

VR-BASED MINDFULNESS INTERVENTION FOR WOMEN RETURNING TO WORK AFTER MATERNITY. DOES VIRTUAL REALITY IMPROVE THEIR EXPERIENCE?

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Abstract

Working mothers deal with various difficulties attaining work-family balance and job satisfaction. Despite the number of women in the labor force, women typically continue to be the primary caregivers of children and this phenomenon makes returning to work a complex issue for women. Maternity leave is subjective to the mothers' work experiences before and after birth, which changes based on different factors (e.g., course of pregnancy, cultural factors, employment contract). Recent studies highlight that 20.1% of women reported having anxiety symptoms during pregnancy or the postpartum period. Given this alarming data, it is important to develop concrete tool to assist women facing emotional stress surrounding maternity leave. A protocol, based on VR-based mindfulness intervention, will be proposed to group of women to understand how this technology can impact the return-to-work experience after maternity leave in reducing stress and anxiety levels.

Inspiring new areas of research have been emerging and among them, one that has stood out is Virtual Reality (VR). VR enables users to experience computer-generated environments within controlled experimental conditions. VR creates an immersive, motivating, and attention-grabbing experiences by engaging several sensory modalities.

Mindfulness can be defined as self-awareness and the focusing on one's experiences in the present moment. This practice leads to multiple psychological benefits such as the enhancement of one's attention regulation, improvements in blood pressure, anxiety, and depression symptoms. Mindfulness can be used to treat a wide range of conditions, from stress management at the work to anxiety and depression, and it has been used in many psychotherapeutic approaches.

VR-BMI has proven to be an effective method to improve one's own psychological and/or physiological status. Many studies have been conducted which examine the effects of VR-BMI in reducing stress and anxiety. Based on previous and promising studies, our interest is to examine the impact of brief guided meditations in the form of paced breathing exercises on the well-being of women returning to work after maternity leave.

The participants will be mothers returned to work after maternity leave who will be administered a training protocol comprising VR-BMI intervention (experimental group) and an audio-based mindfulness intervention without VR (control group). Expanding on the potential of VR demonstrated in previous studies, we would expect to two brief mindfulness interventions, VR-based and guided audio, would induce a greater level of state of mindfulness and a general reduction in stress and anxiety when compared to the control group.

Keywords: *VR-based mindfulness intervention, virtual reality, mindfulness, maternity leave, anxiety.*

1. Introduction

Maternity leave is a period of absence from work granted to new mothers to care for their newborn child. It is a crucial policy that provides time for mothers to bond with their newborns, recover from childbirth, and establish breastfeeding, among other benefits. For many women, returning to work after maternity is a key milestone in their lives. For others, it can be a difficult experience, especially if they have trouble adjusting to a new lifestyle or don't feel prepared for the responsibilities of being a parent. In some cases, women may feel that returning to work after giving birth is an unnecessary

sacrifice (Feinberg et al., 2014; Wiens et al., 2022). Maternity leave is subjective to the mothers' work experiences before and after birth, which changes based on different factors (e.g., course of pregnancy, cultural factors, employment contract). Recent study found that 20.1% of the women reported experiencing anxiety symptoms during pregnancy or the postpartum period (Asaye et al., 2020). These symptoms can include excessive worry or fear, restlessness, irritability, difficulty sleeping, and physical symptoms like sweating or heart palpitations. Anxiety during pregnancy or the postpartum period can have a significant impact on a woman's well-being and may also affect her baby's development (Field et al., 2017).

2. Maternity leave and related issues

There have been some issues with maternity leave in Italy:

- 1) length of maternity leave: According to the International Labour Organization (2020) Italy has a relatively short maternity leave (5 months) compared to other European countries.
- 2) job protection: although mothers are entitled to maternity leave, there have been cases of discrimination against pregnant women and mothers in the workplace (Masser et al., 2007)
- 3) cultural attitudes: There is a cultural expectation in Italy that women are the primary caregivers for children, which can make it difficult for women to balance work and family responsibilities (McCardel et al., 2022)
- 4) access to childcare: Italy has a shortage of affordable, high-quality childcare options, which can make it difficult for mothers returning to work (Del Boca et al., 2015).

