Published in final edited form as:

Asian J Psychiatr. 2018 March ; 33: 1–6. doi:10.1016/j.ajp.2017.12.007.

Chinese immigrant use of smartphone apps toward improving child mental health awareness and resource delivery: A pilot study

Emily Wu^{a,b,c,*}, John Torous^{b,c}, and Cindy Liu^{b,c}

^aHarvard Longwood Psychiatry Residency Training Program, Boston, MA, United States

^bBeth Israel Deaconess Medical Center, Boston, MA, United States

^cDepartment of Psychiatry, Harvard Medical School, Boston, MA, United States

1. Introduction

The prevalence of smartphone applications (apps) use and ownership continue to increase in the United States (Pew Research Center, 2015). Among the general population, a recent survey suggested that 52% of smartphone owners obtain health information through their phones. Ethnic minority adolescents between the ages of 12 and 14 years have high rates of smartphone ownership and medical apps use, with their parents also owning and using these apps at high rates (Singh et al., 2014; St George et al., 2016).

The actual effectiveness of smartphone apps for medical care is largely unknown. With respect to child health apps for parents, early studies indicate its feasibility in providing educational material, caregiving advice, social support, and stress management for parents with chronically ill children (Rodgers et al., 2013; Wesley and Fizur, 2015; Wang et al., 2016). With emerging data indicating the interest and feasibility of medical apps, many hope that new technologies like apps may decrease health disparities by providing low-income minority parents with child health information and by facilitating their engagement with the health care system (Swindle et al., 2014).

The potential for smartphone apps to reach minority populations has yielded research examining its use. Survey studies have shown that diverse populations use smartphones for medical advice. For instance, Latinos and African Americans between the ages of 18–49 or with a college education are more likely to use smartphones to seek health advice (Fox and Duggan, 2012). In a largely Hispanic sample of 244 patients from an internal medicine clinic in Los Angeles, low income and lack of a high school education predicted increased health app usage (Ramirez et al., 2016). While it stands to reason that smartphones and apps may be useful tools in extending healthcare services to these parents and diverse populations, the data indicating this is still nascent. One flaw in much of the existing literature is that studies

*Corresponding author at: Harvard Longwood Psychiatry Residency Training Program, 330 Brookline Ave, Rabb-2, Boston, MA 02215, United States., ewu4@bidmc.harvard.edu (E. Wu).

Conflict of interest

All authors do not have conflicts of interest to disclose.

assessing interest or utilization of online and app based health resources are conducted online, producing sampling bias (Krebs and Duncan, 2015).

Another weakness in the current literature is the lack of knowledge on health and technology literacy levels among populations that apps are hoped to help. Among the Chinese immigrant community, the methods for improving health literacy are not well known. While ethnic minority parents have expressed high interest in utilizing disease-specific smartphone apps to learn about their children's chronic medical conditions (St George et al., 2016), some research suggests that parents in South Asian and Chinese communities tend to passively obtain healthcare information mainly through scheduled primary care appointments and social networks (Kowal et al., 2015). There are limited communication strategies in ensuring that healthcare information is accessible for this population, which in turn, limits their ability to seek proper health care. Previous literature has assessed the multifactorial barriers that hinder Chinese Americans from seeking mental health treatment, and has emphasized the necessity for a cultural validated clinical approach (Leong and Lau, 2001). However, few studies have designed and evaluated the feasibility of a culture-customized intervention to improve mental health literacy and help-seeking behaviors in the Chinese immigrant community. With the increased clinical evidence mentioned above suggesting the feasibility of a medical app, we are interested in evaluating whether smartphone apps could potentially serve as an alternative approach for helping Chinese immigrant parents obtain child mental health resources.

