

# Influence of Hypnosis Combined with CBT-I on Sleep Quality and Negative Emotion in Prenatal - A Network Intervention Model

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## **Abstract:**

**Objective:** The aim of this study was to examine the acceptance and effectiveness of a network psychological intervention based on a combination of hypnosis and cognitive behavior therapy for insomnia among pregnant women.

**Patients and methods:** A sample of 33 pregnant women suffering from negative mood and bad sleep quality received this online intervention. The acceptance questionnaire was taken for measure the acceptance. Negative mood was assessed with Patient Health Questionnaire-9 and General Anxiety Disorder-7. Pittsburg Sleep Quality Index and Cardiopulmonary Coupling (CPC) sleep monitoring system were used to record sleep quality subjectively and objectively. All measurement were taken before and after the intervention.

**Results:** Pregnant women suffered from bad sleep quality and negative mood. This intervention is a well-accepted and feasible model. Significant improvements were observed in the indicators of emotion and subjective sleep parameters, as well as in objective sleep measures.

**Conclusion:** Our findings showed that this network intervention model is a feasible effective model for pregnant women in prenatal to deal with negative mood and poor sleep quality.

**Keywords:** Hypnosis, CBT-I, Pregnant Women, Sleep Quality, Negative Mood, Prenatal.

## **Introduction**

Pregnancy, as a crucial period in a woman's life, brings about significant changes, often leading to tendencies of worry and negative psychological implications as pregnant individuals navigate adjustments and transformations. The transition in identity introduces numerous unpredictable factors, predisposing pregnant women to distress and other negative psychological experiences. Despite various nursing and educational efforts targeting pregnant women's prenatal care in society, the emphasis has predominantly been on physical changes, with minimal focus on prenatal psychological assessment and education (O'Hara & McCabe, 2013; Stewart & Vigod, 2019). Peng et al. suggested that pregnant women's emotions during identity transition should be a focal point, emphasizing continuous attention to negative emotions. Different stages of pregnancy manifest varying expressions of negative emotions (Peng et al., 2021). In early pregnancy, concerns about fetal health and reactions to pregnancy may foster

negative psychological states, while in late pregnancy, negative emotions stem from apprehensions about the birthing process, fear of enduring labor pains, and postpartum body changes. When pregnant women's negative emotions reach a certain threshold, it not only diminishes their own immune system but also increases the risk of infection, which is highly detrimental to fetal development (Okun et al., 2018; Moreno-Fernandez et al., 2020). Gelaye (2016) noted that besides worrying about the healthy growth of the fetus, pregnant women also express concerns about bodily functions and changes in physique, excessive worries leading to emotional shifts and possibly depression (Bei et al., 2015). The research revealed that that nearly 12% of perinatal women experience depression. With the increasing prominence of perinatal depression issues, there is growing attention towards prenatal depression. Research by some scholars indicates that the highest incidence of depression occurs in the late stages of pregnancy, surpassing rates in the postpartum period (Pearlstein et al., 2009; Peng et al., 2021).

Antenatal depression, also known as prenatal depression, refers to emotional disturbances experienced by pregnant women during gestation, characterized by symptoms such as mood swings, insomnia, loss of appetite, fatigue, difficulty concentrating, and an inability to experience pleasure. Antenatal depression has significant implications for the health of both pregnant women and their fetuses, increasing the risk of postpartum depression, affecting fetal development, and raising the likelihood of preterm birth, low birth weight, and infant developmental issues (Brummelte & Galea, 2016). Pregnant women are divided into early, middle, and late stages, with the highest incidence occurring in the early stage, as primigravid women, lacking childbirth experience, are more likely to experience antenatal depression compared to multiparous women (Ng et al., 2023). If antenatal depression occurs, both the physical and mental well-being, as well as the dietary quality, of pregnant women are affected. During gestation, antenatal depression increases the risk of suicide and postpartum depression. Wang et al. (2020) and other scholars assert that antenatal depression in pregnant women affects the physical condition of newborns, primarily manifesting as neurological and behavioral abnormalities, along with a higher incidence of preterm birth and low birth weight. Adverse maternal emotions may be perceived by the fetus as stressors, potentially leading to harmful ideations towards the fetus and impacting maternal reproductive health (Dijk, 2013; Tomfohr-Madsen et al., 2019).

