RESEARCH ARTICLE

Perinatal mental e-health: What is the profile of pregnant women interested in online assessment of their emotional state?

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Abstract

Aim: This study explores the profile of pregnant women interested in the online assessment of their emotional status according to their sociodemographic and obstetric characteristics, history of psychopathology, and healthcare setting used (private vs. public).

Design: This is a comparative and descriptive cross-sectional study.

Method: Participants were 281 Spanish pregnant women assessed with the MamáFeliz (HappyMom) website.

Results: Participants were probably to be unemployed, in a relationship, and generally had a high educational level and an intermediate economic status. Most of them were primiparous, had non-complicated natural pregnancies and presented healthy habits and good physical and emotional health, despite 31.3% of them had a history of psychological treatment. Our results reveal the profile of women interested in the online assessment of their emotional status, which can contribute to improving future initiatives to facilitate rapid screenings of perinatal mental health by nurses in both public and private settings.

KEYWORDS
e-health, perinatal mental health, pregnant women, prenatal depression, screening

1 | INTRODUCTION

Pregnancy and motherhood are life stages in which women experience major biological, psychological and social changes (Guardino & Dunkel Schetter, 2014). The idealization of pregnancy (Law et al., 2021) can generate unrealistic expectations and negatively impact women who are more vulnerable to stress and mood disorders (Staneva et al., 2015). Indeed, recent studies have reported prenatal depression (PDe) and postpartum depression estimates of between 9.2%–19.2%, and between 9.5%–18.7% (Woody et al., 2017), respectively. Moreover, PDe can have statistically significant negative consequences on both the physical and the

mental health of the mother and the newborn (Field et al., 2010) in the short and the long term (Tien et al., 2020).

Detecting prenatal depressive symptomatology is fundamental for healthcare professionals because these symptoms often overlap and are commonly confused with typical pregnancy and postpartum symptoms, such as major weight changes, sleep difficulties and fatigue (Carter et al., 2019). This often results in underdiagnosing and undertreating depressive symptoms during this period (Kingston et al., 2015). It is therefore important for professionals to be trained in perinatal mental health (PMH) (Morrell et al., 2015) and to have adequate tools for the detection of risk factors related to perinatal emotional disorders (Howard & Khalifeh, 2020). In this scenario, international organizations (American College of Obstetricians and Gynecologists, 2018; Curry et al., 2019; NICE, 2015) have emphasized the need to evaluate a set of risk biopsychosocial factors associated with PDe with strong empirical support such as, personal or family history of psychopathology, a history of gender violence, stressful life events, socio-economic status, social support and several obstetric factors, such as previous abortions (Biaggi et al., 2016).

1.1 | Background

Pregnancy monitoring programmes can facilitate screening for mental health status thanks to frequent face-to-face appointments with healthcare professionals involved in perinatal care, including hospital maternity/obstetric teams, primary care teams and midwives. However, mental health professionals, including mental health nurses, should be also involved in the care of perinatal women. In fact, recent studies have shown that low-intensity supportive counselling programmes provided by nurses and midwives can have a statistically significant beneficial effect on perinatal depressive symptoms (Wang et al., 2021). It is therefore necessary to encourage their involvement in all perinatal processes and to facilitate the development of knowledge and skills to address all aspects of perinatal mental health, including the detection and assessment of risk factors for positive mental health (Higgins et al., 2018).

Some barriers to achieve this, however, do exist, both in the women and in the professionals. In the former, some of these include the social stigma associated with mental disorders, the women's limited time while caring for another child, the geographical distance and the economic costs involved (Donker et al., 2015), while the lack of resources and skills to screen for and deal with perinatal mental health problems are frequent barriers in the professionals (Byatt et al., 2013). While acknowledging this, many clinicians are willing to provide flexible models of care to perinatal women to strengthen their engagement with the treatment, to empower the mothers and to enhance the therapeutic relationship (Myors et al., 2015).

The use of Information and Communication Technologies (ICT) in the mental health field (e-mental health) is an alternative to traditional face-to-face assessment methods that can help overcome the aforementioned barriers (Donker et al., 2015). Across countries, there is a great heterogeneity of health services (private vs. public

healthcare), which rely on different bodies with various responsibilities, interests and values. However, successful implementation of digital health strategies is important for all services and requires both public and private financial investment (Odone et al., 2019). In addition, both pregnant women (Osma, Barrera, & Ramphos, 2016) and mental health professionals appear to be interested in the use of ICT for perinatal care (Osma et al., 2017). Despite this, the extent to which there is a profile of women who is particularly interested in such tools is unknown. This is important to develop awareness and motivation campaigns to use these tools, which should be particularly addressed to women who initially show less interest in using these tools for their mental health monitoring.

Our team developed a website for mental health monitoring called MamáFeliz (MMF) [HappyMom]. The objective of this study is to explore the socio-demographic, obstetric and psychosocial profile of the pregnant women who showed an interest in using this website to assess their emotional state over time. We also studied the differences in their profile based on their personal history of psychopathology and the private or public nature of the health centre they were attending. In doing so, we investigated whether the study of correlates of prenatal depressive symptoms with our online tool replicated previous findings (i.e. sources of validity evidence of the new assessment tool). Finally, we discuss potential barriers found with ICT use that could negatively impact implementation purposes (i.e. feasibility). This is important because past research reveals barriers with ICT implementation in health settings, such as data costs associated with use, slow Internet connectivity, low technological literacy rates in the target population, language barriers and fear of data safety (Ralston et al., 2019).

2 | METHODS

2.1 | Participants

The study sample comprised 281 pregnant women who attended their corresponding public or private health services to carry out the medical follow-up of their pregnancy status. In total, researchers provided 4,500 codes to the health professionals collaborating in the study. These codes could be provided to women who met inclusion criteria. The number of codes that were administered to women is unknown because the burden of clinical practice in hospitals difficulted registering this data. Despite this, we know that 2,797 women registered into the programme and 281 of them (10.0%) completed the assessments during the prenatal period.

2.2 | Procedure

The healthcare professionals in charge of pregnancy control (i.e. midwives, obstetricians and nurses) at the health services collaborating in the study (blind note) provided information about the study and the access personal code to allow for voluntary

registration on the MMF website to all women who met the inclusion criteria (pregnant women, over 18 years old, with access to the Internet, and fluent in Spanish). MMF offers an evaluation protocol divided into five phases: two during the prenatal period (gestational weeks 16–24 and 30–36) and three during the post-partum period (weeks 2, 4 and 12). After signing the informed consent digitally, registered women could start the assessment. The steps were as follows:

1. Filling in personal date.
2. The system sends the user to the evaluation phase according to her week of pregnancy or informs her that she will be informed by email or SMS when the evaluation will be available for her.
3. Assessment part I: Socio-demographic, obstetric, medical and health habits information.
4. Assessment part II: Psychological screening.
5. The user receives information about her mood.

In this study, we provide data on the women who completed the assessment during one of the two antenatal periods.

2.3 | Instruments

The complete list of measures administered in the MMF website are described in Table 1.

2.4 | Statistical analysis

All the statistical analyses were performed with the Statistical Package for the Social Sciences software (SPSS) version 22.0 (IBM Corp, 2013). First, a descriptive analysis of the sample was conducted and scores were compared against female population norms. This calculation was made only for the variables that had Spanish normative scores (personality traits, state/trait anxiety, self-esteem, positive and negative affect, coping strategies, mood and social support). Even though some of the variables in our sample were not normally distributed, a t test was implemented in this case because population norms only included means and standard deviations, which means that non-parametric tests could not be calculated.