This is a pilot study to evaluate the feasibility of a customized smartphone application that can deliver child mental health resources effectively to Chinese immigrant parents. First, we assessed the prevalence of smartphone and smartphone apps usage among Chinese immigrant parents with young children from the Greater Boston area. We also gauged their use of healthcare themed applications, their interest level of using smartphone apps to learn about child mental health, the topics they were most interested in learning, the resources they currently use to obtain child mental health information, and the barriers they face in accessing health related information through a mobile app. Second, we determined whether demographic background, such as income, education level, and years living in the US, was associated with the parents' interest in using mental health themed smartphone apps.

2. Methods

2.1. Participants

Participants were eligible if they self-identified as Chinese, and had at least one child between the ages of 3 to 10 years old. The participants were recruited in person at a public Chinese community event that took place in Quincy, Massachusetts (Greater Boston Area) on a single day in October 2016. A total of 100 Chinese immigrant parents ($n = 100$; 79% female; 35.8 ± 6.8 years old) were recruited for this project. They were given a choice of completing a paper-and-pencil survey in either English or Chinese.

2.2. Data collection

Recruitment and study approval were obtained from the Institutional Review Board at Beth Israel Deaconess Medical Center (BIDMC). A survey assessing Chinese immigrant parents' smartphone and smartphone apps ownership, and interest in using smartphone apps to obtain child mental health resources were distributed to eligible participants. A copy of the survey questions is displayed in Fig. 1. The survey was developed by our research team, clinicians who have clinical and research experience with this community. The survey items used to assess mental health relied on common terminologies familiar to the population. The survey was provided in both English and Chinese, and translated by the lead author E.W. A verbal consent that explained the purpose and voluntary nature of the study was obtained prior to the administration of the survey. A \$5 dollar gift card was provided to participants as compensation.

2.3. Measures

The outcome variable of this study was the parents' self-report of their interest in learning about child mental health via smartphone apps. Parents were asked to rate their level of interest (i.e., not interested, rarely interested, somewhat interested, interested, and very interested). Given the small sample size within categories, the outcome variable was recoded into a dichotomous variable by combining the "not interested" and "rarely interested" into "not interested", and the "somewhat interested" "interested" and "very interested" into "interested".

Three dependent variables representing participant's socioeconomic background were selected to evaluate the association with participants' interest level in learning about child mental health via smartphone apps. These dependent variables included self-reported education level, income level, and the length of stay in U.S.

To assess education level, we created a categorical variable based on participants' highest education degree. In this study, the education level was divided into three categories including "high school or lower", "college", and "graduate school or higher".

To assess income level, we created a dichotomous variable based on the total household income during the previous year. In this study, household income was characterized as either "low income" or "high income." The "low income" category included participants with household income lower than \$50,000. The "high income" category included participants with household income higher than \$50,000. We used this income cutoff based on the 2012 census data for Asian Americans in Massachusetts, which indicates a notable difference in the distribution of household income between the Asian Americans and the total population (Lo, 2012).

To assess the length of stay in U.S., we created a dichotomous variable that was divided into "10 years or less" and "above 10 years." Individuals who resided in the U.S in 10 years or less were considered as new immigrants, with this specification following the 1998 National Center for Health Statistics Advance Data report and other studies (Frisbie et al., 2001; LeClere et al., 1994).

2.4. Statistical analysis

Statistical analyses were conducted using IBM SPSS Statistics Version 24 software.

Chi square analyses were used to evaluate the association of socioeconomic status (SES) and the length of residence in US on parent interest in using child behavior themed smartphone apps.

To explore the impact of socioeconomic status (SES) and the length of residence in US on parent interest in using child behavior themed smartphone apps, a series of logistic regression models were established with the dummy variable first (crude model), then adjusted for age, gender, ethnic identity, and number of children (base model). Odds ratios and 95% CIs were recorded to measure the association of smartphone app interest and SES or length of residence in US.

3. Results

Table 1 presents participants' demographic information. Most participants were female immigrants from mainland China, younger than age 36, had less than a 12th grade education, lived in the U.S. less than 13 years, and with household income of less than \$35,000.