Sleep is a physiological state characterized by relaxation and restfulness of the brain, nervous system, and various parts of the body. It is crucial for human health as it facilitates bodily recovery, tissue repair, enhances memory and learning capabilities, and influences emotions and mental well-being. According to Li et al. (2021), sleep quality refers to the subjective experience of individuals obtaining sufficient, deep, and uninterrupted sleep during the sleep process, reflecting the effectiveness of sleep (Lin-Lewry et al., 2023). It typically includes factors such as sleep onset latency, sleep duration, sleep depth, and sleep continuity. There is a close relationship between sleep quality and the duration, depth, and effectiveness of sleep, as well as insomnia. The quality of sleep not only affects the repair of bodily systems but also plays a role in replenishing mental faculties, safeguarding physical health, and aiding patient recovery (Warland et al., 2018).

Hypnotherapy combined with Cognitive Behavioral Therapy (CBT-I) for treating depression and insomnia offers multiple advantages (Elkins, 2023). Firstly, hypnotherapy aids patients in achieving relaxation, reducing anxiety,

and lowering stress levels. By guiding patients into a state of deep relaxation, hypnotherapy can alleviate the physical and psychological discomfort associated with depression and insomnia, promoting the body's natural equilibrium and regulation. Secondly, hypnotherapy facilitates the modification of negative thought patterns and behaviors in patients (Becker, 2015). Under hypnosis, therapists can utilize suggestions and recommendations to guide patients in reshaping positive cognitive patterns and altering negative emotional responses and behavioral habits (Grégoire et al., 2022). This helps reduce symptoms of depression and insomnia while enhancing patients' psychological resilience and self-regulation capabilities. Furthermore, combining hypnotherapy with CBT-I strengthens treatment efficacy. CBT-I focuses on addressing patients' negative thought patterns and behaviors and teaches them skills to cope with stress and challenges (Elkins, 2022; Wolf et al., 2022). By integrating hypnotherapy with CBT-I, therapists can directly access and modify patients' thought processes during hypnosis and reinforce positive cognitive and behavioral patterns through CBT-I techniques post-hypnosis. Lastly, combining hypnotherapy with CBT-I for treating depression and insomnia can enhance treatment durability (Zech et al., 2017; Palsson & Ballou, 2020). By intervening at the subconscious level, hypnotherapy helps patients deeply ingrainedly change negative emotions and behavioral habits, thereby ensuring longer-lasting and more stable treatment effects. The internet-based online hypnosis combined with cognitive-behavioral therapy (CBT-I) treatment model offers several advantages within the pregnant population. Firstly, pregnant women often find it challenging to seek medical care due to their physical condition, whereas the online treatment mode eliminates time and location constraints, allowing pregnant women to comfortably receive treatment at home or in other environments. This convenience reduces the discomfort of pregnant women and helps them to better focus on the treatment process. Secondly, pregnant women may face psychological issues such as anxiety and depression during pregnancy. The online treatment model provides a private and comfortable environment, making pregnant women more willing to share their feelings and problems, which is conducive to the development and improvement of treatment effects. Additionally, the online treatment model offers flexibility, allowing pregnant women to choose suitable treatment times according to their daily schedules, thereby enhancing the continuity and stability of treatment. Lastly, the online treatment model enables pregnant women to engage in real-time communication with medical experts, establishing trust and rapport, which helps enhance the durability and depth of treatment effects. Therefore, the internet-based online hypnosis combined with CBT-I treatment model provides pregnant women with a convenient, private, flexible, and personalized treatment experience, effectively helping them to address psychological issues that may arise during pregnancy, thereby improving their quality of life and mental health. How to effectively prevent the occurrence and progression of maternal anxiety and depression is one of the important issues for special populations. Therefore, the aim of this study is to investigate the effects of network-based online treatment modalities of hypnosis combined with CBT-I on negative emotions and sleep in pregnant women.

