

The IMAGINE social media intervention: Uptake, acceptability, utility and association with
mental wellness of perinatal youth

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Abstract

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Content/background: Perinatal depression affects thirteen percent of birthing people. This includes any clinically significant depressive symptoms during pregnancy or up to 1 year postpartum. Parenting people of color experience a higher risk of postpartum depression (38%). Those younger than 25 are at a higher risk of perinatal depression than older age groups. Technology-based interventions delivered through the internet, have been shown to be feasible and improve perinatal mental health. **Study purpose:** The Interactive Maternal Group for Information and Emotional support (IMAGINE) pilot study sought to adapt an existing CBT based program (Mothers and Babies) developed for low-income racial minority birthing youth in the US to be delivered virtually. **Methods:** IMAGINE was delivered to two groups of participants (n=7, n=3) using the online mobile messaging platform, Slack. A trained facilitator sent graphical, video and text messages to participants 3-4 times per week. Content was designed to promote discussion and reflection, lasted for 10-12 weeks, and primarily asynchronous for smartphone access. Recruitment was from Feb-Dec 2020. Included participants were pregnant or up to 6 weeks postpartum, between ages 16-24. All participants had access to a smartphone, English language literacy, and low depressive symptoms (<10 on PHQ-9). Data were collected on acceptability (by AIM), CBT skill use, and PHQ-9 depression

symptom data were collected. **Results:** This pilot study had high acceptability with an average score of 4.28 out of 5, and 100% of participants noting they would recommend IMAGINE to a friend. Most CBT skills discussed in the intervention were reported to be used by 50% or more of participants. For uptake, a high proportion of eligible participants demonstrated interest but were ineligible due to high depressive symptoms. This study found no significant changes in depression scores, perceived stress, or perceived social support, although the study's small sample size was not powered to detect symptom changes. **Discussion/conclusions:** This data gives promise for IMAGINE's future impact on mental wellness, and appeal to individuals experiencing symptoms of depression, but further trials are needed.

Introduction:

The perinatal period is a time of significant changes to the emotional, social and physical status of a birthing individual. Thirteen percent of birthing people in the United States are affected by perinatal depression, which includes any clinically significant depressive symptoms during pregnancy or up to 1 year postpartum. Parenting people of color experience a higher risk of postpartum depression, at approximately 38%. (Rouland Polmanteer et al., 2018) If unaddressed, perinatal depression can cause serious and long-term effects on the mental wellness of both the birthing parent and child. (Byatt et al., 2020)

Adolescents and young adults age <25 (youth) are at a higher risk of perinatal depression than older age groups. (Recto & Champion, 2017). According to a 2019 report on Washington state inequities in reproductive health, existing societal and structural barriers to accessing medical care are compounded for youth due to limited autonomy and isolating factors such as lack of transportation. (Governor's Interagency Council on Health Disparities, 2019) Additionally, it is documented that in the United States, low-income birthing people receive suboptimal mental health care after delivery, and that there are significant racial/ethnic disparities in the initiation and continuation of postpartum depression care. (Kozhimannil, 2011) Research suggests that adolescent parents of color face more barriers to care than their white counterparts and may experience increased stress specifically related to parenting. (Huang et al., 2019)

Evidence-based interventions have been developed to improve mental healthcare for birthing people of color. The Mothers and Babies Course (MB) is a cognitive behavioral therapy (CBT) based program, developed for low-income racial minority women in the US. MB can be delivered to individuals or groups and is focused on building key skills within participants, specifically regarding their thoughts, social contacts and pleasant activities. (S. D. Tandon et al., 2011a)

The MB program was shown to prevent the worsening of depressive symptoms across several time points, including up to 6-months after intervention. Four randomized control trials using the MB program found reduction of new depressive episodes in the perinatal period. (H.-N. Le et al., 2015) It has also been adapted for one on one use and delivered at scale. (Darius Tandon et al., 2014a, 2018; Diebold et al., 2020; Jensen et al., 2018; H. N. Le et al., 2011; Mcfarlane et al., 2016; Muñoz et al., 2007; D. Tandon et al., 2020; S. D. Tandon et al., 2011b, 2021)