Table 2 presents the percent ownership of smartphone and smartphone apps, the preferred apps features, and the identified barriers in its use among the Chinese immigrant parents. Notably, 97% of participants currently own smartphones. Although there was a high prevalence of smartphone apps ownership (95%) among Chinese immigrant parents, only 19% had previous exposure to healthcare-themed smartphone apps (i.e. Apps about diabetes, herbal medicine, heart rate or walking tracker). Participants reported being interested in a variety of content related to parenting and children's mental health, with at least one fifth of participants indicating this within each category (parenting skills, child nutrition/diet, child tutoring programs, resources to obtain Child Psychiatrist/Psychology counseling, and child behavior problems), although only 19% of participants have seen or used smartphone apps related to these five topics before. The top three identified barriers to smartphone apps use were concerns for their complexity (23%), efficacy (18%), and privacy/security (17%).

Table 3 displays the interest level of using smartphone apps to learn about addressing child mental health problems, the specific topics of interest, and the participants' current means for obtaining child mental health information. Out of our sample, 89% of the participants reported interest in using child mental health themed smartphone apps. The top three specific child mental health topics that parents were interested in learning about included daily conduct problems (30%), attention deficit hyperactivity disorder (ADHD) (20%), and learning disabilities (19%). The top two most used means for obtaining information above were via social media (78%) and via talking to other people (54%).

To understand if the interest level of learning about child mental health varied by parent socioeconomic background, we analyzed the mean interest level by their income level, education level, and years of living in the U.S.

Fig. 2 displays the interest of using smartphone apps to learn about child mental health among Chinese immigrant parents, stratified by participants' education level. A significantly greater proportion of Chinese immigrant parents with lower educational background relative to those with a higher educational background showed interest in using smartphone apps to learn about child mental health ($\chi^2(2, N=98) = 12.52, P=0.002$). Fig. 3 displays the interest of using smartphone apps to learn about child mental health among Chinese immigrant parents, stratified by participants' household income while Fig. 4 displays the mean interest level of using smartphone apps to learn about child mental health among Chinese immigrant parents, stratified by participants' length of stay in U.S. There was no significant differences in interest in using smartphone apps based on household income levels ($\chi^2(1, N=96) = 2.19, P=0.14$) or length of stay in the U.S. ($\chi^2(1, N=96) = 1.03, P=0.31$).

4. Discussion

Our results indicate a high prevalence of smartphone and smartphone apps ownership among the Chinese community, although low utilization of smartphones apps for health. The average rate of smartphone ownership was 97%, with 95% of the participants reported having used smartphone apps in the past. This is higher than the average 68% of smartphone ownership in the general U.S. population, as reported by the 2015 Pew Research Center's technology device ownership survey (Pew Research Center, 2015). However, only 19% of our participants reported using medical themed apps to monitor the health of themselves or their children, whereas previous data shows approximately 62% of smartphone owners throughout the United States have obtained health information via smartphones (Pew Research Center, 2015). The top three reported concerns that hinder Chinese immigrant parents from using health-related smartphone app were its complexity, unclear evidence to work, and privacy/security. Hence, to improve the implementation of mental health themed apps, future app developers should aim to demonstrate the efficacy and effectiveness of such apps, to enhance user-friendly features, and to ensure that confidentiality would not be breached.

When taking into account socioeconomic background, our results indicated that parents with lower education showed higher interest in child mental health themed smartphone apps. These apps may be accessible and affordable methods for obtaining child mental health resources among less educated Chinese immigrants. This might be due to the lack of available local mental health services, and economic and geographic barriers to service access for Chinese immigrants from the inner city (Loo et al., 1989). Our results suggest that accessible and cost-effective smartphone apps may be a promising opportunity for improving parental awareness of child mental health problems and reducing mental health disparities.

