

Feasibility of Utilizing E-Mental Health with Mobile APP Interface for Social Support Enhancement: A Conceptional Solution for Postpartum Depression in Taiwan

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Abstract. Postpartum depression (PPD) is a common issue in global scale. Social support enhancement were proved to be effective for reducing PPD. Currently, there are few researches in Taiwan concerning the subject which were mentioned above. In the other hand, applying E-mental health (EMH) services for social support enhancement has become a trend in modern society. However, few EMH services were designed to target PPD audiences. This research aims to investigate the condition of PPD and social support in Taiwan, in addition, the research also took a look into local reception of EMH services. Questionnaire had been applied to 224 postpartum women through clinical field and forums on the Internet. The result indicates that 27.7% of participant shows potential high risk for PPD, the rate of potential high risk is higher than global average. Negative Correlation between PPD and social support were confirmed. Participants receive more informal social support compares to formal social support. Approximately 90% of the participants were user of EMH services (Social media, Chatroom, Internet forum/Bulletin Board System). About 30% of the participant utilize smartphone APP for EMH services, 25% the participant were unaware of the existence of smartphone APP for EMH services. According to the result, smartphone APP for EMH services were proposed to be a suitable solution for PPD in Taiwan.

Keywords: Mobile application interface · Postpartum depression · Social support · E-Mental health · Edinburgh postnatal depression scale

1 Introduction

1.1 Postpartum Depression

Postpartum depression (PPD) are categorized as one of the non-psychotic major depression, the global prevalence rate of PPD are approximately 10 ~ 15% [1–3]. The major

cause of PPD is believed to be rapid fluctuation of hormone in postpartum condition, other risk factors include a personal or family history of depression (prenatal depression included), low social support, impactful event during pregnancy, life pressure, and gestational diabetes mellitus [4, 5].

PPD often occurs in the postpartum period between 2–4 weeks to 1 year. The major symptoms of PPD include depressed mood, sadness, irritability, weeping, sleep and eating disturbances, feelings of worthlessness/excessive/inappropriate guilt, decreased concentration/ability to make decisions, feeling inadequate in taking care of the baby. The symptoms can persist for 2 weeks to months. For severe cases, the PPD patient has considered a plan to act on suicidal thoughts or has thoughts about harming her infant, thus, intervention such as medical assistant and care should be carried out.

The Edinburgh Postnatal Depression Scale (EPDS) [6] is a popular tool, which serves as a quick assessment for mental condition. The ideal screening time falls in the range between 2 weeks and 6 months after childbirth [7]. The woman who has been assessed with a positive result will be further evaluated by doctors, according to the Diagnostic and Statistical Manual of Mental Disorders, five edition (DSM-V).

Current treatment for PPD includes medicinal treatment and non-medicinal treatment. Although medicinal treatment is relative effective, the side effect of the medicine may raise the concern of breast-feeding mothers [8]. Non-medicinal treatment, in the other hand, is considered to be side effect free. Common non-medicinal treatment includes psychotherapy, supportive group, acupuncture, and yoga. Medical personnel often encourage postpartum to do activities, which concerns exercises, bask in the sun, and expand the comfort zone [9].

1.2 Social Support

Social support is believed to be one of a major factor that influences and indicates PPD condition [5, 10, 11]. Social support is generalized defined as material, cognition and emotional support provided by social network member or professionals [12, 13]. Social support can be divided into formal support and informal support, according to the source provider of support [14].

Formal support is provided by professionals (for example, medical personnel and social human service workers). Postpartum women often learn knowledge and skills from nurse or midwife, and being helped in the process transforming from women to a mother [15, 16]. Postpartum disease supportive group lead by professionals were effective in experiential support and reducing the sense of isolation for postpartum psychosis patient [17].

Informal support is provided by social network members (for example, family, friends, coworkers, supervisors, peers), and serves as the major source of support for postpartum women [18]. Influential of family members are believed to be the greatest [19], and practical support gained from partners and mother are considered very important [20]. In addition, peers provide emotional, information and evaluation support through experience sharing, and the degree of satisfaction are positive correlated with the among of time of the support [21].