Social support can be protective against perinatal depression, and a key component of its management. (Milgrom et al., 2019) (Sun et al., 2021) The COVID-19 pandemic introduced limitations to social support and connection, including recommendations for physical distancing in home environments as well as an increase in isolating clinic protocols that limited the number of people who could be present in a medical facility. (Matvienko-Sikar et al., 2020) In perinatal care, this included restrictions on support people who could accompany birthing or postpartum parents, sudden changes to the care provider team, or prolonged periods of isolation. (Griffin et al., 2020)

Mobile technology can be used to build social support and overcome logistical barriers to in-person care, many of which were exacerbated by the COVID-19 pandemic. Technology-based interventions, delivered through phone call, smartphone applications, text messages, or social media groups have been shown to be feasible and improve perinatal mental health. (Lara-Cinisomo et al., 2021) (Martínez-Borba et al., 2019) Delivery of interventions through mobile technology may be especially appealing to

low-income and young birthing people who experience heightened barriers to facility-based care, and are at elevated risk of perinatal depression. (Lara-Cinisomo et al., 2021) (Barrera et al., 2015a) In addition, adolescents and young adults in particular are known to be avid users of mobile technology. (Kobak et al., 2015)

The Interactive Maternal Group for Information and Emotional support (IMAGINE) pilot study sought to adapt the MB intervention for delivery via a social media group, with the goal of increasing access to the intervention among perinatal youth, who experience elevated barriers to in-person care. The IMAGINE intervention was adapted from the in-person MB course materials and tailored to a youth audience who would engage primarily through asynchronous interaction via a smartphone. Adaptations were guided by formative interviews with youth and healthcare provider stakeholders, including modifications to content structure and delivery. (*Mothers and Babies Online Course*, n.d.) (Gewali et al., 2020)

In this study, we present quantitative findings from a pilot study of the IMAGINE intervention, including uptake, acceptability, and utility of IMAGINE, as well as the association of intervention participation with participant mental wellness.

The specific aims of this study are:

Aim 1: Describe the uptake, acceptability and perceived utility of the IMAGINE intervention.

Aim 2: Evaluate the association of the IMAGINE intervention with participants' mental wellness, including depressive symptoms, social support, and perceived stress.

In analysis and discussion, this study will use the term "birthing people" to more accurately describe the demographics and identities of birthing people who may not identify as "women" or "mothers." (MacKinnon et al., 2021) The term "mothers" will be used specifically to refer to a previously branded program that has "mothers" in the title.

Methods:

Study Participants

Participants were eligible to participate in the IMAGINE pilot if they: were self-reported pregnant or up to 180 days postpartum, age 16-24 years during pregnancy, had daily access to a smartphone, were comfortable conducting study visits, reading and responding to social media messages in English, and exhibited low symptoms of depression at screening, defined as a PHQ9 score of 9 or below (Kroenke et al., 2001).

Participants were recruited between August 2020 – January 2021, through three main methods. First, study participation was promoted through paid, targeted advertisements on Instagram and Facebook throughout the United States. Specific parameters used to target participants were: females ages 16-25, located anywhere in the US. In the first month, participants age 14-25 were recruited, and then the age range was adjusted to 16-25 due to age restrictions associated with using the intervention messaging platform. Second, the study team identified healthcare providers and community-based organizations in several cities in the US (Seattle, WA; Olympia, WA; Philadelphia, PA; Temple, TX) and provided materials for staff at these organizations to promote the study by distributing flyers. Finally, we used respondent-driven sampling to encourage participants who enrolled in the study to invite their peers to participate; a financial incentive of \$20 was offered to the referring participant if their referred peer enrolled.

Potential participants who learned about the study through any method contacted the study by phone call, text message, email, Instagram message, or by sending a message through the study website. Study staff then contacted potential participants to conduct an electronic eligibility screening questionnaire, administered using REDCap, by phone or video call.

