

# Behavioral fluctuation during the menstrual cycle

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## INTRODUCTION

In humans and non-human animals, ritualized behavior has been linked to states of intense stress and anxiety in a range of studies. Moreover, in humans, the emergence of ritualized behavior has been observed in situations of perceived uncertainty, be it unpredictability of physical danger or a threat to social status.

It remains, however, unclear whether ritualized behavior occurs spontaneously also in common, less intense anxiogenic situations. As a suitable naturally occurring condition allowing within-subject comparison, we focused on state anxiety fluctuations within the menstrual cycle, specifically the luteal phase anxiety and stress changes, as possible sources of spontaneous ritualization.

## ASSUMPTIONS

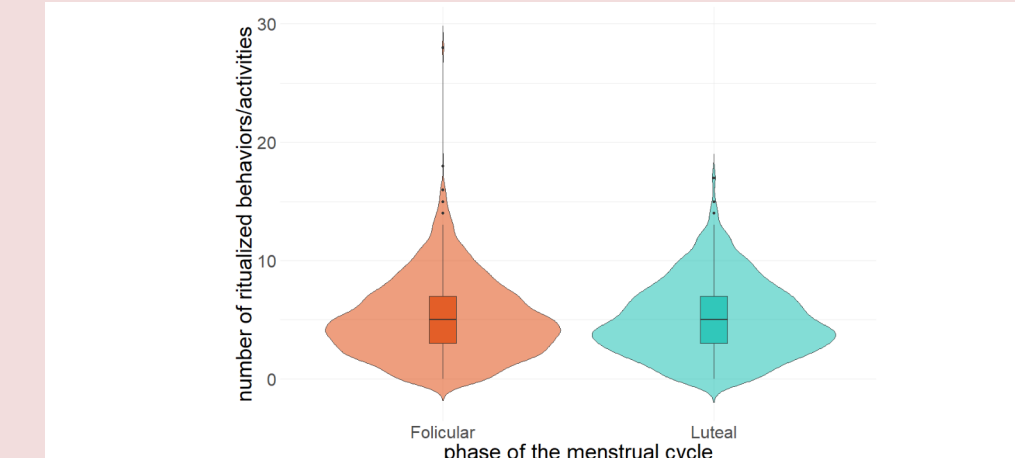
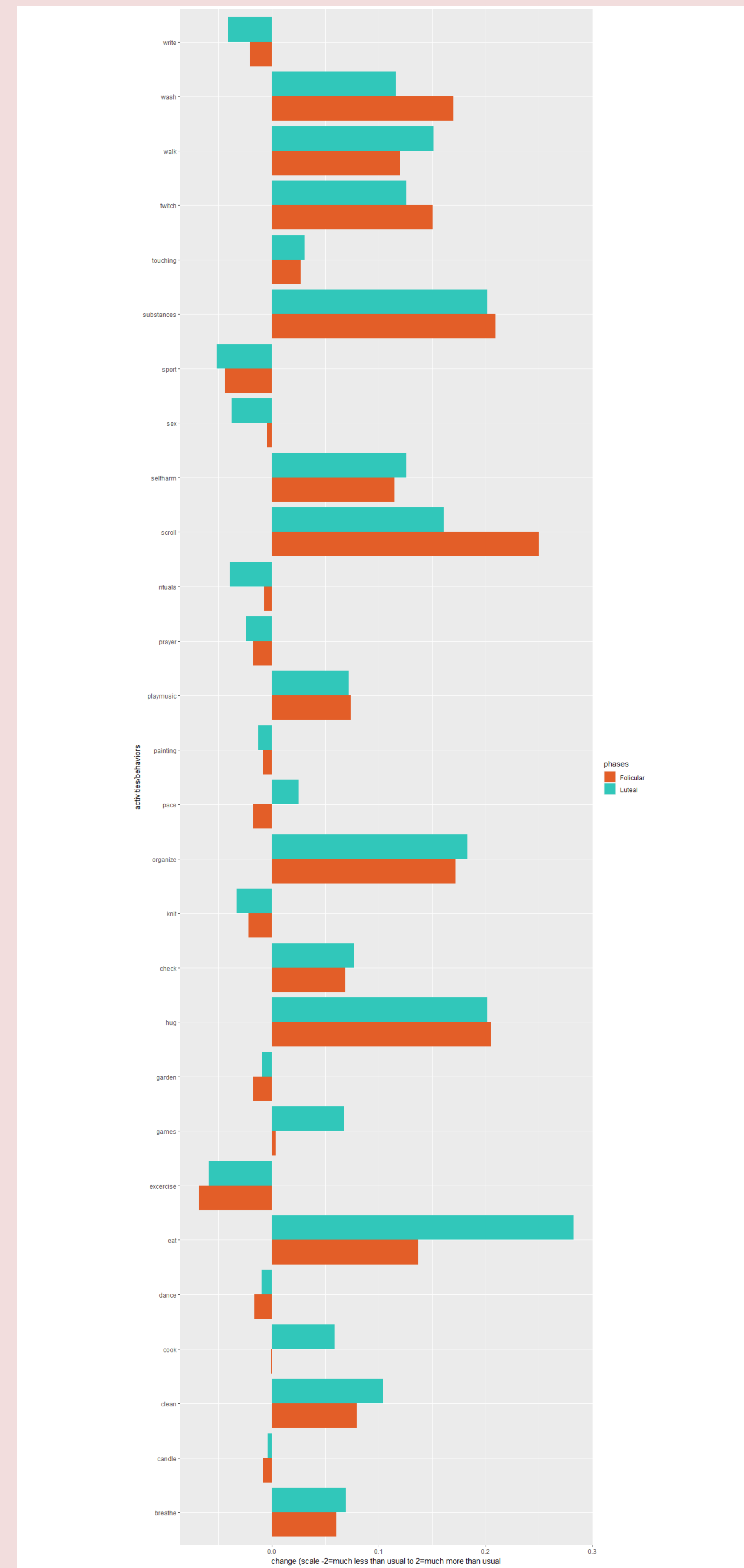
Ratings of psychological and physiological symptoms and difficulties will vary across the menstrual cycle with symptoms rated as worse during (late) luteal phase as compared to (late) follicular phase.