Among the five possible child mental health themes to learn through an app, as listed in the survey (parenting skills, child nutrition, child tutoring, child behavior problems, and resources for child Psychiatrist/Psychology counseling), child behavior problems (19%) and resources for child psychiatrist/psychology counseling (20%) received the least amount of interest among the Chinese immigrant parents. This is consistent with many previous studies

showing lower help-seeking rates of mental health services and preventative care interventions in the Chinese community (Pew Research Center, 2015; Singh et al., 2014; St George et al., 2016; Rodgers et al., 2013; Wesley and Fizur, 2015; Wang et al., 2016; Swindle et al., 2014; Fox and Duggan, 2012; Ramirez et al., 2016; Krebs and Duncan, 2015; Kowal et al., 2015; Leong and Lau, 2001; Lo, 2012; Frisbie et al., 2001; LeClere et al., 1994; Loo et al., 1989; Choi and Miller, 2014; Kim and Lee, 2014; Flores et al., 2015).

However, 50% of all the participants responded to being either interested or very interested in learning about child mental health problems. These findings suggest that although the rate of child mental health service seeking might be lower than that of other types of child services among this population, there is still a large portion of the Chinese immigrant parents who expressed a relatively high level of interest in obtaining child mental health information. The top three most interested child mental health topics for Chinese immigrant parents were daily conduct problems, ADHD, and learning disability. It is possible that Chinese immigrant parents consider externalizing behavior problems as more worrisome (Tao et al., 2010; Eisenberg et al., 2009), and this may be highlighted through social media (Shan, 2007). From our study, the most common method by Chinese immigrant parents to obtain resources of child mental health was through social media, which suggests the feasibility of utilizing smartphone apps to deliver such resources within this population. Together, this could drive interest in resources for these disorders. To increase parental recognition and awareness of child mental illness in this community, future app development should address the clinical symptomatology and intervention on child mental health topics, including conduct disorder, ADHD, and learning disorders.

Our results are similar to previous work examining rates of smartphone ownership and health app use. In a Los Angeles sample of Latinos from an internal medicine clinic, high rates of smartphone ownership with only 17% ever having used health apps were observed (Ramirez et al., 2016). This rate is similar to the one obtained in our study (19% having used a health app) despite our study being located in Boston and with a different ethnic group. However, these rates are less than a cross-sectional online study conducted on general U.S. population, where 58% reported having downloaded a health app (Krebs and Duncan, 2015). It is possible that online studies may overestimate the prevalence of use.

5. Limitations

The limitations in this study should be noted. Since this is a pilot study, the analyses may be underpowered with our small sample size ($N = 100$), and female dominant (79%) sample population. The survey instrument itself can be more detail-oriented and standardized in the future. As well, this study was cross-sectional in nature and assessed survey responses from a single community event. Since we only recruited subjects at a single event on a single day, the results might be biased and may not reflect the Chinese immigrant population at large. Furthermore, as a community-based sample, the rates obtained in both app use and interest in health topics does not reflect actual prevalence rates of the population. In the future,

6. Conclusions

Our study indicates that there may be a very large percentage of smartphone ownership among low-income Chinese immigrants. Although a vast majority of these smartphone users have used smartphone apps in daily life, few of them have used mental health themed smartphone apps, citing concerns for their complexity, efficacy, and confidentiality. Although the rates of help seeking for child mental health and related services are known to be lower within the Chinese community, there seems to be a high level of interest in learning about resources within this among Chinese immigrant parents with a lower educational background. Given their interest, the development of customized smartphone apps may be a promising direction for raising awareness of child mental health, delivering educational resources about child behavioral health, and increasing access to related services among an underserved Chinese immigrant community.

Acknowledgements

Support during the preparation of this manuscript was provided through funding from Brigham Research Institute Microgrant at Brigham and Women's Hospital in Boston, Massachusetts. All authors have no financial relationships relevant to this article to disclose.