Participants with a PHQ9 score of 10 or greater were not eligible to participate in the IMAGINE pilot and were referred to individual clinical care. The study staff conducting the eligibility screen explained to such participants that because IMAGINE had not yet been shown to be effective at reducing depression symptoms, the study team wanted to ensure the individual accessed evidence-based services. Study staff offered support to find treatment and shared information for the National Crisis Line and additional resources. A psychiatrist on the IMAGINE study team was available to support linkage with resources in the participant's location.

IMAGINE Intervention

The IMAGINE intervention was developed by adapting MB content to cater to youth and to be accessed primarily using a smartphone, through a user-centered process described in detail elsewhere (Gewali et al., 2020). IMAGINE was delivered to groups of up to 10 individuals on the messaging platform Slack. Intervention messages were developed ahead of the intervention and the facilitator, a Masters-level clinical social worker, sent text, graphical and video messages to participants 3-4 times per week. Messages were designed to promote group discussion or personal reflection in response to adapted MB content and discussion prompts. The program was designed to be accessed asynchronously, encouraging participants to check their messages and react or participate at a time convenient to them. Additionally, the facilitator held optional weekly synchronous video group calls to review and discuss each week's content. Summary text messages were sent to the group to recap each call for participants who did not attend. Groups ran for approximately eight weeks. The facilitator could exercise discretion in message pacing based on participant feedback and questions during the intervention period.

Data Collection

Data was collected from three primary sources, outlined below.

Referral Log

Participants who contacted the IMAGINE study were logged into a spreadsheet for the study team to contact for follow up. The outcome of eligibility screening, consent and enrollment were recorded in the study referral log.

Screening Questionnaire

The participant screening questionnaire was completed verbally by phone or video call and responses entered into the REDCap instrument by study staff. The screening questionnaire ascertained pregnancy status, age, access to a smartphone, comfort conducting study visits, ability to engage with social media messages in English, and PHQ9 screening score. Information was entered by a study team member into an electronic, HIPAA-compliant questionnaire using REDCap, hosted at the University of Washington (Harris et al., 2009) (Harris et al., 2019).

Consent was obtained for screening and, for eligible participants, enrollment in the study. Consent information was shared with the participant verbally prior to screening and in writing through a link

generated by REDCap prior to enrollment. Following consent, an enrollment interview was either scheduled or conducted immediately.

Enrollment Questionnaire

The enrollment questionnaire was conducted by study staff using either the Zoom video conferencing platform or phone call. If conducted by video call, study staff screen-shared the REDCap questionnaire and read each question aloud so the participant could see and hear the questions and responses. Information was entered in real time to REDCap by study staff. The enrollment questionnaire included demographic questions, as well as questions regarding technology access and effects of COVID-19 on participant day-to-day activities and mental wellness. It also included an abbreviated 12 item version of the Social Support Behavior questionnaire (Vaux et al., 1987) and the Perceived Stress (PSS-4) scale. (Cohen et al., 1983)

Follow-up Questionnaire

A member of the study team other than the pilot facilitator contacted participants the week after they completed the IMAGINE pilot intervention and arranged a follow-up study visit, conducted by Zoom video conference. The follow-up questionnaire included a review of pregnancy status, a PHQ9 questionnaire, abbreviated 12-item Social Support Behavior questionnaire, PSS-4 scale and questions to review impact of COVID-19. It also included questions to assess acceptability via the Acceptability of Intervention Measure (AIM) (Weiner et al., 2017).

Participants were asked how often (using a Likert scale) they had used key CBT skills such as: mood tracking, engaging in pleasant activities, overcoming obstacles to engage in pleasant activities, thought interruption to reduce harmful thoughts, designated worry time to reduce harmful thoughts, time projection to imagine a better time in the future, self instruction, positive contact with others, soliciting positive support from others, and using assertive communication. These questions were modeled on the core CBT concepts of the MB program. (Darius Tandon et al., 2014b) If a participant reported use of a skill, they were then asked how helpful each skill was. Study staff screen-shared the REDCap questionnaire as in the enrollment visit.