1.3 E-Mental Health

E-Mental Health (EMH) system is a modern solution for psychological issues. The key functions of EMH system include information provision [22], assist of assessment, condition monitoring [23], intervention [24], and social support enhancement [25]. The tools and media such as Internet forum, chatroom, blog, and social media are often involved. Advantage of online community includes convenience, anonymous, interaction without opinion.

Social interaction for postpartum women is often reduced, for they tend to stay home for baby caring and physical recovery. By utilizing Internet, postpartum women can reach out to the world and establish connection with people, thus, sense of loneliness and depression can be reduced, as the result of social support and self-esteem enhancement [26]. For example, private group in Facebook are often used as a forum, user tend to exchange their opinion, and provide social support to each other [27, 28].

EMH services are flourishing in recent years, due to the widespread of smart phones and mobile applications (APP). Cost for development are comparatively low for APP compares to traditional mental health services. APP are not limited by location and time, thus it can be more reachable to the user. According to WHO, the key word “depression” hold the 2nd place for search popularity of mobile health APP, second only to “diabetes” [29]. Pregnant women tend to use smartphones for Internet browsing, and utilize APP for information gathering. However, for APP concerning depression, there are about only 23% percent of the app provides suitable functions and contents, and there are few supportive mobile health APP to be found [30].

1.4 Purpose of Research

There are few researches in Taiwan concerning PPD and social support currently, and there are little to none researches concerning suitability for utilizing EMH as a solution for PPD. The aims of this research are: (1) To investigate the condition of PPD in Taiwan, and try to comprehend the scope of the demand, (2) Inspect the condition of social support for postpartum women in Taiwan, and analyze the correlation between social support and PPD. (3) To investigate the utilization rate and circumstances of use for EMH in Taiwan, and consider whether it is suitable or not to utilizing EMH as a solution for PPD in Taiwan, and propose a fitting direction for EMH design.

2 Methods

2.1 Design

The course of survey started from October 2016 and finished in January 2017. Participants were asked to fill out an online questionnaire established with Google Forms.

2.2 Participants

Postpartum women were recruited in clinical field of Taipei Chang Gung Memorial Hospital and PTT Bulletin Board System (BBS). The criterions of eligibility for participant were: (1) Taiwanese only, due to the language barrier of foreigner. (2) Fluent with Chinese mandarin. (3) Age from 20 to 40 approximately. (4) Less than 1 year from date of childbirth. (5) Singleton baby only. (6) First-time mother and mother with multiple children were included.

2.3 Assessments

The questionnaire consist of 4 parts, which are: (1) Demographical data (age, education, occupation, number of children, age of infant, numbers of dates stayed in hospital after childbirth), (2) Multidimensional Scale of Perceived Social Support (MSPSS), (3) Taiwanese version of the Edinburgh Postnatal Depression Scale (EPDS-T), (4) the questionnaire of utilization rate and circumstances of use for EMH (social media, chat-room, forum/BBS) and related APP.

The Multidimensional Scale of Perceived Social Support (MSPSS) [31] is a 12-item research tool designed to measure perceptions social support. The subscales are categorized by 3 source provider of social support, which are: (1) medical personnel subscale (item 1, 2, 5, 10), (2) family subscale (item 3, 4, 8, 11), (3) friend subscale (item 6, 7, 9, 12). Score ranged from 1 to 7 were measured, and mean score were presented as result of MSPSS. Cronbach's α coefficient for the whole scale, medical personnel subscale, family subscale, and friend subscale were 0.88, 0.88, 0.89, 0.86 respectively.

The EPDS is a 10-item self-report instrument designed as a screening questionnaire to detect postnatal depression. In this study, we use Taiwan version of EPDS (EPDS-T) [32]. For each item, a positive score ranged from 0 to 3 were measured. Maximum score is 30, with a cut-off of 12/13. Participant with a score >12 are identified as mentally suffering, and should be aided by clinical intervention. In addition, a specific item in EPDS-T indicates suicidal tendency of the participant. Cronbach's α coefficient for EPDS-T is 0.89.

2.4 Data Analysis

The data collected were analyzed by SPSS 20.0.0 statistic software. Descriptive statistic were applied for basic data analyze, T-test was applied to analyze relationship between social support and PPD. Chi-square was applied to analyze detailed relationship between subscale of social support and PPD.

