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## Stress in Pregnant and Non-Pregnant Women

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## Summary in English

Most people experience stress sometimes, which can affect one's well-being. Usually this is just temporarily, but stress and its effects can accumulate when a stressful period lasts for too long. Eventually, this may have a negative influence on one's mental and physical health. Therefore, it is necessary to signal stress in time and to have tools available that can reduce stress and its negative effects. A group that needs special attention with respect to stress reduction is that of pregnant women, because in this group stress may not only affect the mother-to-be herself, but also the unborn child. Currently, little is known about whether stress-reducing techniques can be effectively used in pregnant women. Also somewhat overlooked are psychological characteristics that may protect against stress and its negative effects, such as positive experience and resilience, partly because few good questionnaires to measure these aspects are available. Therefore, the present thesis addressed the following research topics:

In the first study (**Chapter 2**), we assessed the reliability and validity of a Dutch questionnaire on pregnancy experience that includes both uplifts and hassles of pregnancy. In the second study (**Chapter 3**) we focused on the development of pregnancy-related anxiety and sleep problems, and the effect they have on each other over the course of pregnancy. Furthermore, we examined whether this mutual effect was less strong when resilience was high compared to low. In the final set of studies we examined the efficacy of two potentially stress-reducing interventions that are safe to use during pregnancy: mindfulness meditation (**Chapters 4 & 5**) and heart rate variability (HRV) biofeedback (**Chapters 4–6**).

To study these research topics, we analysed data from four different studies: the first study focused on Dutch-speaking pregnant women, the second study focused on pregnant women in Finland, the third study focused on Dutch young adults, and the last study focused on Dutch-speaking women of child-bearing age. Participants in all studies were between 18 and 44 years of age.





## Findings

In **Chapter 2** of this thesis we examined the reliability and validity of the *Beleving van Zwangerschaps Schaal – verkorte versie (BZS-K)*, the Dutch translation of the Pregnancy Experience Scale – Brief version (PES-brief). This questionnaire assesses the frequency and intensity of the uplifts and hassles of pregnancy. The *BZS-K* showed the same positive and negative underlying factors as the PES-brief and a follow-up test three weeks after the first test showed that it is reliable over time. Comparison to measures of pregnancy-related anxiety, general depression, anxiety and stress, and emotional well-being showed that the *BZS-K* compares well to other well-established measures. We therefore concluded that the *BZS-K* is a reliable, valid questionnaire for measuring how women experience hassles and uplifts of pregnancy.

In **Chapter 3** we examined 1) whether sleep and pregnancy-related anxiety affected each other throughout the course of pregnancy and 2) whether this mutual effect was less strong in women who score high compared to low on resilience. We measured sleep duration and pregnancy-related anxiety at weeks 14, 24 and 34 of pregnancy, and resilience in week 14. Our findings showed that women with a shorter sleep duration had a higher level of anxiety in week 14, indicating that the two are related. Furthermore, when women had a high level of anxiety in week 14 their sleep duration got shorter at a quicker rate over the course of pregnancy compared to women with a lower level of anxiety. We did not find an association between changes in sleep duration and changes in anxiety over the course of pregnancy. Finally, women who scored high on resilience did not show a stronger nor a less strong connection between sleep duration and pregnancy-related anxiety than women who scored low on resilience. These findings suggest that it is important to monitor sleeping problems and pregnancy-related anxiety throughout the course of pregnancy because women who experience one of these problems may also experience or develop the other.



In **Chapters 4 and 5** we compared the efficacy of two self-help courses, mindfulness meditation (MM) and heart rate variability biofeedback (HRV-BF) with physical activity (PA). In **Chapter 4** we examined the effect of these courses on stress and several stress-related mental health problems: anxiety, depression, sleeping problems, and reduced psychological well-being. In **Chapter 5** we focused on some aspects of cognitive functioning that may be altered during stressful periods: worrying, executive functioning, attentional control, mindful awareness, and self-compassion. Each course lasted five weeks and the instructions regarding practice duration were similar. We found that the three self-help courses improved stress-related mental health problems and cognitive functioning aspects. When we selected a subsample with participants who, on average, practiced more, the effects were slightly larger as compared to the complete sample, indicating that practice duration is related to how well the courses work. We did not find a difference in effect between the three courses.

In conclusion, MM, HRV-BF, and PA each seem to be effective self-help methods to improve stress-related mental health problems (i.e., stress, anxiety, depression, sleeping problems, and reduced psychological well-being) and cognitive functioning (i.e., worrying, executive functioning, attentional control, mindful awareness, and self-compassion) that may be altered during stressful periods. Furthermore, MM, HRV-BF and PA each seem to be equally suitable if one wants to improve stress-related mental health problems and cognitive functioning.

In **Chapter 6** the stress-reducing effect of a 5-week HRV-biofeedback group course in pregnant and non-pregnant women was examined. In this study, HRV-biofeedback improved psychological well-being in the whole group, including both pregnant and non-pregnant women. Additionally, it had a beneficial effect on anxiety complaints for pregnant women. HRV-biofeedback thus seems to be a suitable stress-reducing technique to improve well-being among women with mild to moderate stress complaints. Furthermore, our results suggest that this technique can be used to reduce anxiety symptoms or prevent the development of such symptoms during pregnancy.



## Conclusion

Based on the findings in this thesis, it seems necessary to monitor pregnancy-related problems such as sleeping difficulties and anxiety, so that it is possible to intervene at an early stage if one of these aspects or both becomes problematic. The now validated *Beleving van Zwangerschap Schaal – verkorte versie*, which includes questions about sleep and anxiety, appears to be an appropriate instrument for this purpose. In the case that it is necessary to reduce mild to moderate stress and stress-related problems during pregnancy, a brief mindfulness meditation or HRV-biofeedback course may be suitable interventions to improve well-being.