Data Analysis

Participant baseline demographic characteristics were presented descriptively.

Aim 1 analysis described the uptake, acceptability and utility of the IMAGINE intervention, using the following definitions.

Uptake

Uptake of the IMAGINE intervention was determined by calculating the percentage of screened, eligible participants who enrolled in the intervention.

Acceptability

Acceptability was determined using the AIM, which consists of four Likert-scale questions:

- 1) IMAGINE meets my approval.
- 2) IMAGINE is appealing to me.
- 3) I like IMAGINE.
- 4) I welcome IMAGINE.

Each Likert response was assigned a numerical value (1 = Completely disagree, 2 = Disagree, 3 = Neither agree nor disagree, 4 = Agree, 5 = Completely agree) and a total score was calculated by summing the responses over the four questions.

Additionally, the proportion of participants who would recommend the intervention to a friend was reported.

Utility

Utility was summarized by calculating the percentage of participants who reported using a particular CBT skill at least half the time. Additionally, among those who used it at least half the time, the percentage of participants who found it to be helpful was calculated.

Mental Wellness

Aim 2 evaluated the association of the IMAGINE intervention with participants' mental wellness in a pre-post design.

Depressive symptoms for each participant were summarized as the PHQ9 score at baseline and follow-up, calculated according to instrument guidelines. (Kroenke et al., 2001) Social support was determined via the calculation of an overall social support index, defined as the sum score over all questions in the Social Support Behavior questionnaire for each participant. (Vaux et al., 1987) Likert responses were assigned values 1 to 4 and scores were calculated with reference to participants' family and friends separately. Possible scores ranged from 5 to 60. Perceived stress was assessed by summing responses to the four questions in the PSS-4 instrument, with responses assigned a value from 0 to 4, and with two items having inverted scores to accommodate question directionality. The range of possible scores from this instrument are 0-16. (Cohen et al., 1983)

Mean and standard deviation for each score were summarized for each time-point. Scores at the two time-points were compared by paired two-sided t-test. For social support, scores were also presented separated for the domains of "friends" and "family." The R statistical software (version 4.1.0) was used for all data analysis.

Ethical Considerations

The IMAGINE study was approved by the University of Washington Institutional Review Board. All participants provided informed consent for eligibility screening, exposure to the intervention, and data collection. Waivers were obtained for written documentation of informed consent and for parental consent for adolescents under 18 years.

Results:

Participant flow and intervention uptake: Figure 1 summarizes participant flow from contacting the study to completing screening, enrolling in the study, and completing follow-up. Sixty-eight individuals contacted the study between Oct 16, 2020 and Jan 29, 2021. Of these, 22 were assessed for eligibility, while 46 individuals did not complete screening due to challenges scheduling screening calls or participants declining to complete screening. Of the 22 who were assessed, 13 were eligible, while 9 were ineligible, mostly (7, 77.8%) due to elevated depression scores that warranted referral to individual

care. Three eligible participants declined participation and 10 eligible participants were enrolled in the pilot, for an uptake of 76.9% (10 of 13 eligible participants). Participants were divided into two intervention groups: 7 in Group 1 and 3 in Group 2. Of the 10 study participants, 9 completed the 6-month follow-up questionnaire.

Participant demographic characteristics:

Demographic characteristics of enrolled participants are summarized in Table 1. All participants identified as female and median age was 18. Six participants (66.7%) identified as Black, 4 (44.4%) identified as Latinx, and 2 (22.2%) identified as white (categories were not mutually exclusive). Five of the 9 participants (55.5%) were bilingual and 5 had completed at least a high school diploma or obtained a GED. Four participants (44.4%) were pregnant at the time of the study and 6 (66.7%) used Medicaid health insurance. All but one of the participants reported that they were stably housed.