## **Methodology**

### **Participants**

The study was a pilot study. A total of 33 pregnant women were recruited from psychological clinic of Chongqing

Health Center of Women and Children, in Chongqing, China between March 2023 and September 2023. The inclusion criteria include: a, gestational age is less than 28 weeks; b, can read and write; c, no other complications such as pregnancy-induced hypertension, gestational diabetes mellitus; d, no other severe psychiatry disorders. An informed consent should be signed before enrollment.

## Material

Participants were required to complete demographic information, which included age, occupation, level of education, work status and parity. Depression and anxiety were measured using Patient Health Questionnaire-9 (PHQ-9) (Kroenke et al., 2001) and General Anxiety Disorder-7 (GAD-7) (Spitzer et al., 2006). The results were assessed by two professionals. Sleep quality is evaluated subjectively, depending on Pittsburg Sleep Quality Index (PSQI) (Buysse et al., 1989) and objectively, during which a Cardiopulmonary Coupling (CPC) (Chien et al., 2013) sleep monitoring system was used to record individual sleep onset latency (SOL), time in bed (TIB), total sleep time (TST) and sleep efficiency (SE).

## Instrument

### Patient Health Questionnaire-9 (PHQ-9)

The PHQ-9 scale includes nine items, and choices for responses were a) never; b) several weeks over the pregnancy; c) more than half the pregnancy; or d) nearly the whole pregnancy. The PHQ-9 total score is the sum of scores for the nine items for each woman, and ranged from 0-27. We categorized participants as exhibiting symptoms consistent with a diagnosis of moderate or severe depression (PHQ-9 score  $\geq 10$ ) 13. The PHQ-9 has been shown to have good internal consistency and is highly correlated with a depression diagnosis in the general population (Kroenke et al., 2001).

### General Anxiety Disorder-7 (GAD-7)

Anxiety was assessed using the Generalized Anxiety Disorder-7, a seven-item measure of symptoms of anxiety (GAD-7). Items are anchored over a two-week period, using a scale from 0 (Not at all) to 3 (Nearly everyday). Total scores range from 0 to 21, with higher scores suggesting more severe anxiety symptoms. The GAD-7 has shown good internal consistency ( $\alpha = 0.92$ ), test-retest reliability, and convergent validity (Spitzer et al., 2006).

### Pittsburg Sleep Quality Index (PSQI)

The quality of sleep was assessed through the Pittsburg Sleep Quality Index (PSQI). The PSQI scale includes 19 questions. Data from the 19 questions were used to generate seven components. The components were scored individually on a scale of 0 to 3 as described elsewhere. The seven components' scores were summed to generate a total score with a maximum of 21 points, with higher scores indicating poor sleep quality. Participants with a total PSQI score of  $<5$  were identified as having good sleep quality (Buysse et al., 1989).

### Acceptance Questionnaire

The AQ contains 16 items (Table 1). Four scales measured the participants' acceptance of content, frame condition,

instruction of the intervention. Two global items evaluated satisfaction with HT-I and group dynamics. In addition to the acceptance questionnaires, subjects were asked to grade the training on a scale from 1 (“did not help at all”) to 5 (“helped very much”) after completing all training sessions.

**Table 1: Acceptance questionnaire**

Acceptance questionnaire		
Scale	No	Items
Content	1	The topic was accepted by the group
	2	The content seemed useful
	3	The participants understood the content
Frame conditions	4	The session's timeframe was adequate
	5	The session room was adequate
	6	The group size was adequate
Instruction	7	Trainer instructions were comprehensible
	8	Trainer instructions were helpful
Hypnotherapy	9	I was able to present the trance session fluently and in an appropriate tone
Trainer aptitude	10	I felt comfortable in the group
	11	I felt tension in the group (-)
	12	The trainer suits me
	13	The session was fun
	14	The group cooperated well
Group dynamics	15	Enough opportunities for group discussion were provided
	16	I was able to consider each participant's individual situation

## Design

The quasi-experimental study investigated the acceptance, feasibility and effect of a network intervention model depend on hypnosis and CBT-I. Four treatment groups with five to seven participants completed the whole project. All participants suffered from symptoms of sleep disorders, such as insomnia disorder, nightmares or irregular sleep-wake type, according to DSM-5, along with negative emotion such as depression and anxiety during the epidemic.