References

- Choi NY, Miller MJ, 2014 AAPI college students' willingness to seek counseling: the role of culture, stigma, and attitudes. *J. Couns. Psychol* 61 (7 (3)), 340–351. [PubMed: 25019538]
- Eisenberg N, Chang L, Ma Y, Huang X, 2009 Relations of parenting style to Chinese children's effortful control, ego resilience, and maladjustment. *Dev. Psychopathol* 21 (Spring (2)), 455–477. [PubMed: 19338693]
- Flores N, Supan J, Kreutzer CB, Samson A, Coffey DM, Javier JR, 2015 Prevention of filipino youth behavioral health disparities: identifying barriers and facilitators to participating in incredible years, an evidence-based parenting intervention, Los Angeles, California, 2012. *Preventing Chronic Disease* 12, E178 10.5888/pcd12.150186. [PubMed: 26491813]
- Fox S, Duggan M, 2012 Pew Internet and American Life Project Mobile Health Pew Research Center, Washington, DC <http://www.pewinternet.org/2012/11/08/mobile-health-2012/>.
- Frisbie WP, Cho Y, Hummer RA, 2001 Immigration and the health of Asian and Pacific Islander adults in the United States. *Am. J. Epidemiol* 153 (2 (4)), 372–380. [PubMed: 11207155]
- Kim PY, Lee D, 2014 Internalized model minority myth, Asian values, and help-seeking attitude among Asian American students. *Cultur. Divers Ethnic Minor. Psychol* 20 (1 (1)), 98–106. [PubMed: 23914745]
- Kowal SP, Jardine CG, Bubela TM, 2015 If they tell me to get it, I'll get it. If they don't...: Immunization decision-making processes of immigrant mothers. *Can. J. Public Health* 106 (4 (4)).
- Krebs P, Duncan DT, 2015 Health App Use Among US Mobile Phone Owners: A National SurveyHealth app use among US mobile phone owners: a national survey. *JMIR Mhealth Uhealth* 3 (11 (4)).
- LeClere FB, Jensen L, Biddlecom AE, 1994 Health care utilization, family context, and adaptation among immigrants to the United States. *J. Health Soc. Behav* 35, 370–384. [PubMed: 7844331]
- Leong FTL, Lau ASL, 2001 Barriers to providing effective mental health services to Asian Americans. *Mental Health Serv. Res* 3 (4), 201–214.
- Lo S, 2012 Asian Americans in Massachusetts: A census profileAsian Americans in Massachusetts: A Census Profile. Institute for Asian American Studies Publications (Paper 31) http://scholarworks.umb.edu/iaas_pubs/31.
- Loo C, Tong B, True RH, 1989 A bitter bean: Mental health status and attitudes in ChinatownA bitter bean: mental health status and attitudes in Chinatown. *J. Community Psychol* 17, 283–296.