Next, differences were explored between women who had received previous psychological treatment and those who did not, as well as between those who used private healthcare services and those who received health care at public institutions only. To do so, we computed a chi-squared analysis for the dichotomous variables and a Mann–Whitney "U" analysis for the quantitative variables because study variables did not follow a normal distribution (in this case, because this included our data only, a non-parametric test was feasible). The odds ratio (OR) was calculated when statistically significant differences were found between variables. To explore the relation between the independent variables and depressive symptoms (dependent variable), a bivariate correlation was used with the

Spearman coefficient (sources of validity evidence). To minimize the risk of type I errors, the significance level was set at $p < .01$.

2.5 | Ethics statements

This study received approval from the Ethical Committees of the (blind note) for the project entitled: "Mamáfeliz" and all its procedures (reference number CP12/2012).

3 | RESULTS

3.1 | The socio-demographic, obstetric, medical and health habits profile of MMF users

The socio-demographic profile of MMF users was as follows: average age of 33 years (range = 18–43; SD = 4.2), Spanish nationality (93.9%), living with a partner (78.7%), tertiary level of education (87.6%), annual income under €30,000 (57.3%) and were not working at the moment when the assessment was made (51.3% of women were unemployed or on sick leave).

Regarding obstetric variables, most women were primiparous (75%), had natural (89.1%) and non-complicated pregnancies (19.8%) that had been planned (84.8%), and did not have a history of abortion (82.5% of women reported not having previous abortions). Regarding medical history, most women presented no medical diseases (85.1%) and no family history of psychopathology (50.5%). Almost a third of women (31.3%) reported having received previous psychological treatment, mainly for anxiety (15.6%) and depression (12.3%). Regarding health habits, approximately 12% of women smoked during pregnancy and 4.1% reported some alcohol use. The descriptive variables of the participants are seen in Table 2.

3.2 | Psychosocial profile of MMF users

Table 3 shows the means and standard deviations of the women's scores in the psychological variables, as well as a comparison with population normative scores. The pregnant women in our study showed a personality profile characterized by low N (t = 11.66; $p < .001$), P (t = 10.59; $p < .001$), anxiety trait (t = 8.26; $p < .001$) and negative affect (t = 11.66; $p < .001$), as well as high self-esteem (t = −5.01; $p < .001$). The participants obtained high scores in positive coping strategies (i.e. Seeking Social Support [t = −10.42; $p < .001$]) and negative coping strategies (i.e. Emotional Expression Open [t = −21.91; $p < .001$]). The levels of prenatal depressive symptoms in our sample were comparable to those of normative populations (t = 2.10; p = .036), and anxiety symptoms were lower than in the general population (t = 10.84; $p < .001$). Perceived social support was higher in our sample compared with normative data (i.e. friends support [t = −4.71; $p < .001$]). Finally, anxiety control, stressful life events, maladjustment, quality of life and marital adjustment scores

TABLE 1 Description of the psychological measures administered with the MamáFeliz program

Instrument name and authors	Construct assessed	Characteristics
Biographical interview ad hoc.	Socio-demographic, obstetric, medical, and health habits.	Interview that includes multiple items to assess the aforementioned constructs. It takes approximately 10 min to complete.
Revised Eysenck Personality Questionnaire Spanish validation by Eysenck and Eysenck (2001)	Personality dimensions: Neuroticism (N), Extraversion (E) and Psychoticism (P).	Each subscale is composed of 12 items with a dichotomous response scale (yes/no). Higher scores represent increased neuroticism, extraversion, and psychoticism.
State–Trait Anxiety Inventory Spanish validation by Spielberger et al. (1982)	State (transitory emotional condition; STAI-S) and trait (relatively stable anxiety tendency; STAI-T) anxiety.	It comprises 40 items divided in two subscales. Items are rated on a 4-point Likert scale from 0 = *almost ever* to 3 = *almost always*. Greater scores indicate higher anxiety symptoms.
Rosenberg Self-Esteem Scale Spanish validation by Vázquez-Morejón et al. (2004) and Martín-Albo et al. (2007)	Overall self-esteem, understood as feelings of personal worth and self-respect.	It includes 10 items rated on a 4-point Likert scale from 1 = *completely agree* to 4 = *completely disagree*. Half of the items are direct, while the remaining five items are reverse coded. Higher scores indicate increased self-esteem.
Positive Affect Negative Affect Scale Spanish validation by Sandín et al. (1999)	Positive (PANAS+) and negative affective states (PANAS−).	Each subscale is composed of 10 affect descriptors that are responded on a Likert scale from 1 = *nothing or almost nothing* to 5 = *very much*. Higher scores represent higher positive and negative affect.
Revised Anxiety Control Questionnaire Spanish validation by Osma, Barrada, et al. (2016)	Beliefs related to one's perception of anxiety control.	It is composed of 15 items that can be grouped in three subscales (emotional control, threat control, and stress control) or in a total score. It is responded using a 6-Points Likert scale from 0 = *totally disagree* to 5 = *totally agree*. Four items are direct, while 11 are reverse coded. Total scores indicate greater perceived anxiety control.
Coping Stress Questionnaire (Sandín & Chorot, 2003)	Seven coping styles: search for social support (SSS); emotional expression open (EEO); religion (RLG); focus on problem-solving (FPS); avoidance (AVD); negative self-focusing (NSF); positive reappraisal (PR).	It is composed of 42 items arranged in seven coping styles. It is responded using a 5-point Likert scale from 0 = *Never* to 4 = *Almost always*. Higher scores indicate more frequent use of each coping skill.
Stressful Life Events Scale Spanish validation by De Rivera et al. (1983)	Exposure to stressful life events that a person may have experienced in the last year.	This version includes 43 potentially stressful life events. Participants select the events experienced during the last year.
Edinburgh Postnatal Depression Scale (EPDS) Spanish validation by Garcia-Esteve et al. (2003) and Vázquez and Míguez (2019)	Self-perception of depressive symptoms in the last 7 days (it excludes the typical somatic symptoms of the perinatal stage).	It is composed of 10 items that are responded using a 4-point Likert scale. Three items are direct (0 = *as much as ever* to 3 = *No, not at all /ever*), while the remaining seven items are inverse (0 = *No, never* to 3 = *Yes, most of the time*). Higher scores indicate more severe depressive symptoms.
Maladjustment Scale (Echeburúa et al., 2000)	Measure of how psychological distress affects different areas of daily life: work or studies, social life, leisure time, family life, and other relationships.	It includes five items that use a 6-point Likert scale from 0 = *none* to 5 = *very serious*. Higher scores represent higher maladjustment.

TABLE 1 (Continued)

Instrument name and authors	Construct assessed	Characteristics
Quality of Life Index (Mezzich et al., 2000)	Quality of life in different areas (physical, emotional well-being, self-care, occupational and interpersonal functioning, social support, personal, and spiritual) and overall quality of life.	It comprises 10 items that are responded based on a 11-point Likert scale from 1 = *bad* to 10 = *excellent*. Higher scores indicate better quality of life.
Marital Adjustment Scale Spanish validation by Carrobles (1996)	Adaptation and satisfaction with the couple related to family living.	It is composed of 15 items with different response scales each. Total scores range from 0–158, where higher scores indicate better marital adjustment.
Multidimensional scale of perceived social support Spanish validation by Landeta and Calvete (2002) and Zimet et al. (1990)	Perceived support in three areas: family (F), friends (Fr), and other significant people (OSP). A total score (MSPSS total) can also be used.	Each subscale is composed of four items assessed on a 7-point Likert scale from 1 = *strongly disagree* to 7 = *strongly agree*. Higher scores represent higher perceived support.

could not be compared because normative scores do not exist for women. However, these results can be considered in the range of normality taking into account the cut-off points on these scales.

3.3 | Differences in the profile of users depending on whether they had received psychological treatment and their use of public or private health services

The results showed that the women who had received previous psychological treatment were 2.62-fold (OR = 0.38 [95% CI: 0.22–0.66]; 1/0.38 = 2.62) more probably to have a family history of psychopathology (χ^2[1, 268] = 12.533, $p < .001$).