Two weeks before treatment and two weeks after pre-training were measured. All participants provided written informed consent and treatment prior to diagnosis. The intervention consists of six phases. Before and after the measurement, participants filled out subjective and objective sleep record. In addition, participants completed a variety of questionnaires.

## Intervention: A network intervention model based on CBT-I combined with hypnosis

The treatment setting is still based on regular CBT-I treatment setting. With a maximum of six sessions, all these

sessions were based on a combination of CBT-I and hypnosis. As a multicomponent intervention, this intervention work model focused on the challenges of pregnant women's life during epidemic period by addressing special circumstances and environmental factors as well as biological factors. These included irregular sleep-wake cycles due to negative emotion, such as anxiety and depression (Table 2).

**Table 2: The Intervention Strategy**

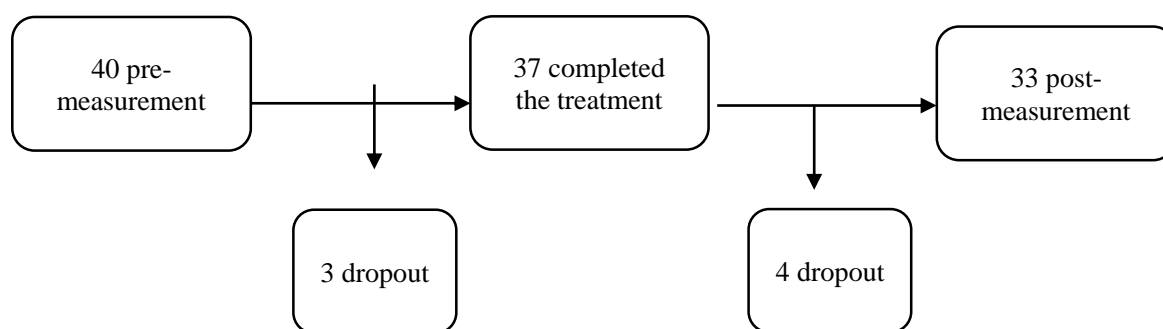
Stage/week	WORK SESSION
<b>Stage1 1<sup>st</sup> week</b>	Evaluation (before therapy cycle) Chief complaint of sleep problems History of sleep problems Sleep habits Behavior related to sleep sleep environment Assessment of other sleep disorders A history of physical and mental illness Categorize the cause of insomnia (3P, Case conceptualization) The first time of sleep diary Self-relaxation and self-hypnosis techniques (body scanning) <ul style="list-style-type: none"> <li>- Reduction of psychovegetative overexcitation</li> <li>- Triggering of the natural circadian rhythm</li> <li>- better management of daytime fatigue</li> <li>- Experience of self-efficacy and self-control</li> <li>- Sleep and re-sleep assistance</li> <li>- Improving perception and influencing cognitive processes</li> </ul>
<b>Stage2 2<sup>nd</sup> week</b>	Sleep hygiene education Work on cognition The scientific sleep knowledge that most people don't know Lower sleep expectations Hypnotic topic--acceptance
<b>Stage3 3<sup>rd</sup> week</b>	Discuss about negative sleep cognition Hypnotic topic: face your inner self Story of a lion
<b>Stage4 4<sup>th</sup> week</b>	stimulus-control, sleep restriction Keep sleep diary Build the reflex between bed and sleep Story: little river

	Change the behavior model: Let go of the past and live in the present
Stage5 5 <sup>th</sup> week	Self-relaxation before falling asleep (China's special)
Stage6 6 <sup>th</sup> week	Prevention of recurrence
	see the problems of the present from the perspective of the future
	Time train
	Planting technique

## Results

### Sample

Figure 1 provides an overview of the participant flow during the study. Forty pregnant women who diagnosed with moderate to severe anxiety were invited to take part in the study. During the course of cognitive behavioral therapy, three patients failed to complete and dropout. After treatment intervention, 4 patients could not be re-evaluated on time and dropout.



