1. **Title of research project:**
   A bitter pill? How the use of oral contraceptives can lead to increased mood and anxiety disorders
2. **co-promotor(es):**
   Dr Estrella Montoya and Dr Lotte Gerritsen.

3. **Promotor(es):** prof dr. Joke Baas and prof dr. Iris Engelhard
4. **Departments:** This will be a collaboration between the departments of Experimental Psychology & Clinical Psychology

5. **Description of the research idea:**

   The majority of young Dutch women uses oral contraceptives (OCs), containing the synthetic hormones estradiol and progesterone. Despite OCs' general popularity serious side effects such as increased risk of mood and anxiety symptoms are reported. Unfortunately such side-effects can hardly be predicted at present and underlying mechanisms are poorly understood. It is therefore crucial that we get a better understanding of when and how the detrimental effects of OC use on psychological health occur.

6. **Research problem:**
   It is already known that variability in endogenous female hormones progesterone and estrogen is associated with variability in mood, anxiety, pain perception and emotional regulation. Many young women use hormonal oral contraceptives and recently it was shown that women who use oral contraceptives are at increased risk for depression and suicide (attempt). The exact mechanism behind this association, and what may predict who is at risk is however unclear.

7. **Research questions:**

a) Does start of OC use increase depressive and anxiety trajectories in adolescents?
b) Is start of OC associated with decreased emotion regulation and social functioning?
c) Which factors confer risk for developing depressive and anxiety symptoms after starting OC use?

8. **Methods:**
   This project will combine methods from experimental psychology, clinical psychology, genetic epidemiology and cognitive neuroscience.
   For this project we will use largescale cohort data in which the PhD candidate will have to conduct complex longitudinal analyses to answer the question whether starting OC at a young age indeed increases prevalence of mood and anxiety symptoms and at which time scale. In the experimental part of the project we will set up laboratory studies using behavioral paradigms probing relevant neural circuitry using explicit emotion and implicit (fear extinction) emotion regulation paradigms. Physiological measures (startle, skin

conductance, electro-encephalography (EEG)) will be taken, as well as saliva analysis for hormone levels.

9. **Relevance:**
   Given that a large group of young women take OCs for a long period of time it is crucial to get a better understanding on how the use of OCs may affect their mood, anxiety, emotional regulation and social behavior.

References:

How oral contraceptives impact social-emotional behavior and brain function
ER Montoya, PA Bos
Trends in cognitive sciences 21 (2), 125-136