Acceptability and utility:

Participants' reported acceptability and utility is summarized in Table 2. Among the 9 participants who completed follow-up, we found a mean acceptability score of 4.3 out of 5. All participants reported that they would recommend IMAGINE to a friend.

When asked about utility of core CBT skills, all participants reported engaging in "playing with baby" "contact with others" and "talking to/contacting someone who has been a positive support for self and baby" skills during half or more days in the prior week (Table 3). The majority reported using the following skills most days: "mood tracking" (66.7%), "engaging in pleasant activities" (66.7%), "overcoming obstacles to doing pleasant activities" (66.7%), "thought interruption to reduce harmful thoughts" (55.6%), "using time projection to imagine a better time in the future" (66.7%), and "using self-instruction to give oneself helpful directions" (77.8%). "Using worry time to reduce harmful thoughts", "making a request to someone using assertive communication", and "meeting a new person to provide support" were less commonly used (11.1%, 33.3%, and 44.4% respectively used them at least half the days).

When prompted about helpfulness of CBT skills utilized by participants, 100% of participants who used them reported they were helpful (Table 3).

Mental Wellness:

Summary statistics for mental wellness outcomes are presented in Table 4. We found no significant difference in depression symptoms, perceived stress, or social support scores when comparing enrollment vs. follow-up among the 9 study participants who completed follow-up. At enrollment, mean depression symptom scores (PHQ-9) was 3.9 out of 27 (standard deviation [SD] 1.7), compared with 3.0 out of 27 (SD 2.8) at follow-up ($p=0.25$). The mean perceived stress (PSS-4) score at enrollment was 4.8 out of 16 (SD 2.6) and 4.8 out of 16 (SD 2.3) at follow-up ($p=1.00$). The mean social support scores for family was 48.4 out of 100 (SD 6.4) at enrollment, and 59.8 out of 100 (SD 30.7) at follow-up ($p=0.11$). The social support scores for friends were 51.1 out of 100 (SD 5.3) at enrollment, and 47.9 out of 100 (SD 7.4) at follow up ($p=0.34$).

Discussion:

In this pilot study, we found that IMAGINE, a novel virtual adaptation of the MB course, had high acceptability, as evidenced by AIM measure scores and willingness to recommend IMAGINE to a friend. Most CBT skills discussed in the IMAGINE intervention were used frequently by the majority of participants and participants reported that the skills they used were useful. Uptake of IMAGINE, defined as the proportion of eligible participants who enrolled, was high. However, many individuals who initially contacted the study did not complete the screening process, suggesting screening procedures presented barriers. We also found that a substantial proportion of screened participants were ineligible, most commonly due to elevated PHQ9 scores. While our study's focus was on prevention of perinatal depression, this observation suggests that IMAGINE may also be appealing to individuals who are already experiencing symptoms of depression. We found no significant changes in depression scores, perceived stress, or perceived social support, although our study's small sample size was not powered to detect symptom changes.

CBT has been found to be effective in the treatment of depression, anxiety and trauma-related perinatal disorders. (Nillni et al., 2018) It has also been found to be effective in the general population when delivered through internet based tools. (Gratzer & Khalid-Khan, 2016) Despite this, a recent scoping review of digital tools for prevention and screening of perinatal depression found a notable absence of interventions that involved the delivery of CBT or other active psychological therapies. (Hussain-Shamsy et al., 2020) Furthermore, other studies noted a need for more mobile phone apps that disseminate perinatal depression prevention programs specifically. (Osma et al., 2016). Barrera et al. previously adapted MB to an online format called e-MB (Mothers and Babies Internet Course/Curso Internet Mamás y Bebés) aiming to increase access and overcome geographical barriers to care, and providing resources in Spanish and English. (Barrera et al., 2015b) eMB is a self-guided website with informational pages, audio and video clips and worksheets that follow MB modules; IMAGINE differs from eMB in its inclusion of a facilitator component and group delivery format.