**Figure 1: Participant Inclusion Process**

### Sample Characteristic

A total of 33 pregnant women were enrolled in this study. Their ages ranged from 21 to 35 ( $M=27.4$ ,  $SD=3.40$ ). The gestational age ranged from 8 to 27 weeks ( $M=17.55$ ,  $SD=5.5$ ). In which, 26 subjects (78.8%) were first-born, 6 subjects (18.2%) were second-born, and 1 subject (3%) were third-born. Most of the participants had college diploma (25 subjects (75.8%)), 4 subjects (12.1%) had high school diplomas and 4 subjects (12.1%) had graduate diplomas. Their employment status was as follows: 22 subjects (66.7%) had regular jobs, 3 subjects (9.1%) were freelancers, and 8 subjects (24.2%) were unemployed or housewives (Table 3).

**Table 3: Sample Characteristics**

Sample Characteristics	
Sample Characteristics	N
N	33
Age, M (SD) (year)	27.48 (3.40)
Age range (years)	21-35

gestational weeks (weeks)	17.55( 5.50)
gestational weeks range (weeks)	8-27
<b>Parity</b>	
1	26
2	6
3	1
<b>Education</b>	
High school diploma	4
College diploma	25
Graduate degree	4
<b>Employment Information</b>	
regular work	22
freelance work	3
unemployed/housewife	8

Abbreviations: SD, Standard Deviation

Pittsburgh Sleep Quality Index

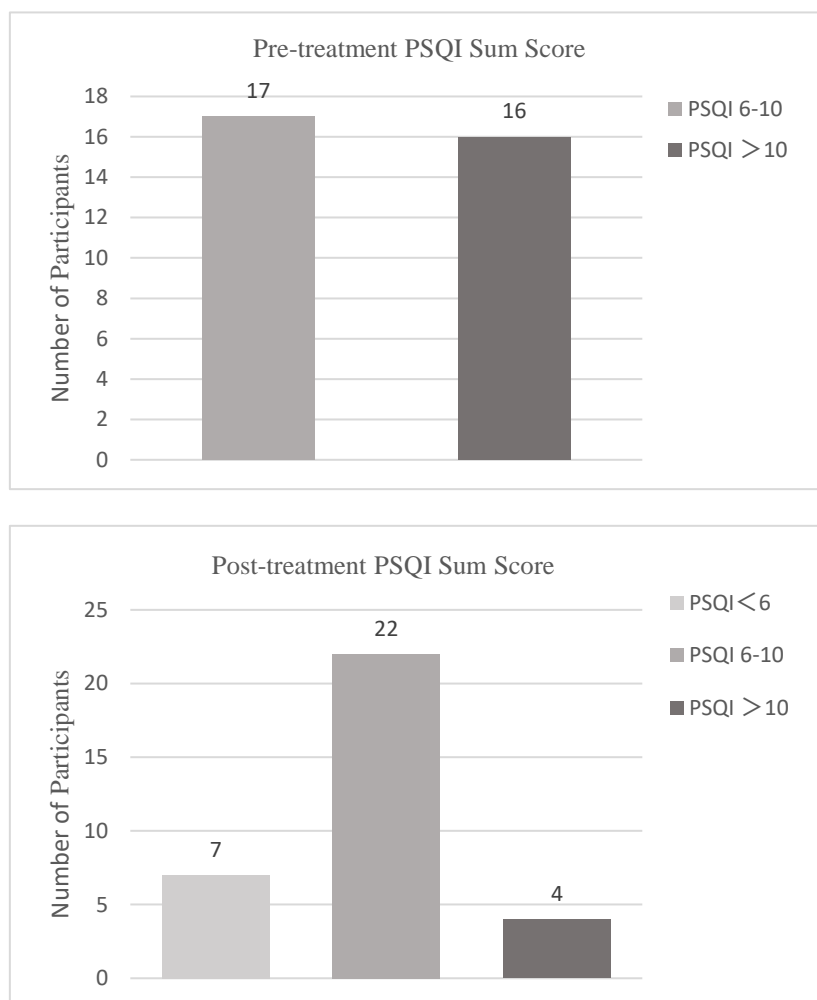
According to the PSQI sum scores, all subjects before treatment reported a poor sleep quality (M=10.76, SD=2.56) with a minimum score of 6 and a maximum score of 18 (Table 1). 48.48% participants even reported a severe sleep disorder (PSQI > 10). After treatment, the quality of sleep was improved (M=7.97, SD=2.65) with a minimum score of 2 and a maximum score of 14. But 78.8% of them still had sleep problems (Table 4).