Regarding the psychosocial variables (Table 4), the women with previous psychological treatments obtained significantly higher mean scores for neuroticism, trait anxiety, stressful life events (score of stressful life events experienced in the last year), number of stressful life events, depressive symptomatology, maladjustment and lower perceived emotional anxiety control, perception of family and global social support (all $p < .01$).

Our results also evidenced that women who had received previous psychological treatment were 2.57-fold (OR = 2.57 [95% CI: 1.28–5.15]) more probably to have used private healthcare services (χ^2[1, 144] = 7.203, $p = .007$). No additional significant association was found between the type of medical institution used (public vs. private) and any of the study variables (all $p > .01$).

3.4 | Bivariate relation between prenatal depressive symptoms and the socio-demographic, obstetric, medical, health habits and psychosocial variables

As shown in Table 5, the results indicated that none of the evaluated socio-demographic, obstetric, medical and health habit variables had statistically significant associations with depressive symptoms (all $p > .01$). Only the women who referred

previous psychological treatment presented greater depressive symptomatology ($r = -.17$, $p = .008$).

Unlike the remaining variables, the psychological factors significantly correlated with depressive symptom severity. Specifically, neuroticism, psychoticism, anxiety (state and trait), negative affect, maladjustment, stressful life events and the number of stressful life events experienced, and negative coping strategies (Emotional Expression Open and Negative Self-Focusing) were associated with increased depressive symptoms (all $p < .01$). Likewise, they also showed that high extraversion, positive affect, self-esteem, perceived anxiety control, marital adjustment and perceived social support from family, friends, other significant people and global, as well as three coping strategies (Search for social support, focus on problem-solving and positive reappraisal) were associated with less severe depressive symptoms (all $p < .01$). The results of the correlations are seen in Table 5.

4 | DISCUSSION

The main contribution of this study is the broad description of the socio-demographic profile, obstetric, medical history, health habits and psychosocial profile of the pregnant women interested in using a website to evaluate their emotional state over time during pregnancy. According to our results, the MMF users were women aged over 30 years who lived with their intimate partner, had a tertiary level of education, reported a medium level of income and did not work. Most of them were new mothers with a planned, non-complicated natural pregnancy and generally indicated no history of abortion. They did not present any medical illness and generally indicated no toxic habits (alcohol use and smoking). They also generally did not indicate family history of psychopathology, while a third of them reported having a personal history of psychological treatment (often for anxiety and/or depression). Finally, the women presented a psychological profile characterized by adequate global functioning, low neuroticism, low psychoticism, low negative affect, low anxiety trait and high self-esteem. Also, a frequent use of positive and negative coping strategies emerged, which might be interpreted

TABLE 2 Socio-demographic and obstetric characteristics, medical history, and health habits of the MamáFeliz users (N = 281), and differences between those with and without previous psychological treatment

Variable	N (%)	With PPT	Without PPT	χ^2	p
Socio-demographic					
Nationality	267				
Spanish	248 (93.9)	77 (28.8)	171 (64)	0.275	.600
Others	19 (7.1)	7 (2.6)	12 (4.5)		
Marital status	267				
With a living partner	210 (78.7)	66 (24.7)	144 (53.9)	0.001	.983
Without a living partner	57 (21.3)	18 (6.7)	39 (14.6)		
Level of education	267				
≤12 years of education	33 (12.4)	7 (2.6)	26 (9.7)	1.834	.176
>12 years of education	234 (87.6)	77 (28.8)	157 (58.8)		
Employment situation	267				
Work	130 (48.7)	38 (14.2)	92 (34.5)	1.221	.543
Unemployed	69 (25.8)	21 (7.9)	48 (18.0)		
On sick leave	68 (25.5)	25 (9.4)	43 (16.1)		
Level of income	267				
≤30,000 €/year	153 (57.3)	45 (16.9)	108 (40.4)	0.698	.404
>30,000 €/year	114 (42.7)	39 (14.6)	75 (28.1)		
Healthcare insurance	144				
Yes	57 (39.6)	29 (20.1)	28 (19.4)	7.203	.007
No	87 (60.4)	25 (17.4)	62 (43.1)		
Obstetric					
Number of pregnancies	268				
Primiparous	201 (75)	62 (23.1)	139 (51.9)	0.092	.761
Multiparous	67 (25)	22 (8.2)	45 (16.8)		
Previous abortions	268				
Yes	51 (17.5)	15 (5.6)	32 (11.9)	0.009	.926
No	221 (82.5)	69 (25.7)	152 (56.7)		
Type of pregnancy					
Natural	211	61 (28.9)	127 (60.2)	1.117	.291
Assisted reproduction	23 (10.9)	10 (4.7)	13 (6.2)		
Complicated pregnancy	239				
Complicated	194 (72.4)	18 (6.7)	35 (13.1)	0.802	.670
Non-complicated	53 (19.8)	58 (21.6)	136 (50.7)		
Do not know/no answer	21 (7.8)	8 (3.0)	13 (4.9)		
Planned pregnancy	211				
Yes	179 (84.8)	63 (29.9)	116 (55.0)	1.264	.261
No	32 (15.2)	8 (3.8)	24 (11.4)		
Medical history and health habits					
Medical illness	268				
Yes	40 (14.9)	16 (6.0)	24 (9.0)	1.637	.201
No	228 (85.1)	68 (25.4)	160 (59.7)		
Family psychopathological history	281				
Yes	139 (49.5)	57 (21.3)	82 (30.6)	12.533	<.001
No	142 (50.5)	27 (10.1)	102 (38.1)		

TABLE 2 (Continued)

Variable	N (%)	With PPT	Without PPT	χ^2	p
Previous psychological treatment	268				
Yes	84 (31.3)				
Anxiety	42 (15.6)				
Depression	33 (12.3)				
Anxiety and depression	9 (3.4)				
No	184 (68.7)				
Smoker	274				
Yes	33 (12.0)	8 (3.0)	14 (5.3)	0.301	.583
≤10 cig/week	23 (8.4)				
>10 cig/week	10 (3.6)				
No	241 (88.0)	74 (28.1)	167 (63.5)		
Drink alcohol	271				
Yes	11 (4.1)	2 (0.8)	1 (0.4)	1.781	.182
≤5 times/week	11 (4.1)				
>5 times/week	0				
No	260 (95.9)	80 (30.4)	180 (68.4)		
Variable	**M (SD)**	**With PPT** **M (SD)** **(N = 84)**	**Without PPT** **M (SD)** **(N = 183)**	**U**	**p**
Age	33.0 (4.2)	33.8 (4.0)	32.7 (4.3)	6,559.0	.054

Abbreviations: *M*, Mean; *p*, level of significance; PPT, Previous Psychological Treatment; *SD*, Standard Deviation; *U*, Mann–Whitney's *U*; χ^2, chi-square statistic.

as showing that coping resources might be more necessary during pregnancy. In general, the participants presented a low level of state anxiety and depressive symptoms, as well as a moderate level of maladjustment. They generally enjoyed a good quality of life, a good adjustment with their partners and high perceived social support.

A few studies have described the socio-demographic, obstetric and psychosocial profiles of women participating in online screening programmes during pregnancy, which limits the comparability of the findings. Similarities, however, exist between the present and past research in terms of age, partner cohabitation status, educational level (Barrera et al., 2014; Marcano-Belisario et al., 2017), income (Drake et al., 2014), employment status and percentage of primiparous women (Teaford et al., 2015). However, these studies do not report extensive obstetric data, such as type of pregnancy (natural vs. assisted reproduction) or history of abortion. Regarding the evaluation of psychological factors, similar ICT-based studies have focused mainly on the evaluation of depression and anxiety symptoms.