Strengths of our study include that the IMAGINE intervention was systematically adapted from the evidence-based MB program, prioritizing fidelity to MB while incorporating adaptations based on the recommendations of pregnant or postpartum youths and healthcare workers. The nature, timing, reason and goal of adaptations is reported in a separate paper. (Gewali et al., 2021) Inherent to the development of IMAGINE was a desire to decrease the barriers to access, specifically for young people and those for whom telehealth was more feasible than in-person engagement. The intervention was also designed to acknowledge current events such as the COVID-19 pandemic and other topics of interest to participants, through pre-developed content as well as dynamic moderation by a trained facilitator to monitor and tailor content.

Strengths of our evaluation include selecting measures of uptake of CBT skills that align with the known mechanisms of the MB program and measures used in previous MB studies. This allows comparison of our findings with those from other MB studies, and interpretation in the context of evidence-based mechanism. The levels of engagement our participants reported in CBT skills was similar to that reported in a cluster randomized trial of MB used during in-person one on one visits (S. D. Tandon et al., 2018): 66% of IMAGINE participants reported that they engaged in pleasant activities and 100% talked to or contacted someone who has been a positive support, compared with 78% and 80% respectively. While our study was not powered to test whether IMAGINE has the same clinical impact as in-person MB delivery, these data on engagement of CBT skills are promising. Tandon et al found that of the core

CBT skills, cognitive restructuring techniques were least commonly used. Consistent with this finding, worry time, a cognitive restructuring technique, was the least utilized in our data. Tandon et al also found that several participants enjoyed the practice of noticing one's mood using a scale, which aligns with our data on self-reported frequency of mood tracking and perceived helpfulness.

Our findings of high intervention acceptability and high use of CBT skills suggests the IMAGINE intervention is promising and its effects should be further studied. Our findings on uptake and acceptability are consistent with the existing literature on use of mobile applications for pregnant people. In a study that integrated SMS text messages into MB one on one home visitation interventions, participants reported high acceptability, specifically pertaining clarity and usefulness of messages. This study also concluded with the need to further explore integration of human support to the intervention. (Barrera et al., 2021)

Our study also has limitations. Recruitment was primarily conducted through Facebook and Instagram, which selected for participants who were already using social media platforms. Future evaluations should employ additional recruitment channels from non-social media sources to prevent excluding those who do not participate in social media platforms currently, and increase generalizability. For example, a study reviewing prevention and treatment interventions for perinatal depression and anxiety in Latina and African American women cited Google Ads as a non-social media avenue for recruitment. (Lara-Cinisomo et al., 2021)

We observed high attrition from initial contact to completion of screening. We do not have data on the characteristics of participants who did not complete screening, but completion of the screening process may have systematically excluded certain groups; further research is needed to better understand the barriers to participation. Additionally, our eligibility criteria included ability to read and write in English. It is known that rates of perinatal depression are as high as 60% among immigrant Latinx communities. (Lara-Cinisomo et al., 2019) Perinatal anxiety disorders also have higher prevalence in individuals who identify as Indigenous. (Ward et al., 2022) Studies have also found that even with increased identification of perinatal depression, engagement with treatment is lower in non-white women as compared to white women. (Iturralde et al., 2021) It will be important to adapt IMAGINE for delivery in additional language, particularly Spanish, in which MB materials already exist.

Our findings are also limited by our study's small sample size and non-randomized design. The mode of recruitment and small sample size mean the sample may not be broadly representative: recruitment was initially focused in Seattle/King County and was expanded across the United States when in-person recruitment activities were suspended due to COVID-19. The sample therefore overrepresents residents of Washington State. Comparisons made in this small pre-post analysis are not powered to rigorously evaluate the intervention's effect and are susceptible to confounding by changes over time or other variables that are not attributable to the intervention. Additional larger-scale, randomized studies are needed to evaluate the intervention more robustly. Additionally, due to one participant being lost to follow up, bias from complete case analysis should be considered a limitation as intervention acceptability and utility may be systematically different in the participant who did not complete follow-up.