Table 4 PSQI: descriptive statistics and comparisons for pre- and post-measurement

PSQI: Descriptive Statistics and Comparisons for Pre- and Post-Measurement					
	t1 (SD) (N=33)	t2 (SD) (N=33)	t	P-value	
PSQI sum score	10.76 (2.56)	7.97 (2.65)	5.266	0.001	
Sleep quality	2 (0.75)	1.55 (0.62)	2.887	0.007	
Sleep latency	2.36 (0.78)	2.18 (0.73)	1.063	0.296	
Sleep duration	1.12 (0.96)	0.52 (0.62)	3.384	0.002	
Sleep efficiency	0.73 (0.88)	0.27 (0.52)	2.689	0.011	
Sleep disturbances	1.88 (0.60)	1.52 (0.67)	2.171	0.037	
Daytime-sleepiness	2.58 (0.56)	1.94 (0.79)	3.464	0.002	

The PSQI sum scores declined significantly from pre- to post-measurement (Figure 2). The results for the PSQI scales showed significantly improved scores in sleep quality, sleep duration, sleep efficiency, sleep disturbances and daytime sleepiness (P<0.05). The scale of sleep latency did not show significantly change.





**Figure 2: The PSQI Sum Scores Declined Significantly from Pre- to Post-Measurement**

#### GAD-7

The GAD-7 scores of the pregnant women included in this study before treatment were all at the moderate and severe level ( $M=13.58$ ,  $SD=2.41$ ). Twenty-four participants (72.3%) show moderate anxiety (10-14 points). While nine participants (27.3%) show severe anxiety (15-21 points). After treatment, the GAD-7 score of the subjects was significantly increased ( $M=9.91$ ,  $SD=3.82$ ), in which 18 subjects (54.5%) had mild anxiety (5-9 points). There were 10 patients (30.3%) with moderate anxiety and 5 patients (15.2%) with severe anxiety. After treatment, the anxiety level of participants was significantly improved ( $P < 0.05$ ). (Table 5)

**Table 5: GAD-7, PHQ-9: Descriptive Statistics and Comparisons for Pre- and Post-Measurement**

	t1 (SD)	t2 (SD)	t	p
GAD-7	13.58(2.41)	9.91(3.82)	6.357	< 0.05
PHQ-9	10.76 (5.35)	6.33 (3.40)	6.732	< 0.05

### PHQ-9

The results of the PHQ-9 scale suggested that 82% of the pregnant women included in the study had depression ( $M=10.76$ ,  $SD=5.35$ ). Nineteen participants (57.6%) show mild to moderate depression (5-14 points). While two participants (6%) show severe depression (20-27 points). After treatment, the PHQ-9 score of the subjects was significantly decreased ( $M=6.33$ ,  $SD=3.40$ ). Eleven (33.3%) of them did not develop depression after treatment, seventeen participants (51.5) had mild depression after treatment, and no participants had severe depression. After treatment, the depression level of participants was significantly improved ( $P < 0.05$ ). (Table 5)

### CPC

The results for CPC are presented in Table 7. After treatment, the sleep quality was significantly improved. significant tendencies were discovered for sleep duration, deep-sleep duration, REM-sleep duration, deep-sleep-onset latency, wakefulness time, time in bed and sleep efficiency. A nonsignificant development toward light sleep time. (Table 6)