Similar to past research, our findings strengthen the idea that certain characteristics, such as income, educational level, nationality, pregnancy planning, parity or the opportunity to communicate with other pregnant women might influence the willingness to use e-mental health screening in this population (Mo et al., 2018). Since our target population included all pregnant women users of the public or private health system (regardless of their nationality or economic status), we can infer from our results that profiles of more vulnerable and underprivileged pregnant women (i.e. less educated

and more economically disadvantaged), who might experience more difficulties in accessing and handling technological tools (Mo et al., 2018). To overcome these barriers, several strategies might be necessary. On the one hand, real implementation will require investing in health care, recognizing the use of technology as a priority at all government levels (from local to state) and defining the tasks required by all the professionals involved (Dattakumar et al., 2012). Importantly, this should be done with an appropriate socio-cultural approach (Berg et al., 2003). On the other hand, local health systems should be provided adequate materials and human resources (e.g. training courses for technology-use learning, hiring device loan services and appointing professionals who will be in charge of supervision and problem-solving).

The MMF website allowed us to explore the existence of possible differences between the pregnant women according to their history of mental health and the type of healthcare setting, as well as the relationship between biopsychosocial variables and the severity of depressive symptoms. Our results showed that the women who received psychological treatment for depression and/or anxiety before pregnancy were more probably to present a family history of psychopathology, stressful life events, higher neuroticism, less anxiety control and anxious and depressive symptoms, as well as poorer adjustment and social support. All these factors have been demonstrated to increase their vulnerability towards emotional disorders during pregnancy (i.e. Milgrom et al., 2019). The results also showed that women who had received prior psychological treatment were

TABLE 3 Descriptive statistics of psychological variables and comparison with normative scores

Variables	MamáFeliz sample size	Pregnant women M (SD)	Reference Female Population[a] M (SD)	t	p	d
Personality						
EPQ-RS (N)	268	3.7 (3.3)	6.6 (3.4)	11.66	<.001	0.86
EPQ-RS (E)	268	8.3 (2.9)	8.2 (2.9)	−0.47	.640	0.03
EPQ-RS (P)	268	2.0 (1.8)	3.8 (2.5)	10.59	<.001	0.83
STAI-T	244	18.2 (9.8)	24.9 (10.0)	8.26	<.001	0.68
RSES	250	33.1 (4.7)	31.1 (4.6)	−5.01	<.001	0.43
PANAS+	247	30.9 (7.1)	30.4 (6.1)	−0.97	.332	0.07
PANAS−	247	16.8 (5.5)	22.7 (6.8)	11.66	<.001	0.95
Coping						
ACQ-R (EC)	232	13.7 (5.1)	NA	—	—	—
ACQ-R (TC)	232	21.0 (5.4)	NA	—	—	—
ACQ-R (SC)	268	11.8 (3.8)	NA	—	—	—
ACQ-R total	268	46.5 (11.7)	NA	—	—	—
CSQ (SSS)	227	20.4 (5.7)	14.4 (6.2)	−10.42	<.001	1.00
CSQ (EEO)	227	13.2 (3.0)	6.2 (3.6)	−21.91	<.001	2.11
CSQ (RLG)	227	8.7 (4.4)	6.4 (5.9)	−4.60	<.001	0.44
CSQ (FPS)	227	21.3 (4.7)	14.5 (4.8)	−14.77	<.001	1.43
CSQ (AVD)	227	15.5 (3.6)	9.6 (4.4)	−15.23	<.001	1.47
CSQ (NSF)	227	12.8 (3.5)	6.3 (3.5)	−19.15	<.001	1.86
CSQ (PR)	227	20.8 (3.4)	14.9 (3.9)	−16.70	<.001	1.61
Stressful life events						
SLES No. events	228	6.9 (4.0)	NA	—	—	—
SLES total	228	211.1 (133.2)	NA	—	—	—
Mood						
EPDS	247	5.6 (4.8)	6.3 (4.3)	2.10	.036	0.15
STAI-S	243	13.3 (10.2)	23.3 (11.9)	10.84	<.001	0.90
Adjustment and quality of life						
MS	243	8.4 (5.5)	NA	—	—	—
QLI	227	8.1 (1.8)	NA	—	—	—
Social support						
MAS	224	125.1 (21.2)	NA	—	—	—
MSPSS (F)	226	6.3 (1.0)	6.0 (1.2)	−2.98	.003	0.27
MSPSS (Fr)	226	6.1 (1.0)	5.6 (1.3)	−4.71	<.001	0.43
MSPSS (OSP)	226	6.6 (0.8)	6.4 (0.8)	−2.76	.006	0.25
MSPSS total	226	6.3 (0.8)	6.0 (0.9)	−3.87	.001	0.35

Abbreviations: ACQ-R, Revised Anxiety Control Questionnaire (EC, emotional control; TC, threat control; SC, stress control); CSQ, Coping Stress Questionnaire (SSS, Search for Social Support; EEO, emotional expression open; RLG, religion; FPS: focus on problem-solving; AVD, avoidance; NSF, negative self-focusing; PR, positive reappraisal); d, Cohens's "d"; EPDS, Edinburgh Postnatal Depression Scale; EPQ-RS, Eysenck Personality Questionnaire (N, neuroticism; E, extraversion; P, psychoticism); M, mean; MAS, Marital Adjustment Scale; MS, Maladjustment Scale; MSPSS, Multidimensional Scale of Perceived Social Support (F, family; Fr, friends; OSP, other significant people); NA, data not available; PANAS−, Affect Negative Scale; PANAS+, Affect Positive Scale; QLI, Quality of Life Index; RSES, Rosenberg Self-Esteem Scale; SD, standard deviation; SLES, Stressful Life Events Scale (No. events, number of stressful life events); STAI-S, State–Anxiety Inventory; STAI-T, Trait–Anxiety Inventory; t, Student's "t".
[a]Normative data from reference sample population has been obtained in the Spanish validation of each questionnaire described in Table 1.

more probably to use private healthcare services during pregnancy. In some countries, such as Spain, there is a universal public health system in which the necessary physical perinatal care is provided to all women (Bernal-Delgado et al., 2018). However, having a private insurance is also frequent, which seems to be related to obtaining faster and more personal physical and obstetric care, as well as having a greater availability of medical information (Epstein & Jiménez-Rubio, 2019). In this sense, recent studies (i.e. Oechsle

TABLE 4 Differences between pregnant women with and without previous psychological treatment