The majority of members of the study team who collected the screening, entry and follow-up questionnaire data for the IMAGINE pilot, including those who are supporting this thesis' analysis, do not share the eligibility characteristics of the participant population – especially pertaining to age and

parenting status. This may impact the data collection and results interpretation process, leaving room for bias or power dynamics.

In conclusion, our findings provide preliminary data on the promise of a novel intervention to support youth perinatal mental health and prevention depression. Larger, randomized trials are needed to evaluate the intervention's efficacy. The relatively large number of participants who were ineligible due to elevated depression symptoms also highlights unmet need for support among peripartum youth who are already experiencing depression.

Appendix:

Table 1: Participant Baseline Demographic Information

Participant Characteristic	N	n (%) or median (IQR)
Age (years)	9	18.0 (17.6-22.2)
Gender		
Female	9	9 (100.0%)
Race/Ethnicity	9	
Black		6 (66.6%)
Latinx		4 (44.4%)
White		2 (22.2%)
Pregnancy Status		
Pregnant at time of enrollment	9	4 (44.4%)
English Proficiency		
Fluent	9	9 (100.0%)
Bilingual		
Yes	9	5 (55.5%)
Highest Level of School Completed	9	
9-12 th grade		4 (44.4%)
High school diploma / GED		1 (1.1%)
Some college, Associates degree or 4-year college degree		4 (44.4%)
Currently Working Outside the Home	9	
No		7 (77.7%)
Yes, part-time (<40hrs/week)		1 (1.1%)
Yes, full-time (40hr/week)		1 (1.1%)
Health Insurance Status	9	
Medicaid / Apple Health		6 (66.6%)
Private insurance (employer purchased)		3 (33.3%)
Housing Status	9	
Stably		8 (88.8%)
Unstably		1 (1.1%)