Given this alarming data, it is crucial to develop tangible tools that can aid women who are dealing with emotional stress related to maternity leave.

In this paper we explain a protocol, based on VR-based mindfulness intervention, that will be proposed to a group of about women to understand how this technology can impact the return-to-work experience after maternity leave in reducing stress and anxiety levels.

3. Virtual reality and mindfulness

Immersive virtual reality (VR) refers to a type of VR experience that seeks to fully immerse the user in a virtual environment, creating a sense of presence and engagement that can feel remarkably real. Immersive VR typically involves the use of a VR headset, along with specially designed software that creates the virtual environment (Freeman et al., 2017).

This paper aims to propose a mindfulness technique combined to VR, using VR-based mindfulness intervention (VR-BMI). Mindfulness is a technique that has been shown to reduce stress and anxiety and it can be used to reduce the effects of physical and psychological distress (Gong et al., 2023; Goldberg et al., 2020; Marchand, 2012).

VR-BMI are a novel approach to delivering mindfulness-based interventions using immersive technology. Mindfulness interventions are techniques that aim to cultivate present-moment awareness and non-judgmental acceptance of one's experiences and have been found to be effective in improving psychological well-being, reducing symptoms of anxiety and depression, and improving cognitive functioning. Several studies have found that mindfulness-based interventions can improve well-being, reduce symptoms of anxiety also during pregnancy and the perinatal period (Dhillon et al., 2017; Goodman et al., 2014), as well as decrease work-related stress among employees. Indeed, there is evidence to suggest that mindfulness can be effective in reducing work-related stress. For example, a meta-analysis of 22 studies found that mindfulness-based interventions had a small but significant effect on reducing occupational stress and improving well-being among employees (Donald et al., 2019). Another study found that mindfulness-based stress reduction (MBSR) reduced perceived stress and improved sleep quality among healthcare workers (Burton et al., 2017). Moreover, a randomized controlled trial found that an online mindfulness intervention reduced work-related stress and improved well-being among employees compared to a control group (Kreplin et al., 2018).

4. A new protocol of intervention

Research on VR-BMI is still in its early stages, but initial studies suggest that this approach may be effective in promoting mindfulness and reducing symptoms of anxiety and depression (Navarro-Haro et al., 2019). Based on the previous research, there is good reason to believe that mindfulness-based interventions like guided meditations could be effective in improving well-being among women returning

to work after maternity leave. The study aims at investigating the effects of VR-BMI that involve paced breathing exercises on the well-being of women who are returning to work after taking maternity leave.

Our previous studies (Rapisarda, Falco et al., 2022; Rapisarda, Mora et al., 2022), aimed at exploring the personal and professional resources of working mothers and deconstructing irrational beliefs on the role of mother and worker, showed the potential of VR which had positive outcomes. State anxiety was assessed using the STAI-Y questionnaire which was administered before and after each session of the protocol. The results showed that there was a statistically significant decrease in symptoms following both the diaphragmatic breathing session and body scan session. Regarding the quality of return to work after maternity leave following the intervention, more positive perceptions were found related to organizational flexibility and colleague's support. In addition, perceptions of self as a woman capable of coping with personal and organizational challenges seem to mostly prevail (e.g., *At work I feel like a tiger, like a warrior*).

Our objective is to determine whether these interventions can improve overall well-being, reduce stress, and anxiety for this population, who may be experiencing significant challenges during this transitional period. By examining the impact of VR-BMI, we aim to gain insight into the potential benefits of VR-BMI for improving the health and well-being of working mothers.

5. Phases of intervention

To evaluate the preliminary efficacy of VR-BMI intervention on maternity leave, in this study participants will be randomly divided into two groups: the treatment group will receive VR-BMI, the control group will receive an audio-based guidance. Both treatment and control groups received the same core content delivered in distinct formats (VR versus audio).