**Table 6: CPC: Descriptive Statistics and Comparisons for Pre- and Post-Measurement**

	t1 (SD) (N=33)	t2 (SD) (N=33)	t	P-value
sleep duration	391.48 (17.26)	422.48 (20.94)	-7.233	0.000
deep-sleep duration	161.24(15.96)	189.27(14.66)	-7.022	0.000
light sleep time	184.97(10.09)	182.61(9.73)	1.01	0.320
REM-sleep duration	45.27(9.00)	50.61(8.34)	-3.303	0.002
deep-sleep-onset latency	34.52(12.95)	26.61(8.57)	3.774	0.001
wakefulness time	24.06(8.99)	17.64(5.77)	3.529	0.001
time in bed	483.42(34.96)	464.67(19.42)	2.778	0.009
sleep efficiency	81.20 (4.43)	90.93 (2.22)	-10.283	0.000

### Questionnaire Investigation

The results for the questionnaire Investigation are presented in Table 2. Pregnant women were most concerned about prenatal tests could not be performed on time and hospital delivery arrangements affected by the outbreak. Twenty-six (78.8%) participants worried about delayed postnatal tests. Among them, 16 participants (48.5%) were mildly worried, 8 participants (24.2%) were moderately worried and 2 participants (6.1%) were severely worried. According to another question, 28 participants were worried about it.

### Acceptance

The results for the acceptance questionnaire are presented in Table 7. All components were well accepted. The content of the session received the highest acceptance ratings, while the trainer aptitude was only medium. But there's also a lot of variation in how people think about trainer aptitude ( $2.16 \pm 2.08$ ). (Table 7)

**Table 7: Pregnant's Acceptance of the Measurement**

	<b>M</b>	<b>SD</b>
Content	3.48	0.83
Frame conditions	3.38	0.83
Instuction	3.36	0.78
Hypnotherapy	3.21	0.89
Trainer aptitude	2.16	2.08
Group dynamics	2.68	0.87

## Discussion

The purpose of this study is to explore an online psychological intervention model that can solve the sleep and negative emotions of pregnant women. A total of 33 insomnia pregnant women implemented for statistical analysis, in which all participants had comorbidities of moderate to severe anxiety and nearly 87.9% reported depression. Sleep parameters, depression, and anxiety were assessed at two measurement times: right before (pre-measurement) and after the intervention (post measurement). The acceptance, feasibility and effectiveness were investigated with several objective and subjective instruments.

Overall, acceptance of this intervention model was high among all participants. The CBT-I elements were rated as very good. Participants' high attendance and low dropout rates can reflect the better feasibility of this intervention model. In the whole program, only 3 patients due to network failure and scheduling problems. The subjects had good satisfaction with the content, time setting and form of this intervention mode, which indicated that the subjects have a high acceptance of the online psychotherapy. Based on these results, the first hypothesis can be confirmed.

Prior to treatment, pregnant women reported poorer sleep quality and negative mood, with difficulty falling asleep being the most common symptom of insomnia, and a higher incidence of anxiety. This is in accordance with current research that indicates reduced sleep quality and more sleep disorders in pregnant women in comparison to the general population (Maleki Dana et al., 2020).

After intervention, sleep improved on nearly all outcome measures. CBT-I is an efficacious non-pharmacological treatment for insomnia and is recommended as a first-line treatment for adults with chronic insomnia disorder (Brooks et al., 2018). Several studied showed that CBT-I influenced several subjective sleep parameters, such as increasing Sleep Efficiency (SE), Total Sleep Time (TST), sleep quality and declining use of sleep medication (Gałuszko-Węgielnik et al., 2012; Hamoen et al., 2014; Koffel et al., 2015; Trauer et al., 2015). In our study, the same positive results were observed. Pregnant women reported a significantly better sleep quality, including improvement in sleep duration, sleep efficiency and less daytime sleepiness, sleep disturbance to the PSQI. Sleep was improved on a subjective basis in sleep questionnaires, but also on more detailed instruments as CPC. As an objective measure, the CPC data showed a significant improvement of sleep efficiency up to 90.93%, which is in