- Pew Research Center, 10 29 Techonology Device Ownership; 2015 2015; <http://www.pewinternet.org/2015/10/29/technology-device-ownership-2015>.
- Ramirez V, Johnson E, Gonzalez C, Ramirez V, Rubino B, Rossetti G, 2016 Assessing the use of mobile health technology by patients: An observational study in primary care clinicsAssessing the use of mobile health technology by patients: an observational study in primary care clinics. *JMIR Mhealth Uhealth* 4 (2), e41. [PubMed: 27095507]
- Rodgers CC, Krance R, Street RL, Hockenberry MJ, 2013 Feasibility of a symptom management intervention for adolescents recovering from a hematopoietic stem cell transplant. *Cancer Nurs* 36, 394–399. [PubMed: 23842522]
- Shan H, 2007 ADHD Affects over 15 Million Chinese Children (8 <http://www.china.org.cn/english/China/219830.htm>).
- Singh A, Wilkinson S, Braganza S, 2014 Smartphones and pediatric apps to mobilize the medical home. *J. Pediatr* 165 (9 (3)), 606–610. [PubMed: 24986454]
- St George SM, Delamater AM, Pulgaron ER, Daigre A, Sanchez J, 2016 Access to and interest in using smartphone technology for the management of type 1 diabetes in ethnic minority adolescents and their parents. *Diabetes Technol. Ther* 18 (2 (2)), 104–109. [PubMed: 26840496]
- Swindle TM, Ward WL, Whiteside-Mansell L, Bokony P, Pettit D, 2014 Technology use and interest among low-income parents of young children: differences by age group and ethnicity. *Nutr. Educ. Behav* 46 (11-12 (6)), 484–490.
- Tao A, Zhou Q, Wang Y, 2010 Parental reactions to children's negative emotions: prospective relations to Chinese children's psychological adjustment. *J. Fam. Psychol* 24 (4 (2)), 135–144. [PubMed: 20438189]
- Wang J, Yao N, Shen M, Zhang X, Wang Y, Liu Y, Geng Z, Yuan C, 2016 Supporting caregivers of children with acute lymphoblastic leukemia via a smartphone app: a pilot study of usability and effectiveness. *Comput. Inform. Nurs* 34 (11 (11)), 520–527. [PubMed: 27385540]
- Wesley KM, Fizur PJ, 2015 A review of mobile applications to help adolescent and young adult cancer patients. *Adolesc. Health Med. Ther* 6, 141–148. [PubMed: 26316835]

1. Your Age: _____
2. Gender: ☐ M ☐ F
3. Total Years living in US: _____
4. What is your highest level of education that you have completed (Please select one):
- ☐ Elementary school
 - ☐ Middle school
 - ☐ High school
 - ☐ Some college
 - ☐ College
 - ☐ Graduate degree
5. Total Household Income (Please select one):
- ☐ < \$10,000
 - ☐ \$10,000–\$14,999
 - ☐ \$15,000–\$19,999
 - ☐ \$20,000–\$24,999
 - ☐ \$25,000–\$34,999
 - ☐ \$35,000–\$49,999
 - ☐ \$50,000–\$74,999
 - ☐ > \$75,000
6. Number of children: _____
7. What is the age and gender of each of your children: _____
8. Would you describe yourself as Chinese or Chinese American? (Please select one)
- ☐ Chinese ☐ Chinese American
9. What city and country were you born? (Please state): _____
10. Do you use smartphone: ☐ Y ☐ N
11. Smartphone type: ☐ iPhone ☐ Android ☐ I don't know
12. Have you used mobile apps before (i.e. Apps for Facebook, Google map, Wechat, or Line): ☐ Y ☐ N ☐ I don't know
13. Have you ever used a healthcare related apps on your phone (i.e. Apps about diabetes, herbal medicine, heart rate or walking tracker): ☐ Y ☐ No ☐ Don't know
14. What kind of mobile apps have you used? (Please state): _____
15. What language of mobile app do you prefer?
- ☐ English ☐ Chinese ☐ Both
16. With the options listed below, which themes below you would be interested in using mobile app to learn about (select all that apply):
- ☐ Parenting skills
 - ☐ Common child behavior problems
 - ☐ Resources to find child psychiatrist/psychology counseling
 - ☐ Children dietary nutrient
 - ☐ Local services for child education
17. Have you seen/used mobile apps to learn about topics mentioned above? ☐ Y ☐ N
18. What are the greatest barriers (if any) that prevent you from using smartphone app for health and parenting (select the most applicable one)
- ☐ They cost too much
 - ☐ They take too much time to use
 - ☐ They are too complex
 - ☐ They don't have evidence they work
 - ☐ They do not keep my information private or secure
 - ☐ They are not in my language
 - ☐ They are not relevant to my situation
 - ☐ None of the above
19. What aspects of child behavioral problem below are you interested in learning about causes and parenting advices (check all that apply):
- ☐ Attention deficit hyperactivity disorder (ADHD)
 - ☐ Oppositional defiant problem
 - ☐ Autism spectrum problem
 - ☐ Anxiety problem
 - ☐ Depression
 - ☐ Learning disability
 - ☐ Daily conduct problem
 - ☐ None of above
20. Please indicate the level of your interest in learning about behavioral problems in children (Please select):
- ☐ Not interested ☐ Rarely interested ☐ Somewhat interest ☐ Interested ☐ Very interested
21. Currently, how do you learn info about behavioral problems in children? (Select all that apply)
- ☐ Social media (i.e. WeChat, Line, Facebook, Twitter, Instagram, Youtube, Google, Blogs, Pinterest, etc.).
 - ☐ Local resources (i.e. Chinese community center, workshop, lectures).
 - ☐ Articles (i.e. Magazine, books, newspaper).
 - ☐ Exchange experience with other people (i.e. Spouse, Friends, Teachers, Priests).
 - ☐ Others. Please specify: _____