VR group participants will use an Oculus Go VR headset preloaded with VR software, the audio program will consist of much of the same core content as the VR program, through sound only, without the visual component.

To conduct this research, they will recruit about 30 women after maternity leave and randomly assign them to either the control group (receiving audio-based mindfulness intervention) or the experimental group (receiving mindfulness intervention with VR). Audio guided meditations (e.g., Body Scan Meditation; Breath Awareness Meditation; Loving-Kindness Meditation) will be comparable in length and content to the VR-BMI that will be used in the experimental group:

Body Scan Meditation: a classic mindfulness meditation that involves systematically scanning your body for sensations of tension or relaxation.

Breath Awareness Meditation: this meditation involves bringing attention to your breath to anchor your awareness in the present moment.

Loving-Kindness Meditation (LKM): this meditation involves cultivating feelings of kindness, compassion, and goodwill towards oneself and others.

VR-BMI will provide an immersive 360-degree visuals and ambient sounds to create a more engaging and immersive meditation experience. Based on the current scientific literature, both interventions will last from 20 to 45 minutes (Rodrigues et al., 2018; Fortney et al., 2013). They will be used quantitative measures to assess participants' well-being, stress, anxiety, and related outcomes at different time points, including before and after the intervention and at follow-up periods. They will be collected also qualitative data through interviews or focus groups to gain a deeper understanding of participants' experiences and preferences for each type of intervention.

Based on our promising study (Rapisarda, Mora et al., 2022) and growing body of research on the potential LKM and Mindfulness interventions in general, in the workplace we can expect some potential positive outcomes that could result from the VR-BMI for women returning to work after maternity leave.

Reduced stress and anxiety levels: Mindfulness interventions have been shown to be effective in reducing stress and anxiety levels in various populations, including pregnant women and new mothers. By reducing stress and anxiety levels, women returning to work after maternity leave may be better equipped to manage the demands of their work and home lives (Dhillon et al., 2017; Guardino et al., 2020)

Reduce stress and burnout: Mindfulness interventions have been shown to be effective in reducing burnout and stress among employees. A recent study aimed to investigate whether a mindfulness-based intervention could reduce stress and burnout among intern medical practitioners, and it showed that the intervention group (which received a mindfulness-based training) experienced significant improvements in stress, burnout, and psychological distress compared to the control group, which received no intervention. By reducing stress and burnout, mothers may be better able to cope with the challenges of parenting, which could lead to improved mental health and better outcomes for their

children. Additionally, reducing stress and burnout could help mothers maintain their own well-being, which could have long-term benefits for their physical and mental health. (Ireland et al., 2017).

Promoting work-life balance and well-being: a very recent study examined the impact of a mindfulness intervention on work-life balance and well-being, and how individual preferences may affect these outcomes. The mindfulness intervention group received a mindfulness training program, while the control group received no intervention. The results of the study showed that the mindfulness intervention had a positive impact on work-life balance and well-being, as participants in the intervention group reported greater improvements in these outcomes compared to the control group. Specifically, the mindfulness intervention was associated with increased detachment from work during non-work time, which in turn led to greater improvements in work-life balance and well-being. This last aspect can be particularly important for mothers during and after maternity leave, who may feel pressure to constantly stay connected to work even while they are away. Overall, promoting work-life balance through mindfulness can have various potential benefits for mothers, by improving well-being, enhancing time management, and improving relationships with others (Althammer et al., 2021).

6. Conclusion

Our hypothesis for this study would be to find new evidence about whether a VR-BMI can effectively reduce stress and anxiety levels for women returning to work after maternity leave. Specifically, we could expect to see differences between the control group (receiving an audio-based mindfulness intervention) and the experimental group (receiving the VR-based mindfulness intervention) in terms of reductions in stress and anxiety levels, as well as improvements in overall well-being. If the results are consistent with previous studies on mindfulness interventions, we could expect to see significant improvements in well-being outcomes for both the control and experimental groups. However, if the VR-based mindfulness intervention is found to be more effective in reducing stress and anxiety levels compared to the audio-based intervention, this could have important implications for the use of VR technology as a tool for supporting mental health and well-being in various contexts.