Variables	N^a	With PPT M (SD)	N^b	Without PPT M (SD)	U	p
Personality						
EPQ-RS (N)	84	4.9 (3.4)	184	3.2 (3.1)	5,513.0	<.001
EPQ-RS (E)	84	8.3 (3.3)	184	8.2 (2.7)	7,111.5	.292
EPQ-RS (P)	84	1.9 (1.6)	184	2.0 (1.9)	7,573.0	.788
STAI-T	81	20.7 (10.4)	163	16.9 (9.3)	5,026.5	.002
RSES	81	32.7 (4.9)	169	33.2 (4.6)	6,409.5	.415
PANAS+	77	29.9 (7.5)	170	31.4 (7.0)	5,825.5	.166
PANAS−	77	17.5 (5.8)	170	16.4 (5.4)	5,810.0	.156
Coping						
ACQ-R (EC)	84	11.8 (4.9)	184	14.5 (5.0)	5,352.0	<.001
ACQ-R (TC)	84	20.9 (5.7)	184	21.0 (5.3)	7,684.5	.941
ACQ-R (SC)	84	11.2 (3.7)	184	12.0 (3.8)	6,668.0	.071
ACQ-R total	84	43.9 (11.6)	184	47.6 (11.6)	6,301.5	.015
CSQ (SSS)	80	20.7 (5.7)	147	20.2 (5.7)	5,682.5	.675
CSQ (EEO)	80	14.0 (3.3)	147	12.8 (2.8)	4,700.5	.012
CSQ (RLG)	80	9.2 (4.9)	147	8.1 (4.1)	5,379.0	.242
CSQ (FPS)	80	20.8 (4.3)	147	21.5 (4.9)	5,081.5	.090
CSQ (AVD)	80	16.2 (3.5)	147	15.2 (3.6)	4,847.5	.028
CSQ (NSF)	80	13.4 (3.6)	147	12.5 (3.5)	5,070.0	.085
CSQ (PR)	80	20.5 (3.3)	147	21.0 (3.4)	5,087.0	.092
Stressful life events						
SLES No. events	78	7.5 (3.0)	150	6.6 (4.4)	45,554.5	.006
SLES total	78	231.4 (96.6)	150	200.5 (148.1)	4,430.5	.003
Mood						
EPDS	81	6.7 (5.1)	166	5.0 (4.6)	5,337.5	.008
STAI-S	81	15.2 (10.8)	162	12.4 (9.8)	5,520.5	.044
Adjustment and quality of life						
MS	81	9.6 (5.4)	162	7.9 (5.4)	5,197.0	.008
QLI	80	7.6 (1.9)	147	8.3 (1.7)	4,713.5	.011
Social support						
MAS	79	120.3 (24.7)	145	127.7 (18.6)	4,738.5	.033
MSPSS (F)	80	6.0 (2.3)	146	6.5 (0.8)	4,651.5	.008
MSPSS (Fr)	80	5.9 (1.2)	146	6.2 (0.9)	5,046.0	.083
MSPSS (OSP)	80	6.5 (0.9)	146	6.7 (0.7)	5,037.5	.034
MSPSS total	80	6.1 (1.0)	146	6.4 (0.6)	4,603.0	.008

Note: N^a indicates sample size considering the group of women with previous psychological treatment; N^b indicates sample size considering the group of women without previous psychological treatment.

Abbreviations: ACQ-R, Revised Anxiety Control Questionnaire (EC, Emotional Control; TC, Threat Control; SC, Stress Control); CSQ, Coping Stress Questionnaire (SSS, search for social support; EEO, emotional expression open; RLG, religion; FPS: focus on problem-solving; AVD, avoidance; NSF, negative self-focusing; PR, positive reappraisal); d, Cohens's "d"; EPDS, Edinburgh Postnatal Depression Scale; EPQ-RS, Eysenck Personality Questionnaire (N, neuroticism; E, extraversion; P, psychoticism); M, mean; MAS, Marital Adjustment Scale; MS, Maladjustment Scale; MSPSS, Multidimensional Scale of Perceived Social Support (F, family; Fr, friends; OSP, other significant people); p, level of significance; PANAS−, Affect Negative Scale; PANAS+, Affect Positive Scale; PPT, previous psychological treatment; QLI, Quality of Life Index; RSES, Rosenberg Self-Esteem Scale; SD, standard deviation; SLES, Stressful Life Events Scale (No. events, Number of stressful life events); STAI-S, State- Anxiety Inventory; STAI-T, Trait–Anxiety Inventory; t, Student's "t"; U, Mann–Whitney's "U".

TABLE 5 Spearman correlations between psychological variables and depressive symptoms

Variables	EPDS		
	N	**r**	**p**
Personality			
EPQ-RS (N)	247	0.56	<.001
EPQ-RS (E)	247	−0.22	.001
EPQ-RS (P)	247	0.25	<.001
STAI-T	244	0.72	<.001
RSES	247	−0.50	<.001
PANAS+	240	−0.45	<.001
PANAS−	240	0.63	<.001
Coping			
ACQ-R (EC)	256	−0.45	<.001
ACQ-R (TC)	256	−0.34	<.001
ACQ-R (SC)	256	−0.37	<.001
ACQ-R total	256	−0.48	<.001
CSQ (SSS)	227	−0.21	.001
CSQ (EEO)	227	0.22	.001
CSQ (RLG)	227	0.06	.358
CSQ (FPS)	227	−0.35	<.001
CSQ (AVD)	227	−0.14	.029
CSQ (NSF)	227	0.39	<.001
CSQ (PR)	227	−0.31	<.001
Stressful life events			
SLES No. events	228	0.21	.001
SLES total	228	0.23	<.001
Anxiety symptoms			
STAI-S	243	0.68	<.001
Adjustment and quality of life			
MS	243	0.39	<.001
QLI	227	−0.55	<.001
Social support			
MAS	224	−0.37	<.001
MSPSS (F)	226	−0.30	<.001
MSPSS (Fr)	226	−0.34	<.001
MSPSS (OSP)	226	−0.21	.002
MSPSS Total	226	−0.39	<.001

Abbreviations: ACQ-R, Revised Anxiety Control Questionnaire (EC, emotional control; TC, threat control; SC, stress control); CSQ, Coping Stress Questionnaire (SSS, search for social support; EEO, emotional expression open; RLG, religion; FPS, focus on problem-solving; AVD, avoidance; NSF, negative self-focusing; PR, positive reappraisal); EPDS, Edinburgh Postnatal Depression Scale; EPQ-RS, Revised Eysenck Personality Questionnaire (N, neuroticism; E, extraversion; P, psychoticism); STAI-T, Trait–Anxiety Inventory; MAS, Marital Adjustment Scale; MS, Maladjustment Scale; MSPSS, Multidimensional Scale of Perceived Social Support (F, family; Fr, friends; OSP, other significant people); *p*, level of significance; PANAS−, Affect Negative Scale; PANAS+, Affect Positive Scale; QLI, Quality of Life Index; *r*, Spearman's Correlation; RSES, Rosenberg Self-Esteem Scale; SLES, Stressful Life Events Scale; STAI-S, State–Anxiety Inventory.

et al., 2020) report that women who receive more detailed health information from their gynaecologist have a higher level of knowledge of lifestyle-related risk factors during pregnancy and that health insurance status may be a factor in the acquisition of such knowledge.

Another interesting finding was that both women using private and public healthcare services were interested in using MMF to assess their emotional state during pregnancy. Additionally, both groups presented a very similar biopsychosocial profile. These similarities between both groups of women would be an added advantage if this is interpreted as indicating that a specific adaptation of online applications according to the health system used by women (public vs. private) is not probably to be necessary according to our findings. Thus, healthcare professionals (medical practitioners, nurses and midwives) could integrate ICTs to manage the mental health of pregnant women and carry out different tasks such as Internet-based screening for women at high risk irrespective of the type of hospital they attend to (Mu et al., 2021).

Another important finding was that several psychological factors (history of psychological treatment, neuroticism, low self-esteem, anxiety, several coping strategies, stressful life events, poor adjustment and low social support) were associated with more severe depressive symptoms. This finding is consistent with previous studies (Biaggi et al., 2016; Wszołek et al., 2020) and international recommendations (American College of Obstetricians and Gynecologists, 2018; Curry et al., 2019; NICE, 2015) and may encourage healthcare professionals to implement early detection strategies that include assessment of these factors in the prenatal period. While national and international guidelines recommend that all women should be screened about their emotional status, particularly anxiety and depressive symptoms, and the associated risk factors during the perinatal period, in Spain this is only considered to be a recommendation. In fact, Spanish public and private hospitals rarely establish protocols that allow the routine assessment of these variables. ICTs can facilitate this routing monitoring and early detection of mental health vulnerability factors or existing emotional problems during the perinatal period (Martínez-Borba et al., 2018). In this sense, ICTs could be used for perinatal mental health promotion, prevention and intervention purposes.

