptions about the relevant resources (e.g., mental health services are not helpful). The challenge here is to set up a pathway to empower international students to become more educated in understanding the symptoms and causes of mental health issues, and to be able to monitor the change in their mental health.

Recent studies have revealed significant cultural influences on mental health literacy, suggesting the importance of culturally sensitive approaches (e.g., incorporating cultural related ways of expression and educational/health resources) in designing mental health technologies [58, 59]. Therefore, the key is to identify culturally appropriate ways for international students to improve their understanding of mental health issues and to promote active engagement, especially given the existing stigma (e.g., “Mental health issues are often seen as just complaining without real problems”; P9), cultural biases (e.g., the unique way Chinese-speaking international students describe mood swings as ‘emo’), and limited understanding or knowledge

about the local healthcare systems and social norms. Possible solution could be the integration of culturally sensitive user interfaces that provide more relevant, effective, and needed mental health education and support [60].

Based on these insights, the design of a digital mental health platform should provide a personalized mechanism to allow for normalized and culturally adapted resources that enable students to gain knowledge that can help them to interpret their own results in the context of mental health. Importantly, rather than presenting a matter-of-fact type diagnosis, the system would provide feedback to students with a tone of empathy, linking the results to the challenges that they experience to normalize the results that the student might find too challenging to accept. Digital support discussed by previous studies has shown advantages in personalized design that integrates AI-enabled, empathetic, and evidence-driven conversational models, demonstrating greater effectiveness and user engagement [61]. Moreover, the feedback will be linked to recommendations or resources that align with the students' interests and needs, particularly those related to cultural aspects, such as language support, peer support, and assistance with geographical transitions.

Encourage taking actions towards professional help seeking

The current study found that Chinese-speaking international students shared a tendency where they feel that professional help is “something for other people” or for “very severe cases”, this is consistent with prior work reporting that international students are resistant towards counselors and counseling services [62]. This resistance persists even when participants experience emotional challenges, such as feeling ‘emo’, leading to a preference for solitude and self-coping, which in turn reflects a limited level of help-seeking intentions within this population. Recent studies have indicated that higher levels of help-seeking intentions are associated with better well-being outcomes among university students [63], and particularly among international students, mental health literacy has been found to play a significant role in help-seeking intentions, which subsequently influence levels of psychological distress [64]. Therefore, in addition to promoting mental health awareness and literacy, enhancing help-seeking intention – through improved decision-making abilities and greater access to available services – would be another important aspect to consider when designing digital mental health platforms.

Various barriers to seeking professional help were identified in this study, including language and cultural barriers, financial concerns, fear of judgment and a lack of knowledge and experience with the healthcare system in Australia. Moreover, prior work [65] on international students' attitude towards professional psychological help suggested that inexperience with professional support correlated with perceiving these services as non-trustworthy and inappropriate for solving personal difficulties. In contrast, students who received help previously (in their native countries) showed reduced concerns and more positive attitudes for professional help seeking. To design support that address the resistant attitude towards professional service,

encouraging students in need of professional support to gain experience of support seeking is key. This could be operationalized in two main ways: 1) encouraging students to take the first step in help seeking and 2) support student to navigate out of the initial contact point and into the broader health system where on-going services are available.

To overcome the barriers identified and encourage students taking the first step in professional help seeking, the system should provide destigmatizing mechanisms for students to feel safe and reassured to take the first step and thus increase the access to the health services [66]. Relevant lived experience stories of other Chinese-speaking international students can be integrated here to reduce perceived language and cultural barrier, and social stigma, while showcasing the effects and benefits of professional support. In addition, providing of information that demonstrate, in a linguistically and culturally sensitive way, why help-seeking is necessary and beneficial and how services ensure privacy of help-seekers are protected and ways that help can be sought “here and now” without monetary concerns. This would entail listing available free services tailored to the students’ preferences, interpretation services coupled with various free helplines and what specific areas these helplines provide support on. This “in the moment” education could significantly increase the students familiarity with professional help and aid their decision-making processes, which increases the chances of them taking the first step.

While taking the initial step to seeking professional help can be beneficial, for students who are at an elevated risk of mental health problem, seeking and obtaining mid-to-long-term professional support is necessary. For this group of at risk students, it is imperative to guide and empower them to go beyond the initial step and access the broader allied health system for support of ongoing nature. The design here should focus on empowering students with knowledge and resources to build their own care pathway by providing culturally tailored guidelines and resources on available services. For example, the system should have a “one-stop-shop” design where resources are categorized according to the barriers identified by the students. This can include toolkit of specific functions: navigating the Australian health system; identifying clinicians with appropriate background and experiences; identifying and utilizing available financial support; what happens in a therapy session. As student and social support initiatives that introduce educational resources or social skills have shown benefits in strengthening self-efficacy and confidence [67, 68], this toolkit design will not only rapidly increase students relevant knowledge but also build their ability to navigating and making use of support that are available to them.

Universities are often the first place students turn to for help. It is essential for educational institutions to play a central role in a digital mental health support system. The current study identified multiple challenges faced by international students, many of which are closely related to their academic experiences. In addition, a limited knowledge of available university services was also observed. Prior research has found that the

awareness of on-campus mental health service can have positive influence on international students' help seeking attitude and behavior [7], and that university-based information and digital tools have been proven effective in delivering these services to students [52, 69]. While it is crucial for educational institutions to provide information on the availability of on-campus support, this is often not culturally and linguistically adapted. In this case, the designed tool should aim to provide culturally tailored information from the universities and encourage students to take a proactive approach in navigating and making use of on-campus services.

Limitations and Future Work

There are a few limitations of the current study. The qualitative nature of this study has led to an engagement with a relatively small sample of Chinese-speaking international students, and the findings might not be able to be generalized to international students at large. However, current findings have been synthesized with the support of existing literature to strengthen the applicability of the design insights and solutions. The given scope of the study focused on Australia as an academic context, expanding the geographic location may allow for different findings to emerge. The study scope also limited the possibility of exploring diverse cultures that international students come from, however, it is essential for having an exploratory study to dive deeper into one student group and learn how cultural adaption can be designed and developed. Future work can explore other cultures and their influences on the international students mental health, to uncover similarities and differences in the students' lived experiences and the unique mental health challenges and needs.

Conclusions

In summary, a set of clear insights and solutions for designing mental health support for Chinese-speaking international students have been presented. This study adds insights to the digital tool development in relation to mental health support, with an understanding of the challenges and needs of this specific user group – international students. Current findings provide a rich and in-depth description of the barriers and needs associated with international students' mental health while relocating to a new cultural context. How these needs and concerns are synthesized to inform the design implications have been discussed. These design implications captured key mechanisms that enable culturally adapted strategies to help build international students' mental health awareness and literacy, while encourage them to take actions towards professional help seeking when needed. These design implications provide key considerations for researchers, designers, developers who are interested in providing culturally sensitive and appropriate support international students' mental health and wellbeing.

Conflicts of Interests

The authors declare that they have no competing interest.

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Data Availability

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Abbreviations

DASS-21: Depression, Anxiety, and Stress Scale – 21 items

MHL: Mental health literacy

P[Number]: Participant number

SD: Standard deviation

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