3 Results and Discussion

3.1 Demographic Characteristics

In this study, 224 postpartum women were recruited. The basic demographic characteristics of participant are listed below, please refer to Table 1 for additional information:

(1) Average age: 32.11 (SD 3.5), (2) numbers of dates stayed in hospital after childbirth: 4.09 (SD 1.4), (3) first-time mother: 74.6%.

Table 1. Demographic characteristic of the participants (n = 224)

Characteristic	Total		High risk group		Non-high risk group		χ^2	P
	n	%	n	%	n	%		
Number of participants	224	100.0	62	27.7	162	72.3		
Previous depression							7.120	.008
Diagnosed	9	4.0	6	9.7	3	1.9		
Non-diagnosed	215	96.0	56	90.3	159	98.1		
Age of maternal (in years)								NS
20–25	7	3.1						
26–30	65	29.0						
31–35	111	49.6						
36–40	41	18.3						
Age of infant (in months)								NS
0–3	125	55.8						
4–6	54	24.1						
7–9	25	11.2						
10–12	20	8.9						
Education								NS
High school	7	3.1						
Junior college	14	6.3						
College or university	129	57.6						
Graduate school	74	33.0						
Occupation								NS
Full-time	139	62.1						
Homemaker	85	37.9						

NS indicates not significant.

3.2 Prevalence of PPD

According to the point of cut off (12/13) of EPDS-T, participant with a score exceeding 12 are identified as high risk group for PPD. The result shows 27.7% of the participants were identified as high risk group for PDD. According to Table 2, the score for the participant ranged from 0 to 25.

Generally, previous studies indicate the rate for high risk group are ranged between 5.5–16.6%. A study concerning influence of postnatal depression on obstetric and perinatal outcomes, which involves 23220 participants, shows 10.4% rate of the participant scoring ≥ 12 [33]. A study involved 528 prenatal participant shows 5.5% for rate of high risk group [34]. 16.6% high risk rate were identified for a research concerning ethnic

Table 2. Percentage of EPDS score

Scores of EPDS	n	%
0–5	44	19.6
6–10	92	41.1
11–15	54	24.1
16–20	27	12.1
21–25	7	3.1

minorities in London [35]. According to Table 3, locally, result from previous studies in Taiwan indicated a range of 19.0–21.0% for PDD high risk rate.

Table 3. Prevalence of high risk of PPD in Taiwan

Author	Sample size	EPDS Cut-off	Time frame (days after childbirth)	High risk of PPD (%)
Huang and Mathers (2001)	100	12/13	0–3 months	19.0
Our study	224	12/13	0–3 months	14.7
Heh et al. (2004)	186	9/10	1–4 weeks	21.0
Our study	224	9/10	1–4 weeks	6.2

By comparing the result of this research and previous studies under the condition of equal cut-off point and timing, we found out that the local high risk rate has declined, but the high risk rate in Taiwan is comparative high than general high risk rate globally. The scope and severity of local PPD problem were demonstrated, a solution for the problem would be valuable.

The severity of depression is positively correlated with history of depression. The results of this study are consistent with previous study [4, 5]. According to Table 1, 4% of the participants were diagnosed with depression. The relative risk of participant with history of depression were 2.6 times higher than participant without history of depression.

Postpartum women stayed in hospital for only a short period (4.09 days in average), EPDS assessment are seldom applied widely in the period [38]. For the WHO suggestion, best screening opportunity are believed to be the return visit to the obstetrics in 4–6 week after childbirth, and the visit to pediatrics in 2 month after childbirth. Return visit to the obstetrics are often neglected or overlooked. As for the visit to pediatrics, attentions are paid mostly to the infant. Thus, mental state mother are not heeded [39]. According to the research result, smartphone APP is extensively accepted in Taiwan, suitability for applying EMH with APP interface as a convenient EDPS assessment interface were verified.

3.3 Social Support and PPD

According to Table 4, score of EPDS-T are negatively correlated with score of social support and its subscale (medical personnel subscale, family subscale, and friends subscale). The result indicates that enhancing social support is a suitable counter-measure for local PPD problem.