## HYPOTHESES

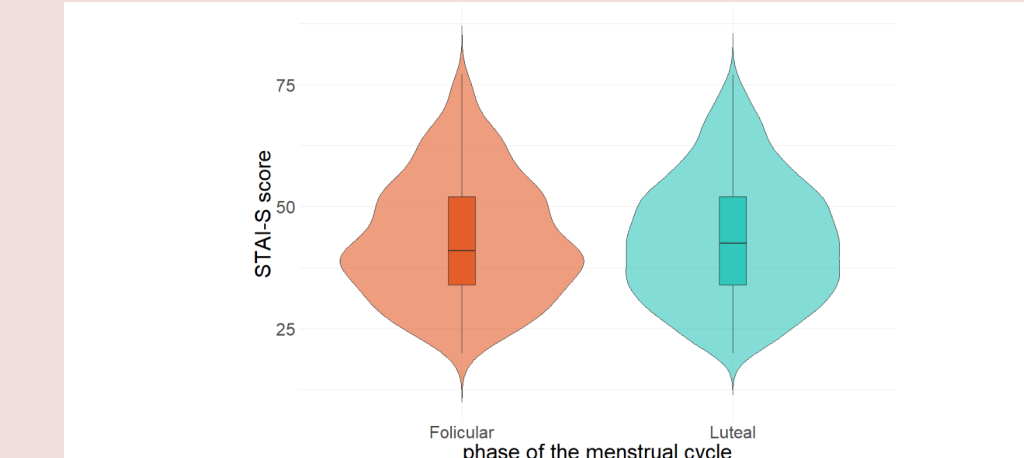
**H1:** All women will ritualize more in the (late) luteal phase as compared to themselves in the (late) follicular phase.

**H2:** Women with relatively higher trait anxiety would ritualize more in the (late) luteal phase as compared to themselves in the (late) follicular phase and to women with lower trait anxiety.

## RESULTS



No difference between follicular and luteal phases in number of ritualized behaviors.



No difference between follicular and luteal phases in STAI-S scores.