Finally, based on our experience with MMF, we can make suggestions to improve online screening and monitoring of perinatal emotional disorders. First, it would be interesting to evaluate the psychopathological history and evaluate key risk factors (e.g. neuroticism, coping, adjustment or social support) to detect vulnerability factors that can be targeted with treatment (Stewart, 2011). Second, we suggest that screening programmes could be enhanced by incorporating feedback to the women on the results obtained (Diez-Canseco et al., 2018). This would allow women to be more aware of their perinatal emotional state and the risk factors they present and ask for help when needed. Finally, it would be interesting to include women's partners in prenatal assessments to promote empathy, as well as to have a measure of the partner's emotional status, which can ultimately influence the well-being of women (Underwood et al., 2017).

Regarding adherence, previous research conducted with women evidenced their willingness to use technologies related to perinatal mental health (Osma, Barrera, & Ramphos, 2016). In our study, there was a marked initial interest in using MMF (2,797 women registered into MMF). However, the participants' retention percentage significantly decreased (only 10% of the women who initially registered into MMF completed the assessment). Even though these numbers are poor, the literature into ICTs in the perinatal women (Barrera et al., 2014) has revealed similar dropout rates. Several studies have identified some barriers to e-mental health adherence. These include a preference by perinatal women to receive face-to-face treatment programmes, their limited ability to use such programmes, low expectations about their effectiveness, concerns about personal data security, lack of interactivity or appeal and poor content suitability to the target population (Donkin et al., 2011; Osma et al., 2020). In our case, the large number of questionnaires administered and the time required to complete them might have affected the continuity in ICT use. Therefore, to improve the participants' adherence, it would be appropriate to reduce assessment burden by using short or single-item versions of scales (Suso-Ribera et al., 2018), establish clear instructions on ICT use and incorporate information on ICT benefits (Ying Gun et al., 2011) and personal data security (Young, 2005).

Another strategy to improve adherence to online applications is considering the use of personalized interventions for pregnancy and postpartum (Lee et al., 2016). Exploring the users' experiences with e-mental health is important for the design, evaluation and implementation of a mental health intervention with technological resources such as smartphones, as this information helps to clarify the real needs of users and helps to anticipate barriers to the use of ICTs (Lemon et al., 2020). In this sense, knowing the profile of perinatal women interested in using ICT would help to include interactive content tailored to the specific needs and preferences of the specific perinatal period (planning vs. prenatal vs. postnatal). At the same time, improvements could be made in the design of ICTs, such as providing resources to increase social support or contact with healthcare professionals to help solve issues or difficulties (Maloni et al., 2013).

4.1 | Limitations

Although the present study might contribute to the perinatal literature, it also has some limitations. First, the characteristics of the women not interested in the platform are unknown. Second, it should be noted that a random sampling strategy was not used and the sample size is medium in size. Therefore, the representativeness of the results to the general population may be limited. More similar studies are needed to support the results and guide clinical and institutional changes. Moreover, the number of psychosocial and obstetric variables included is ample, but not fully comprehensive. Finally, as described in the data analysis section, although some of our study variables were not normally distributed, the fact that population norms only included means and standard deviations prevented us from using non-parametric tests. Even though Student t tests are generally robust against non-normality (Stonehouse & Forrester, 1998), especially when violations are not too severe as in the present investigation, the results comparing both samples should be interpreted with caution in the light of potential type I and type II errors.

5 | CONCLUSION

Add knowledge about the risk factors associated with prenatal depressive symptoms, such as history of psychological treatment, neuroticism, low self-esteem, anxiety, coping strategies, stressful life events, poor adjustment and poor social support, is of interest to detect risk profiles in perinatal women. The findings obtained in this study about the socio-demographic, medical, obstetric and psychosocial profile of women interested in evaluating their prenatal emotional state via the Internet, together with the results of future similar studies could make a valuable contribution to the development and improvement of universal ICT-based screening and prevention programmes tailored to the profile of users. This, in turn, could facilitate the increased use of and adherence to ICTs and open new avenues for the development of novel strategies to reach less favourable perinatal women thanks to ICT-based programmes. The implementation of e-mental health tools such as MMF could facilitate the rapid detection of mental health problems in the perinatal period by health professionals, including mental health nurses, in both public and private health systems.

CONFLICT OF INTEREST

The authors report no conflict of interest.

ETHICAL APPROVAL

This study received approval from the Ethical Committees of the (blind note) for the project entitled: "Mamáfeliz" and all its procedures (reference number CP12/2012). blind note: Hospìtal General Universitario de Castellón (Departamento de salud de Castellón) and Hospital Universitario La Plana (Vilareal, Castellón) (Departamento de salud La Plana).

DATA AVAILABILITY STATEMENT

Data available on request from the authors.

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REFERENCES

American College of Obstetricians and Gynecologists. (2018). ACOG Committee Opinion No. 757: Screening for perinatal depression. *Obstetrics and Gynecology, 132*, e208–e212.

Barrera, A. Z., Kelman, A. R., & Muñoz, R. F. (2014). Keywords to recruit Spanish- and English-speaking participants: Evidence from an online postpartum depression randomized controlled trial. *Journal of Medical Internet Research, 16*(1), e6. https://doi.org/10.2196/jmir.2999

Berg, M., Aarts, J., & Van der Lei, J. (2003). ICT in health care: Sociotechnical approaches. *Methods of Information in Medicine, 42*(4), 297–301. https://doi.org/10.1055/s-0038-1634221

Bernal-Delgado, E., García-Armesto, S., Oliva, J., Sánchez-Martínez, F. I., Repullo, J. R., Peña-Longobargo, L. M., Ridao-López, M., & Hernández-Quevedo, C. (2018). Spain: Health system review. *Health Systems in Transition, 20*(2), 1–179.

Biaggi, A., Conroy, S., Pawlby, S., & Pariante, C. M. (2016). Identifying the women at risk of antenatal anxiety and depression: A systematic review. *Journal of Affective Disorders, 191*, 62–77. https://doi.org/10.1016/j.jad.2015.11.014

Byatt, N., Biebel, K., Friedman, L., Debordes-Jackson, G., Ziedonis, D., & Pbert, L. (2013). Patient's views on depression care in obstetric settings: How do they compare to the views of perinatal health care professionals? *General Hospital Psychiatry, 35*(6), 598–604. https://doi.org/10.1016/j.genhosppsych.2013.07.011

Carrobles, J. A. (1996). Adaptación en población española de la Escala de Ajuste Marital de Locke-Wallace, 1959. In J. Cáceres Carrasco (Ed.), *Manual de Terapia de Pareja en Intervención en familias* (pp. 105–106). Fundación Universidad Empresa.

Carter, E. A., Bond, M. J., Wickham, R. E., & Barrera, A. (2019). Perinatal depression among a global sample of Spanish-speaking women: A sequential-process latent growth-curve analysis. *Journal of Affective Disorders, 243*, 145–152. https://doi.org/10.1016/j.jad.2018.09.006

IBM Corp. (2013). *IBM SPSS Statistics for windows, Version 22.0.* IBM Corp.

Curry, S. J., Krist, A. H., Owens, D. K., Barry, M. J., Caughey, A. B., Davidson, K. W., Doubeni, C. A., Epling, J. W., Grossman, D. C., Kemper, A. K., Kubik, M., Landefeld, S., Mangione, C. M., Silverstein, M., Simon, M. A., Tseng, C.-W., Wong, J. B., & US Preventive Services Task Force. (2019). Interventions to prevent perinatal depression: US Preventive Services Task Force recommendation statement. *JAMA, 321*(6), 580–587. https://doi.org/10.1001/jama.2019.0007

Dattakumar, A., Gray, K., Henderson, K. B., & Chenery, H. (2012). We are not educating the future clinical health professional workforce adequately for ehealth competence: Findings of an australian study. In A. J. Meaeder & F. J. Martin-Sanchez (Eds.), *Health informatics: Building a healthcare future through trusted information: Selected papers from the 20th Australian National Health Informatics Conference* (pp. 33–39). IOS Press BV.

