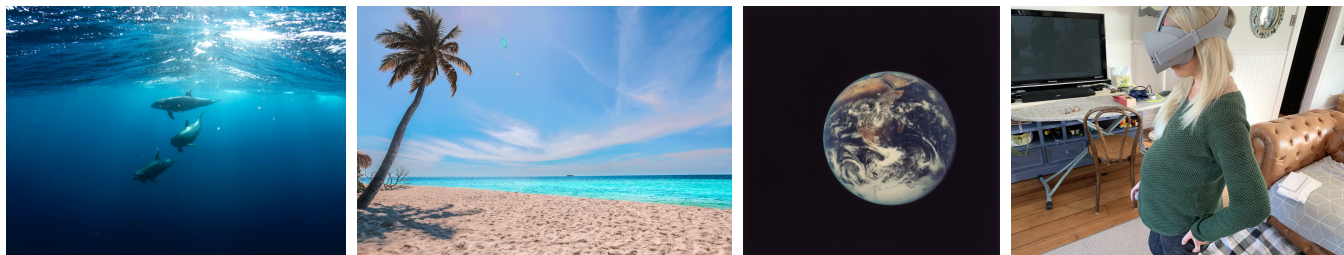# VR Experiences of Pregnant Women During Antenatal Care

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(a) Dolphins underwater.   (b) Palm beach.   (c) Earth from Space.   (d) Pregnant mother using Oculus Go.

Figure 1: Some of the VR environments experienced by pregnant women during antenatal care.

ABSTRACT

Pregnant women use a range of non-pharmacological pain relief methods to help manage and reduce pain intensity and to induce relaxation. We conducted a study with 18 pregnant women to explore VR experiences as a non-pharmacological method of pain relief to determine the effect on pain intensity. The results of the study identified several themes: evoking emotion with sub-themes, memory, and imagination. The theme presence, with sub-themes of relatability, realism, immersion, interactivity, and narration. Finally, the escape and anchoring themes were descriptions of how women envisaged using VR antenatally. This study provides a novel contribution to the field of VR and antenatal and labour care which can help inform the design of VR experiences for pregnant women.

KEYWORDS

Analgesia, Antenatal, Birth, Labour Pain, Relaxation, Virtual Reality

1 INTRODUCTION

The use of complementary and alternative therapies in pregnancy and labour is becoming increasingly common [1]. In 2016, 52.5% of a cohort of 30K mothers in NZ did not use pharmacological pain relief during their labour and 64.4% did not have any anaesthetic products (e.g. epidural analgesia) [1]. The use of non-pharmacological methods of pain relief in labour has a variety of benefits than purely the attenuation of pain. Non-pharmacological pain relief can help women relax and manage pain, increase self-confidence and satisfaction with birth [5]. Non-pharmacological labour methods include position changes, heat packs, water immersion, massage, acupressure, and distraction techniques (e.g. music therapy, visualisation, & hypnobirthing). Hypnobirthing is a deep state of relaxation (like meditation) and is used to help women in labour to manage pain.

A novel non-pharmacological technique that has been shown to be effective in the management of acute pain and anxiety in a range of clinical settings is VR distraction therapy [2, 4]. VR has elements of many natural therapies, such as distraction and visualisation with meditation and hypnotic features. Distinct from traditional forms of distraction such as listening to music or watching television, VR has emerged as an effective distraction tool due to multi-sensory input and interactiveness that gives the user the illusion of entering a virtual world. This paper reports a study exploring pregnant women (n=18 and >35 weeks) using VR as a non-pharmacological method of pain relief antenatally to understand the effect on pain intensity. The study uses existing low-cost VR head mounted displays and Virtual Environments (VE).

2 ANTENATAL VR EXPERIENCES

To fully explore and understand the phenomenon of women's experiences using VR in the antenatal period and as a non-pharmacological method of pain relief in their labour and birth and to determine a possible effect on labour pain, a mixed methods approach was chosen as the most appropriate method. This qualitative research sought to explore women's initial experience using VR in the antenatal period of their pregnancy. The research questions were: *what are women's experiences of using VR while pregnant and in labour*, and *what is the effect of VR on pain intensity?* 18 participants were recruited for the antenatal period study who were 35 weeks or greater. Ages ranged from 28–42 years and all identified as cisgender. A user study was conducted with participants who trialed four different commercial VEs (see Figure 1) in the antenatal period in their homes using the Oculus Go HMDs. The VEs were carefully selected based as much as possible on the criteria identified in the literature to increase levels of presence, be a distraction for women in labour, represent natural environments, and were passive [3]. Participants were shown all VEs with questions after each VE, and a semi-structured interview was conducted at the end. The first author who was a qualified midwife with 25+ years experience conducted the study and university human ethics was approved.