Fig. 1.

A copy of the survey questions reformatted to be displayed in a single figure.

Fig. 2.
Interest level of learning child behavior via smartphone apps stratified by education.

Fig. 3.
Interest level of learning child behavior via smartphone apps stratified by household income.

Fig. 4.
Interest level of learning child behavior via smartphone apps stratified by length of stay in U.S.

Table 1

Demographic characteristics of participants.

Age (Mean years)	35.8
Age (Range Years)	23–65
Gender (%)	
Male	21
Female	79
Education (%)	
Elementary School	1
Middle School	24
High School	26
Some College	5
College	32
Graduate School	12
Income Range (%)	
< \$14,999	16
\$15,000–\$19,999	17
\$20,000–\$24,999	16
\$25,000–\$34,999	12
\$35,000–\$49,999	8
\$50,000–\$74,999	11
> \$75,000	17
No Response	3
Years Living in US (Mean years)	12.9
Years Living in US (Range years)	1–40
Country of Origin (%)	
Mainland China	82
Hong Kong, China	6
United States	4
Vietnam	3
Myanmar	2
Taiwan	1
Bangkok	1
No Response	1
Ethnic Identity (%)	
Chinese	56
Chinese American	44
Children	
Number of Children (Mean years)	2
Number of Children (Range years)	1–3
Age (Mean years)	5.1
Age (Range years)	1–20

Table 2

Smartphone Apps Usage Among Participants who use a Smartphone.

Smartphone Use (% from overall sample)	97
Smartphone Type (%)	
iPhone	72
Android	25
Don't Know	2
No Response	1
Smartphone Apps Use (%)	95
Healthcare Themed Smartphone Apps Use (%)	19
Preferred Smartphone App Language (%)	
English	26
Chinese	33
Both	38
No Response	3
Interested Smartphone App Themes (Select all that apply) (%)	
Parenting Skills	30
Child Behavior Problems	19
Resource for Child Psychiatrist/Psychology Counseling	20
Child Nutrition	27
Child Tutoring Program	23
Previously Used Smartphone Apps with Themes Mentioned Above (%)	19
Barriers to Smartphone Apps Usage (%)	
Too complex	23
Don't have evidence to work	18
Don't keep personal information private or secure	17
Take too much time to use	13
Cost too much	9
Not relevant to my situation	7
Not in my language	3
No Response	10

Table 3

Interest Level for Learning Child Behavior via Smartphone Apps Among All the Participants.

Level of Interest (%)	
Not interested	6
Rarely interested	3
Somewhat interested	39
Interested	33
Very interested	17
No Response	2
Interested Child Behavior Topic (Select all that apply) (%)	
Attention deficit hyperactivity disorder (ADHD)	20
Oppositional defiant disorder (ODD)	15
Autism spectrum	8
Anxiety	9
Depression	7
Learning disability	19
Daily conduct problem	30
Current Means To Obtain Child Behavior Information (Select all that apply) (%)	
Social media	78
Community resources	19
Newspaper	38
Exchange experiences with other people	54