De Rivera, G., Revuelta, J. L., & Morera Fumero, A. (1983). La valoración de sucesos vitales: Adaptación española de la escala de Holmes y Rahe. *Psiquis, 4*(1), 7–11.

Diez-Canseco, F., Toyama, M., Ipince, A., Perez-Leon, S., Cavero, V., Araya, R., & Miranda, J. J. (2018). Integration of a technology-based mental health screening program into routine practices of primary health care services in Peru (The Allillanchu Project): Development and implementation. *Journal of Medical Internet Research, 20*(3), e9208. https://doi.org/10.2196/jmir.9208

Donker, T., Cuijpers, P., Stanley, D., & Danaher, B. (2015). The future of perinatal depression identification: Can information and communication technology optimize effectiveness? In J. Milgrom & A. W. Gemmill (Eds.), *Identifying perinatal depression and anxiety: Evidence-based practice in screening, psychosocial assessment, and management* (pp. 240–255). Wiley-Blackwell.

Donkin, L., Christensen, H., Naismith, S. L., Neal, B., Hickie, I. B., & Glozier, N. (2011). A systematic review of the impact of adherence on the effectiveness of e-therapies. *Journal of Medical Internet Research, 13*(3), e52. https://doi.org/10.2196/jmir.1772

Drake, E., Howard, E., & Kinsey, E. (2014). Online screening and referral for postpartum depression: An exploratory study. *Community Mental Health Journal, 50*(3), 305–311. https://doi.org/10.1007/s10597-012-9573-3

Echeburúa, E., Corral, P. D., & Fernández-Montalvo, J. (2000). Escala de Inadaptación: Propiedades psicométricas en contextos clínicos. *Análisis y Modificación de Conducta, 26*(107), 325–340.

Epstein, D., & Jiménez-Rubio, D. (2019). What does the decision to opt for private health insurance reveal about public provision? *Gaceta Sanitaria, 33*(5), 442–449.

Eysenck, H. J., & Eysenck, S. B. G. (Eds.). (2001). *EPQ-R: Cuestionario Revisado de Personalidad de Eysenck: Versiones Completa (EPQ-R) y Abreviada (EPQ-RS): Manual* (2nd ed.) Madrid, Spain: TEA.

Field, T., Diego, M., Hernandez-Reif, M., Figueiredo, B., Deeds, O., Ascencio, A., Schanberg, S., & Kuhn, C. (2010). Comorbid depression and anxiety effects on pregnancy and neonatal outcome. *Infant Behavior and Development, 33*(1), 23–29. https://doi.org/10.1016/j.infbeh.2009.10.004

Garcia-Esteve, L., Ascaso, C., Ojuel, J., & Navarro, P. (2003). Validation of the Edinburgh postnatal depression scale (EPDS) in Spanish mothers. *Journal of Affective Disorders, 75*(1), 71–76. https://doi.org/10.1016/S0165-0327(02)00020-4

Guardino, C. M., & Dunkel Schetter, C. (2014). Coping during pregnancy: A systematic review and recommendations. *Health Psychology Review, 8*(1), 70–94. https://doi.org/10.1080/17437199.2012.752659

Higgins, A., Downes, C., Carroll, M., Gill, A., & Monahan, M. (2018). There is more to perinatal mental health care than depression: Public health nurses reported engagement and competence in perinatal mental health care. *Journal of Clinical Nursing, 27*(3–4), e476–e487. https://doi.org/10.1111/jocn.13986

Howard, L. M., & Khalifeh, H. (2020). Perinatal mental health: A review of progress and challenges. *World Psychiatry, 19*(3), 313–327. https://doi.org/10.1002/wps.20769

Kingston, D., Austin, M. P., Heaman, M., Mc Donald, S., Lasiuka, G., Sword, W., Giallo, R., Hegadoren, K., Vermeyden, L., Veldhuyzen van Zanten, S., Kingstong, J., Jarema, K., & Biringer, A. (2015). Barriers and facilitators of mental health screening in pregnancy. *Journal of Affective Disorders, 186*, 350–357. https://doi.org/10.1016/j.jad.2015.06.029

Landeta, O., & Calvete, E. (2002). Adaptation and validation of the multidimensional scale of perceived social support. *Ansiedad y Estrés, 8*(2–3), 173–182.

Law, S., Ormel, I., Babinski, S., Plett, D., Dionne, E., Schwartz, H., & Rozmovits, L. (2021). Dread and solace: Talking about perinatal mental health. *International Journal of Mental Health Nursing*, *30*, 1376–1385. https://doi.org/10.1111/inm.12884

Lee, E. W., Denison, F. C., Hor, K., & Reydnolds, R. M. (2016). Web-based interventions for prevention and treatment of perinatal mood disorders: A systematic review. *BMC Pregnancy and Childbirth*, *16*(1), 38. https://doi.org/10.1186/s12884-016-0831-1

Lemon, C., Huckvale, K., Carswell, K., & Torous, J. (2020). A narrative review of methods for applying user experience in the design and assessment of mental health smartphone interventions. *International Journal of Technology Assessment in Health Care*, *36*(1), 64–70.

Maloni, J. A., Przeworski, A., & Damato, E. G. (2013). Web recruitment and internet use and preferences reported by women with postpartum depression after pregnancy complications. *Archives of Psychiatric Nursing*, *27*, 90–95. https://doi.org/10.1016/j.apnu.2012.12.001

Marcano-Belisario, J. S., Gupta, A. K., O'Donoghue, J., Ramchandani, P., Morrison, C., & Car, J. (2017). Implementation of depression screening in antenatal clinics through tablet computers: Results of a feasibility study. *BMC Medical Informatics and Decision Making*, *17*(1), 1–11. https://doi.org/10.1186/s12911-017-0459-8

Martín-Albo, J., Núñez, J., Navarro, J., & Grijalvo, F. (2007). The Rosenberg Self-Esteem scale: Translation and validation in University students. *The Spanish Journal of Psychology*, *10*(2), 458–467. https://doi.org/10.1017/S1138741600006727

Martínez-Borba, V., Suso-Ribera, C., & Osma, J. (2018). The use of information and communication technologies in perinatal depression screening: A systematic review. *Cyberpsychology, Behavior and Social Networking*, *21*(12), 741–752. https://doi.org/10.1089/cyber.2018.0416

Mezzich, J. E., Ruipérez, M. A., Pérez, C., Yoon, G., Liu, J., & Mahmud, S. (2000). The Spanish version of the quality of life index: Presentation and validation. *The Journal of Nervous and Mental Disease*, *188*(5), 301–305.

Milgrom, J., Hirshler, Y., Reece, J., Holt, C., & Gemmill, A. W. (2019). Social support—a protective factor for depressed perinatal women? *International Journal of Environmental Research and Public Health*, *16*(8), 1426. https://doi.org/10.3390/ijerph16081426

Mo, Y., Gong, W., Wang, J., Sheng, X., & Xu, D. R. (2018). The association between the use of antenatal care smartphone apps in pregnant women and antenatal depression: Cross-sectional study. *JMIR mHealth and uHealth*, *6*(11), e11508. https://doi.org/10.2196/11508

Morrell, C. J., Jan Cubison, J., Ricketts, T., Sved Williams, A., & Hall, P. (2015). Training health-care professionals for the assessment and management of perinatal depression and anxiety. In J. Milgrom & A. W. Gemmill (Eds.), *Identifying perinatal depression and anxiety: Evidence-based practice in screening, psychosocial assessment, and management* (pp. 210–227). John Wiley & Sons.