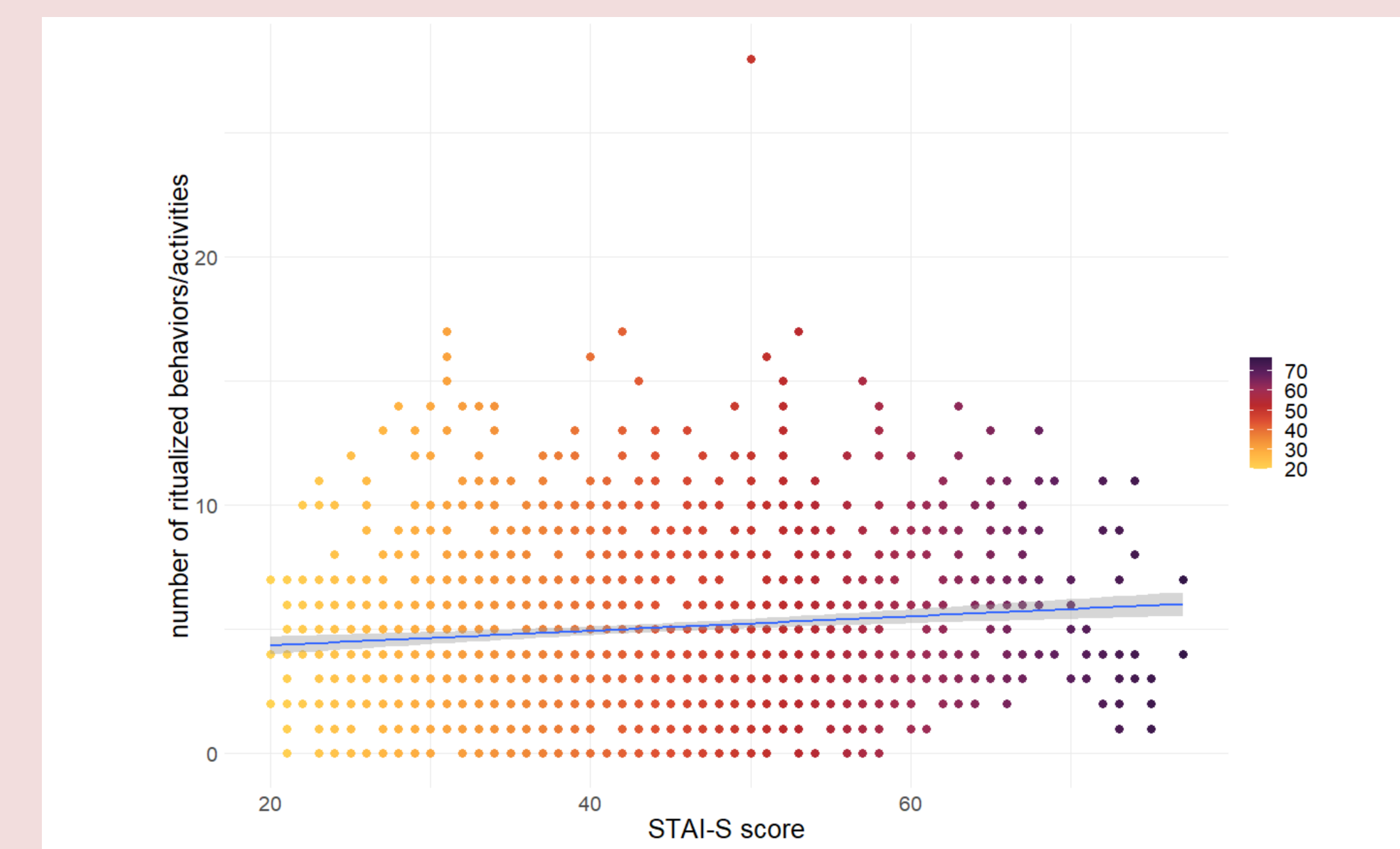
As the assumption of the pre-registered study was not met (there was no difference in perceived anxiety and physical difficulties between the follicular and luteal phases) we further explored more generic hypothesis:

**H3:** Higher state anxiety will positively correlate with higher number of ritualized behaviors/activities.

Number of ritualized behaviors/activities			
	Model 1	Model 2	Model 3
STAI-S	0.029*** (0.016, 0.043)	0.029*** (0.016, 0.043)	0.029*** (0.016, 0.043)
phase - luteal		-0.099 (-0.471, 0.273)	-0.099 (-0.472, 0.273)
STAI-T			0.003 (-0.045, 0.052)
Constant	3.769*** (3.164, 4.375)	3.839*** (3.179, 4.500)	3.679*** (1.166, 6.191)
Observations	1,429	1,429	1,429

Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

Beta Estimates with 95% CIs. The Coefficients are Estimated Rating differences on ritualized behavior scores (0-28).



## METHODS

Female participants, recruited via Prolific (n=227), age 18–35 years and regular menstrual cycle 23-35 days. Data were collected in two waves (June/July and August/September 2021).

To measure low-level ritualized behaviors and activities, we created an instrument, listing behaviors showing signs of ritualization. Participants were presented with the list of 28 activities, and instructed to think of them as performed outside of one's job, routine or necessity, but with possible compulsion to perform them.

Data collection took place over the course of 36 days. Participants were contacted every 3rd day (12x) with a request to complete a short survey concerning activities from the previous 48 hours, and record the day of their cycle. On selected time intervals, in addition to activities records, participants also completed the State Anxiety Inventory (STAI-S) and Daily record of severity of problems (DRSP)\* questionnaires.

Detailed methods and hypotheses for this study were preregistered at <https://osf.io/hrxbs>.

\* not reported here

## CONCLUSION

No differences in anxiety levels between follicular and luteal phases of the menstrual cycle.

No differences in number of ritualized behaviors between follicular and luteal phases of the menstrual cycle.

Higher state anxiety associated with higher number of ritualized behaviors.

Some support for anxiety management function of ritual systems.

Patterns of anxiety fluctuation throughout the menstrual cycle not supported by the data, more precise measures needed (e.g. progesterone fluctuations).