line with results of Blom et al., Koffel et al. (Blom et al., 2015; Koffel et al., 2015). Angelika Anita Schlarb et al. developed a sleep training (SWIS; studying in your sleep) for university students with sleep problems, which is also based on a combination of CBT-I and HT-I (Schlarb et al., 2018). After SWIS treatment, improvements in objective sleep measures (actigraphy), like a reduced duration of night wakings, reduced sleep onset latency and higher sleep efficiency. In our program, we also found improvements in these sleep indicators. More importantly, compared with SWIS, our training program included negative emotional management under the influence of the epidemic, metaphorical stories and relaxation training.

The incidence of comorbid anxiety and depression is higher in insomnia. Higher level of anxiety could exacerbate a distorted perception of sleep, which could leave pregnant women trapped in a vicious cycle of "anxiety-insomnia - more anxiety". Some studies have shown that CBT-I improves sleep and has positive effects on anxiety and depression (Harvey et al., 2015; Oh et al., 2019). Blom et al. compared patients with insomnia and depression receiving either an insomnia (CBT-I) or depression intervention. Patients from the CBT-I group showed a distinctive increase of SE and decrease of SOL and use of sleep medication with medium to large effects. Depressive symptoms were unaffected by the type of intervention. A meta-analysis from Belleville showed that CBT-I has a moderate effect on anxiety (Belleville et al., 2011).

The content of this training project including hypnosis and CBT-I converges with other programs regarding stimulus control, sleep hygiene, relaxation training and cognitive therapy. Hypnosis is "a procedure during which a person experiences suggested changes in sensation, perception, thought or behavior". It is characterized by an ability to sustain a state of absorption, dissociation, and suggestibility, by diminished peripheral awareness of external stimuli. Hypnosis is one of effective allopathic and complementary treatments in pregnant women, which has been shown to assist women in coping with physical and psychological symptoms during pregnancy, labor, and postpartum period. Hypnosis can also increase postpartum psychological well-being and reduce risk of postpartum depression (Cordi et al., 2015, 2014; Ng and Lee, 2008). Zuhrah Beevi's research aiming to investigate the impact of hypnosis intervention in alleviating psychological and physical symptoms during pregnancy showed that hypnosis has definite improvement in reducing stress, depression and anxiety during pregnancy (Beevi et al., 2019). The combination of hypnosis and cognitive behavioral therapy ensures the therapeutic effect of this online psychological intervention, and improves the negative emotions and sleep quality of pregnant women. The results suggest that such a treatment might be used to treat sleep and mood problems in other groups.

### **Strengths and Limitations**

The most important advantages of this sleep training are the great applicability to insomnia pregnant women and the focus on their negative mood. Subjective and objective indicators were measured to evaluate the subjective attitude and efficiency of this treatment model. Because the research was a pilot study, only a small sample size of 33 participants was contained. The main reason to be considered was the aim of current study is to test the program's acceptance and feasibility and to seek for the first indications of effectiveness. Although the sample size was small, all the hypotheses were definitely obtained.

## **Conclusion**

Overall, our findings corroborate with other indicators to confirm high acceptability and feasibility for these online psychological interventions for pregnant women. This sleep training scored well on participant and trainer acceptance as well as feasibility. Furthermore, the pregnant women's sleep quality improved significantly, making it a feasible program for this special group during this special context. These results strongly support further investigation of this sleep training, especially regarding important aspects of pregnant women's life such as fetus-related impairments and cognitive performance. These may include the cognitive function and mental state of the pregnant woman and the psychosomatic health of the fetus. Future evaluations should include the methodological changes indicated by the limitations section, that is, a control group design, follow-up assessments and a larger sample size to expand the generalization of results. Lastly, the improvements in the sleep variables and negative mood may lead to reduced health issues for pregnant women (i.e., somatization, etc.) and a better life quality, which should be assessed in future studies.

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