Figure 1: Uptake of Intervention

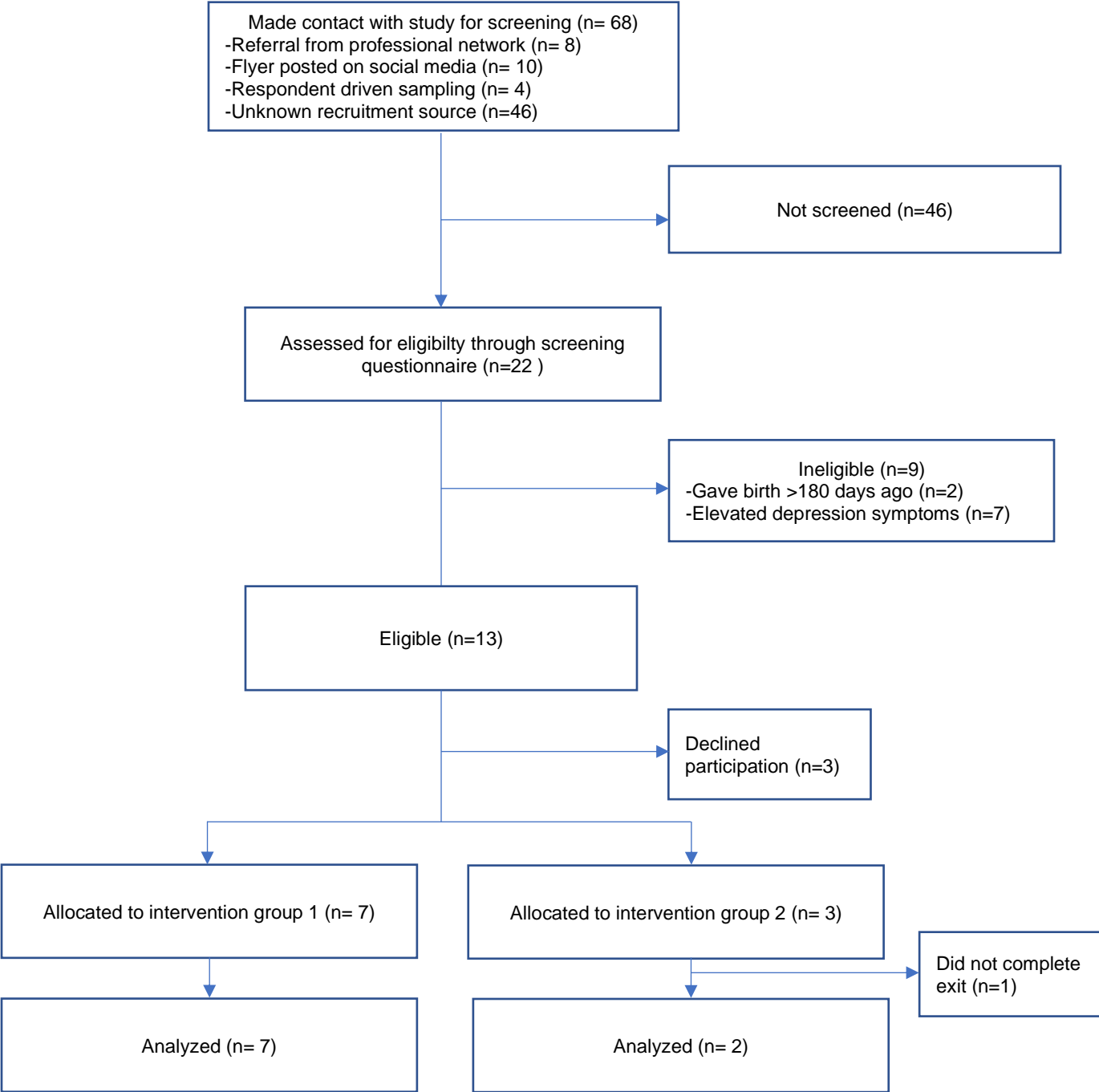


Table 2: Reported Acceptability

Measure	N	Mean Participant Score at Follow-up, (SD) or n (%)
Acceptability of Intervention Measure (AIM)	9	4.3 (1)
Would recommend IMAGINE to a friend (completely agree or agree)	9	9 (100%)

Table 3: Frequency and Helpfulness of CBT Skill Utilization as Reported by Participants

Skill	N	n used skill $\geq 1/2$ time	% used skill $\geq 1/2$ time	n found skill helpful*	% found skill helpful
Kept track of mood	9	6	66.7	6	100.0
Engaged in pleasant activities	9	6	66.7	6	100.0
Overcame obstacles to engage in pleasant activities	9	6	66.7	6	100.0
Used thought interruption to reduce harmful thoughts	9	5	55.6	5	100.0
Used worry time to reduce harmful thoughts	9	1	11.1	1	100.0
Used time projection to imagine a better time in the future	9	6	66.7	6	100.0
Used self-instruction to give yourself helpful directions	9	7	77.8	7	100.0
Played with baby	9	9	100.0	9	100.0
Had positive contact with others	9	9	100.0	9	100.0
Talked to or contacted someone who has been a positive support to yourself/baby	9	9	100.0	4	100.0
Made a request using assertive communication	9	3	33.3	3	100.0
Met a new person who can provide support for you and your baby**	9	4	44.4	4	100.0

* among those who reported using the skill; includes reports of both “somewhat helpful” and “very helpful”

**responses for this question asked for number of new people met who can provide support. This n represents number of those who met at least 1 new support person.

Table 4: Change in Participant Mental Wellness from Baseline to Follow-up

Measure	Mean Participant Score at Screening/Entry, (SD)	Mean Participant Score at Follow-up, (SD)	P Value
Depression (PHQ 9)	3.9, (1.7)	3.0, (2.8)	0.25
Perceived Stress (PSS-4)	4.8, (2.8)	4.8, (2.6)	1.00
Social Support	Family: 48.4, (6.4) Friends: 51.1, (5.3)	Family: 49.6, (4.4) Friends: 47.9, (7.4)	Family: 0.11 Friends: 0.88

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