Table 4. Correlations between social support and PPD (n = 224)

Social support	High risk group (n = 62)		Non-high risk group (n = 162)		T test		Total		Correlation coefficient, <i>r</i>
	Mean	SD	Mean	SD	<i>t</i>	<i>p</i>	Mean	SD	
Total social support	4.65	0.89	5.11	0.80	-3.779	.000	4.98	0.85	-.320**
Formal support	3.80	1.30	4.33	1.19	-2.904	.004	4.18	1.24	-.184**
Informal support	5.08	1.00	5.52	0.84	-3.307	.001	5.40	0.90	-.323**
Family support	5.02	1.17	5.59	0.98	-3.743	.000	5.43	1.06	-.371**
Friend support	5.18	1.14	5.46	0.90	-1.949	NS	5.38	0.98	-.185**

** P < .01, NS indicates not significant.

Previous study shows informal support and PPD are significant correlated, on the other hand, correlation between informal support and PPD are insignificant [19]. In this research, social support of non-high risk groups significantly higher than high risk group. Postpartum women receive informal support (mean = 5.40, SD 0.90) more than formal support (mean = 4.18, SD 1.24). Reinforcement for formal support may be helpful for countering PPD problem.

For informal support, participant received more support from family than friends. Family and friends are proved to be major source of support for postpartum women [18]. Both family support and friends support are negatively correlated with PPD in this research, implying the feasibility of developing related EMH features for these targeted audiences.

3.4 Reception for EMH and Smartphone APP as EMH Interface

88.4% of the participants were identified as EMH services user (current user or former user). 71.4% were identified with experience of joining social media groups; 49.1% were identified with experience using chatroom; 74.6% were identified with experience using forum/BBS. the high reception of EMH indicates the proposal for EMH as PPD countermeasure can be perceived positively.

All of participants show the habit of using smart phones. There is 66.5% being identified for using related app. Although the reception are positive, the content of EMH with APP interface were not perceive as trustworthy enough, only 35% of the APP were recognized for including information that is reliable or intact [40]. The 28.6% of participants are unaware of the existence of EMH APP. In addition, most of the participant are identified as member of online supportive group, such supportive group includes mother group, mother chatroom, APP for postpartum community, and forum/BBS. The reception of APP as EMH interface shows there are space for improvement, especially in information quality and availability for EMH with APP interface.

3.5 Limitations

The limitations of this research includes survey environment, category of EMH, and data analysis. (1) For survey environment, conditions were not equivalent between clinical environment and web survey. The researcher interprets meaning of question for participant in clinical environment, but not on the web survey. (2) The content of EMH have been slightly modified. There a no distinctive difference for contextual meaning between the word “Internet forum” and “BBS” in Taiwan in general, so the researcher made modification and combined the two word into a single one, which is “Internet forum/BBS”. Blog is personal, and considered to be non-mainstream social media. In Taiwan, few people follow and subscribe bloggers proactively, so the item concerning blog in EMH was removed. For the reason mentioned above, the reliability and validity for questionnaires applied in this research should be verified in the future. (3) For data analysis, this research applied only correlation analyze between social support and PPD. Previous studies generally examine the relationship further by utilizing path analysis. Thus, path analysis should be carry in the future to inspect condition of influence between the two factors.

4 Conclusion

This research aims to investigate the condition of PPD and social support in Tai-wan. In addition, the research also took a look into local reception of EMH services. Based on the result, conclusions are made and listed as below:

1. The rate of PPD high risk group (Scoring >12 in EPDS-T) is comparatively high in Taiwan, and room for improvement exist for EPDS assessment. Indicating a serious problem concerns a large proportion of local population.
2. Social support is verified as a negative correlated factor for PPD, thus, it may be suitable to be manipulated as PPD countermeasure. Participants receive higher informal social support than formal social support. For informal support, participant received more support from family than friends.
3. A positively perceived opportunity gap exists in developing EMH for PDD, EMH with APP interface is suitable. For local participant, 88.4% were EMH user, 66.5% were user of EMH with APP interface, and 28.6% of the user are unaware of the existence of EMH with APP interface.

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