The use of new immersive technologies, such as VR, can be a valuable tool in promoting individual and organizational well-being among women returning to work after maternity leave. This technology can provide women with flexibility and convenience in their work schedule, which could help them balance their work and family responsibilities. VR technology can also provide a safe space for women to practice their skills and increase their confidence before returning to work. Overall, a mindfulness-based intervention with VR can provide a novel and effective approach to supporting mental health and well-being of mothers during and after maternity leave. By using VR technology, the intervention might be made more accessible, engaging, and personalized, ultimately leading to better outcomes for participants.

References

- Althammer, S. E., Reis, D., van der Beek, S., Beck, L., & Michel, A. (2021). A mindfulness intervention promoting work–life balance: How segmentation preference affects changes in detachment, well-being, and work–life balance. *Journal of Occupational and Organizational Psychology*, 94(2), 282-308. <https://doi.org/10.1111/joop.12346>
- Asaye, M. M., Muche, H. A., & Zelalem, E. D. (2020). Prevalence and predictors of postpartum depression: *Northwest Ethiopia. Psychiatry journal*, 2020. doi: <https://doi.org/10.1155/2020/9565678>
- Burton, A., Burgess, C., Dean, S., Koutsopoulou, G. Z., & Hugh-Jones, S. (2017). How effective are mindfulness-based interventions for reducing stress among healthcare professionals? A systematic review and meta-analysis. *Stress and Health*, 33(1), 3-13. doi: <https://doi.org/10.1002/smi.2673>
- Del Boca, D., Locatelli, M., & Vuri, D. (2015). Child care choices by Italian households. *Review of Economics of the Household*, 13(3), 453-488. doi: <http://dx.doi.org/10.2139/ssrn.494084>
- Dhillon, A., Sparkes, E., & Duarte, R. V. (2017). Mindfulness-based interventions during pregnancy: A systematic review and meta-analysis. *Mindfulness*, 8(6), 1421-1437. doi: 10.1007/s12671-017-0726
- Donald, J. N., Sahdra, B. K., Van Zanden, B., Duineveld, J. J., Atkins, P. W., Marshall, S. L., & Ciarrochi, J. (2019). Does your mindfulness benefit others? A systematic review and meta-analysis of the link between mindfulness and prosocial behavior. *British Journal of Psychology*, 110(1), 101-125. doi: 10.1111/bjop.12338