Thematic analysis was the method used for analysis and themes identified were scrutinised and reviewed by all authors. Four major themes were constructed: Evoking Emotion, Presence, Envisaged using VR in Labour, and Ideal Virtual Environment.

The **Evoking Emotion** theme described the participants' impression of the VEs in terms of an emotional experience using memory and imagination. These experiences varied greatly amongst participants with some reacting positively and others negatively to each VE. There was a range of emotional experiences after each of the VEs were viewed and described in the participant's narratives. The participants described how watching and listening to each VE evoked emotional responses. All the participants were able to recall a particular emotional state and participants used a variety of emotion words to describe their experience. All VEs induced at least one emotion for each of the participants. The participants described a range of emotions that they experienced after viewing each VE. These varied from "relaxed", "calmness" or "happiness" when viewing the underwater dolphin and the beach VE. The blob environment evoked strong emotive words and diverse descriptions such as "confusion", "scary", "disconcerting", "soothing", "entrancing." The space environment evoked a range of emotive words and descriptions such as: "ethereal", "relaxing", "awesome" and "boring."

The **Presence** theme described the sense participants experienced in relation to each VE and is divided into five sub-themes: relatability, immersion, realism, interaction and movement, and narration and storytelling. This theme was a concept that was unfamiliar to participants. However, when they described their experiences in VR, they used terms that indicated that they were experiencing this concept of presence. They used phrases such as: *"I was really in it"* (PID5), *"it was like I was instantly there ... it didn't feel fake, it felt quite real which added to it"* (PID2), and ' *'bubbles that came from me, that was sort of me, and it felt quite real"* (PID6). The expression of such phrases demonstrated a feeling of disorientation, and of disconnect at times, of being between the virtual and the physical world. Presence is a subjective feeling and was experienced individually and to different degrees by the participants who used the VR. Participants spoke of scenes in the VEs that evoked a sense of presence: *"The dolphins ... .seemed to be attacking my goggles and the space thing ... it was really cool, it felt like I was there."* (PID7).

The **Envisaging using VR in Labour** theme described how participants would use VR for labour. Two sub-themes were constructed from the data: escape as an effective distraction technique and anchoring describing using VR in labour as a way of grounding oneself, to avoid feeling out of control and avoid negative thoughts. All participants found using VR to be an effective distraction, describing it in terms of escape, and helping to remove them from the present reality. Many participants articulated they envisaged that they would use the VR in labour to distract them from the pain of contractions, as a tool to help them relax, and to encourage positive thoughts while labouring. The use of the word escape by the participants was a powerful description of how VR resulted in some participants feeling as if they had removed themselves from the physical environment and yet were present. Participants used words such as "remove", "drift off", "being taken away", "lose yourself", to convey this sense of escape from the physical world into the virtual world. In discussing VR and managing their labour pain, participants considered that VR could act as an 'anchor' and help them ground themselves, enabling them to feel calm and in control of their pain. They shared they would use it as a visualisation tool to help bring them back to a serene, focused state. One participant said that it would work similarly to meditation. Participants were concerned that when they were in labour, they might lose control. They wanted to avoid negative thoughts and the feeling that they were not coping with labour and the pain. They acknowledged that feeling out of control or catastrophising would affect their ability to cope with labour pain. Participants perceived VR as a 'tool' to include in their toolkit of complementary therapies for use in labour alongside other techniques. They envisaged that VR would help to relax and calm them so to focus on breathing techniques.

The **Ideal Virtual Environment** theme described features participants thought they would enjoy during labour and that they would find distracting and relaxing. There was a variety of VEs mentioned, demonstrating how subjective a VR experience is. Features wanted included the natural world, people, particular sounds and colour, and some personalized content.

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