Mu, T. Y., Li, Y. H., Xu, R. X., Chen, J., Wang, Y. Y., & Shen, C. Z. (2021). Internet-based interventions for postpartum depression: A systematic review and meta-analysis. *Nursing Open*, *8*(3), 1125–1134. https://doi.org/10.1002/nop2.724

Myors, K. A., Johnson, M., Cleary, M., & Schmied, V. (2015). Engaging women at risk for poor perinatal mental health outcomes: A mixed-methods study. *International Journal of Mental Health Nursing*, *24*(3), 241–252. https://doi.org/10.1111/inm.12109

National Institute for Health and Clinical Excellence (NICE). (2015). *Antenatal and postnatal mental health: Clinical management and service guidance. NICE Clinical Guideline*. British Psychological Society and The Royal College of Psychiatrists.

Odone, A., Buttigieg, S., Ricciardi, W., Azzopardi-Muscat, N., & Staines, A. (2019). Public health digitalization in Europe: EUPHA vision, action and role in digital public health. *European Journal of Public Health*, *29*(Supplement_3), 28–35. https://doi.org/10.1093/eurpub/ckz161

Oechsle, A., Wensing, M., Ullrich, C., & Bombana, M. (2020). Health knowledge of lifestyle-related risks during pregnancy: A cross-sectional study of pregnant women in Germany. *International Journal of Environmental Research and Public Health*, *17*(22), 8626. https://doi.org/10.3390/ijerph17228626

Osma, J., Barrada, J. R., García-Palacios, A., Navarro-Haro, M., & Aguilar, A. (2016). Internal structure and clinical utility of the anxiety control questionnaire-revised (ACQ-R) Spanish version. *The Spanish Journal of Psychology*, *19*, E63. https://doi.org/10.1017/sjp.2016.69

Osma, J., Barrera, A. Z., & Ramphos, E. (2016). Are pregnant and postpartum women interested in health-related apps? Implications for the prevention of perinatal depression. *Cyberpsychology, Behavior and Social Networking*, *19*(6), 412–415. https://doi.org/10.1089/cyber.2015.0549

Osma, J., Sprenger, M., & Mettler, T. (2017). Introduction of e-mental health in national health systems—A health professionals' perspective. *Health Policy and Technology*, *6*(4), 436–445. https://doi.org/10.1016/j.hlpt.2017.07.001

Osma, J., Suso-Ribera, C., Martínez-Borba, V., & Barrera, A. Z. (2020). Content and format preferences of a depression prevention program: A study in perinatal women. *Anales de Psicología*, *36*(1), 56–63. https://doi.org/10.6018/analesps.356051

Ralston, A. L., Andrews, A. R., & Hope, D. A. (2019). Fulfilling the promise of mental health technology to reduce public health disparities: Review and research agenda. *Clinical Psychology: Science and Practice*, *26*(1), e12277. https://doi.org/10.1111/cpsp.12277

Sandín, B., & Chorot, P. (2003). Cuestionario de afrontamiento del estrés (CAE): Desarrollo y validación preliminar. *Revista de Psicopatología y Psicología Clínica*, *8*(1), 39–54.

Sandín, B., Chorot, P., Lostao, L., Joiner, T. E., Santed, M. A., & Valiente, R. M. (1999). Escalas PANAS de afecto positivo y negativo: Validación factorial y convergencia transcultural. *Psicothema*, *11*(1), 37–51.

Spielberger, C. D., Gorsuch, R. L., & Lushene, R. E. (Eds.). (1982). *Cuestionario de Ansiedad Estado-Rasgo* (9th ed.). TEA.

Staneva, A. A., Bogossian, F., & Wittkowski, A. (2015). The experience of psychological distress, depression, and anxiety during pregnancy: A meta-synthesis of qualitative research. *Midwifery*, *31*(6), 563–573. https://doi.org/10.1016/j.midw.2015.03.015

Stewart, D. E. (2011). Depression during pregnancy. *New England Journal of Medicine*, *365*(17), 1605–1611. https://doi.org/10.1056/NEJMcp1102730

Stonehouse, J. M., & Forrester, G. J. (1998). Robustness of the *t* and *U* tests under combined assumption violations. *Journal of Applied Statistics*, *25*(1), 63–74. https://doi.org/10.1080/02664769823304

Suso-Ribera, C., Castilla, D., Ribera-Canudas, M. V., Botella, C., & García-Palacios, A. (2018). Validity, reliability, feasibility, and usefulness of pain monitor. *The Clinical Journal of Pain*, *34*(10), 900–908. https://doi.org/10.1097/AJP.0000000000000618

Teaford, D., Goyal, D., & McNeish, S. G. (2015). Identification of postpartum depression in an online community. *Journal of Obstetric, Gynecologic & Neonatal Nursing*, *44*(5), 578–586. https://doi.org/10.1111/1552-6909.12740

Tien, J., Lewis, G. D., & Liu, J. (2020). Prenatal risk factors for internalizing and externalizing problems in childhood. *World Journal of Pediatrics*, *16*, 341–355. https://doi.org/10.1007/s12519-019-00319-2

Underwood, L., Waldie, K. E., Peterson, E., D'Souza, S., Verbiest, M., McDaid, F., & Morton, S. (2017). Paternal depression symptoms during pregnancy and after childbirth among participants in the growing up in New Zealand study. *JAMA Psychiatry*, *74*(4), 360–369. https://doi.org/10.1001/jamapsychiatry.2016.4234

Vázquez, M. B., & Míguez, M. D. C. (2019). Validation of the Edinburgh postnatal depression scale as a screening tool for depression in Spanish pregnant women. *Journal of Affective Disorders*, *246*, 515–521. https://doi.org/10.1016/j.jad.2018.12.075

Vázquez-Morejón, A. J., Jiménez García-Bóveda, R., & Vázquez-Morejón Jiménez, R. (2004). Escala de autoestima de Rosenberg:

Fiabilidad y validez en población clínica española. *Apuntes de Psicología*, 22(2), 247–255.

Wang, T. H., Pai, L. W., Tzeng, Y. L., Yeh, T. P., & Teng, Y. K. (2021). Effectiveness of nurses and midwives-led psychological interventions on reducing depression symptoms in the perinatal period: A systematic review and meta-analysis. *Nursing Open*, 8(5), 2117–2130. https://doi.org/10.1002/nop2.764

Woody, C. A., Ferrari, A. J., Siskind, D. J., Whiteford, H. A., & Harris, M. G. (2017). A systematic review and meta-regression of the prevalence and incidence of perinatal depression. *Journal of Affective Disorders*, 219, 86–92. https://doi.org/10.1016/j.jad.2017.05.003

Wszołek, K., Żurawska, J., Łuczak-Wawrzyniak, J., Kopaszewska-Bachorz, B., Głowińska, A., & Pięta, B. (2020). Postpartum depression—A medical or a social problem? *The Journal of Maternal-Fetal & Neonatal Medicine*, 33(15), 2556–2560. https://doi.org/10.1080/14767058.2018.1555802

Ying Gun, S., Titov, N., & Andrews, G. (2011). Acceptability of Internet treatment of anxiety and depression. *Australasian Psychiatry*, 19(3), 259–264. https://doi.org/10.3109/10398562.2011.562295

Young, K. S. (2005). An empirical examination of client attitudes towards online counseling. *CyberPsychology and Behavior*, 8(2), 172–177. https://doi.org/10.1089/cpb.2005.8.172

Zimet, G. D., Powell, S. S., Farley, G. K., Werkman, S., & Berkoff, K. A. (1990). Psychometric characteristics of the multidimensional scale of perceived social support. *Journal of Personality Assessment*, 55(3–4), 610–617. https://doi.org/10.1080/00223891.1990.9674095