- Feinberg, M. E., Jones, D. E., Roettger, M. E., Solmeyer, A., & Hostetler, M. L. (2014). Long-term follow-up of a randomized trial of family foundations: Effects on children's emotional, behavioral, and school adjustment. *Journal of Family Psychology*, 28(6), 821–831. doi: <https://doi.org/10.1037/fam0000037>
- Field, T. (2017). Prenatal anxiety effects: a review. *Infant Behavior and Development*, 49, 120-128. doi: 10.1016/j.infbeh.2017.08.008
- Fortney, L., Luchterhand, C., Zakletskaia, L., Zgierska, A., & Rakel, D. (2013). Abbreviated mindfulness intervention for job satisfaction, quality of life, and compassion in primary care clinicians: a pilot study. *The Annals of Family Medicine*, 11(5), 412-420. doi:10.1370/afm.1511
- Freeman, D., Reeve, S., Robinson, A., Ehlers, A., Clark, D., Spanlang, B., & Slater, M. (2017). Virtual reality in the assessment, understanding, and treatment of mental health disorders. *Psychological medicine*, 47(14), 2393-2400. doi: 10.3390/jcm9113434
- Gong, X. G., Wang, L. P., Rong, G., Zhang, D. N., Zhang, A. Y., & Liu, C. (2023). Effects of online mindfulness-based interventions on the mental health of university students: A systematic review and meta-analysis. *Frontiers in Psychology*, 14 (8). doi: 10.3389/fpsyg.2023.1073647
- Goodman, Janice H., Anthony Guarino, Kerry Chenausky, Lauri Klein, Joanna Prager, Rebecca Petersen, Avery Forget, and Marlene Freeman (2014). CALM Pregnancy: results of a pilot study of mindfulness-based cognitive therapy for perinatal anxiety. *Archives of women's mental health* 17(5):373-87. doi: 10.1007/s00737-013-0402-7
- Guardino, C. M., Dunkel Schetter, C., Bower, J. E., Lu, M. C., & Smalley, S. L. (2014). Randomised controlled pilot trial of mindfulness training for stress reduction during pregnancy. *Psychology & Health*, 29(3), 334-349. doi: <https://doi.org/10.1080/08870446.2013.852670>
- International Labour Organization. (2020). Maternity and paternity at work: Law and practice across the world. International Labour Office.
- Ireland, M. J., Clough, B., Gill, K., Langan, F., O'Connor, A., & Spencer, L. (2017). A randomized controlled trial of mindfulness to reduce stress and burnout among intern medical practitioners. *Medical Teacher*, 39(4), 409-414. doi: 10.1080/0142159X.2017.1294749
- Kreplin, U., Farias, M., & Brazil, I. A. (2018). The limited prosocial effects of meditation: A systematic review and meta-analysis. *Scientific reports*, 8(1), 2403. doi: 10.1038/s41598-018-20299
- Marchand, W. R. (2012). Mindfulness-based stress reduction, mindfulness-based cognitive therapy, and Zen meditation for depression, anxiety, pain, and psychological distress. *Journal of Psychiatric Practice*, 18(4), 233-252. doi: 10.1097/01.pra.0000416014.53215.86
- Masser, B., Grass, K., & Nesic, M. (2007). 'We like you, but we don't want you'—The impact of pregnancy in the workplace. *Sex Roles*, 57, 703-712. doi: <https://doi.org/10.1007/s11199-007-9305-2>
- McCardel, R. E., Loedding, E. H., & Padilla, H. M. (2022). Examining the Relationship Between Return to Work After Giving Birth and Maternal Mental Health: A Systematic Review. *Maternal and Child Health Journal*, 26(9), 1917-1943. doi: <https://doi.org/10.1007/s10995-022-03489-0>
- Navarro-Haro, M. V., Modrego-Alarcón, M., Hoffman, H. G., Lopez-Montoyo, A., Navarro-Gil, M., Montero-Marin, J., & Garcia-Campayo, J. (2019). Evaluation of a mindfulness-based intervention with and without virtual reality dialectical behavior therapy® mindfulness skills training for the treatment of generalized anxiety disorder in primary care: A pilot study. *Frontiers in Psychology*, 10, 55. doi: 10.3389/fpsyg.2019.00055
- Rapisarda, S., Falco, A., De Carlo, A., Barbieri, B., & Dal Corso, L. (2022, April). *Moms immersed in their work: Virtual reality and mental health promotion after maternity leave*. International Psychological Applications Conference and Trends – InPACT 2022.
- Rapisarda, S., Mora, D., Crudo, L., & De Carlo, A. (2022). La realtà virtuale come strumento per migliorare l'esperienza del rientro al lavoro dopo la maternità [Virtual Reality as a tool to enhance the return-to-work experience after maternity]. In L. Camoni, G. Palumbo & A. Gigantesco (Eds.), *La salute mentale nel periodo perinatale. Uno sguardo tra le diverse discipline* [Mental Health during the Perinatal Period. A Look Across Various Disciplines] (pp. 253-262). Il Pensiero Scientifico Editore.
- Rodrigues, H., Cobucci, R., Oliveira, A., Cabral, J. V., Medeiros, L., Gurgel, K., & Gonçalves, A. K. (2018). Burnout syndrome among medical residents: A systematic review and meta-analysis. *PLoS One*, 13(11), e0206840. doi: 10.1371/journal.pone.0206840
- Wiens, D., Theule, J., Keates, J., Ward, M., & Yaholkoski, A. (2022). Work–family balance and job satisfaction: An analysis of Canadian psychologist mothers. *Canadian Psychology/Psychologie canadienne*. <https://doi.org/10.1037/cap0000321>