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Effects of Chronic Stress on Infant Memory



Theresa A. Moore and Hannah B. White

Introduction

Stress seems to play a significant role in the ability, or lack thereof, to create long and short-term memories. Studies on adults have suggested that acute elevated cortisol levels may be associated with enhanced short-term memory (Becker & Rohleder, 2019), whereas chronically elevated cortisol may instead be linked to a more diminished short-term memory capability, in addition to reduced neurogenesis in the hippocampus (Wirkner et al., 2019). To our knowledge, no studies exist at this time that have directly examined how stress impacts infant memory at three months of age. We did an exploratory data analysis on infant habituation across repeated exposures to faces to scrutinize how it related to basal cortisol levels.

Methods

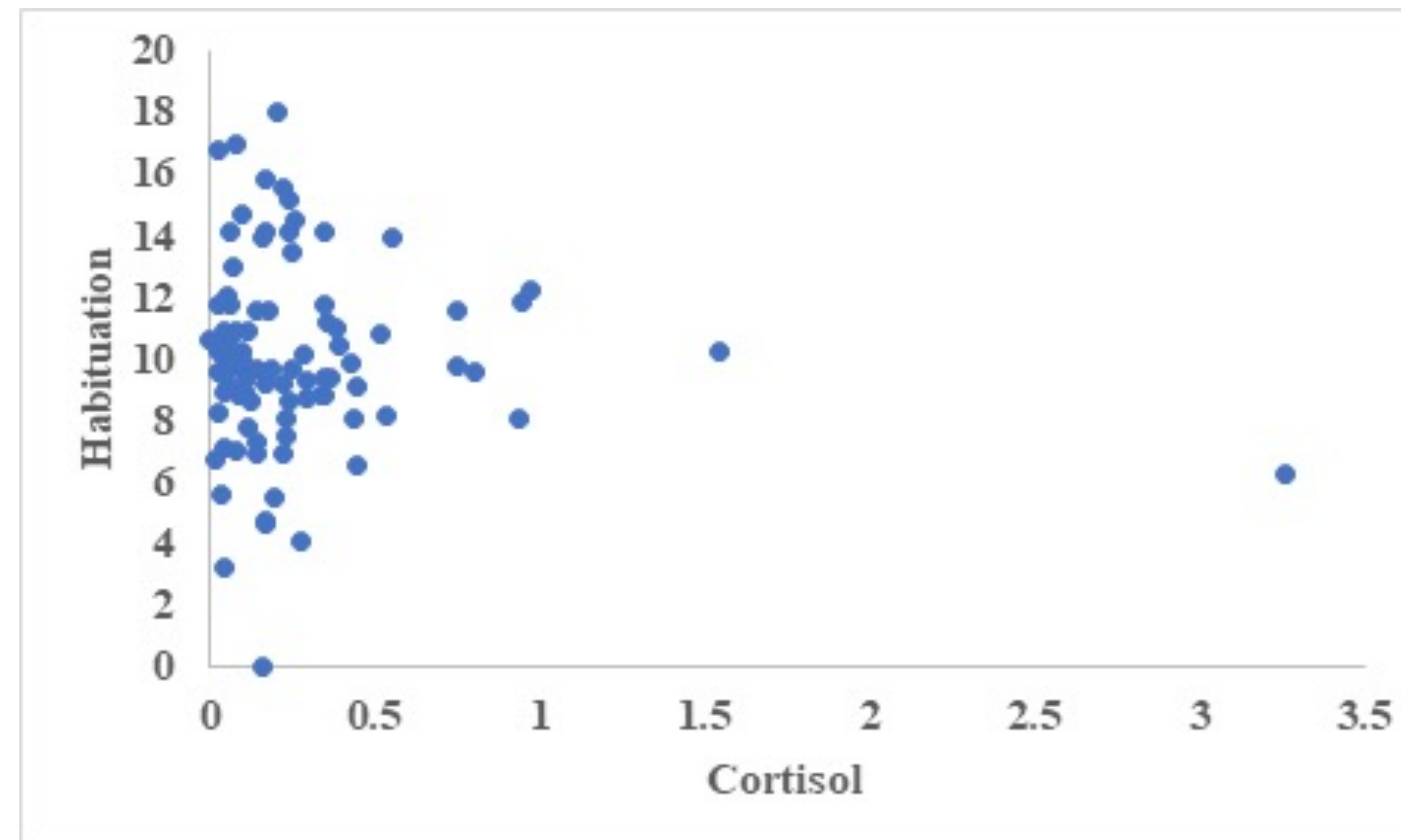
Participants:

- 94, 3.5-month-old infants (mean age in days 105.04, $SD = 9.69$)
- 65% White, Non-Hispanic
- 51% Female

Procedure:

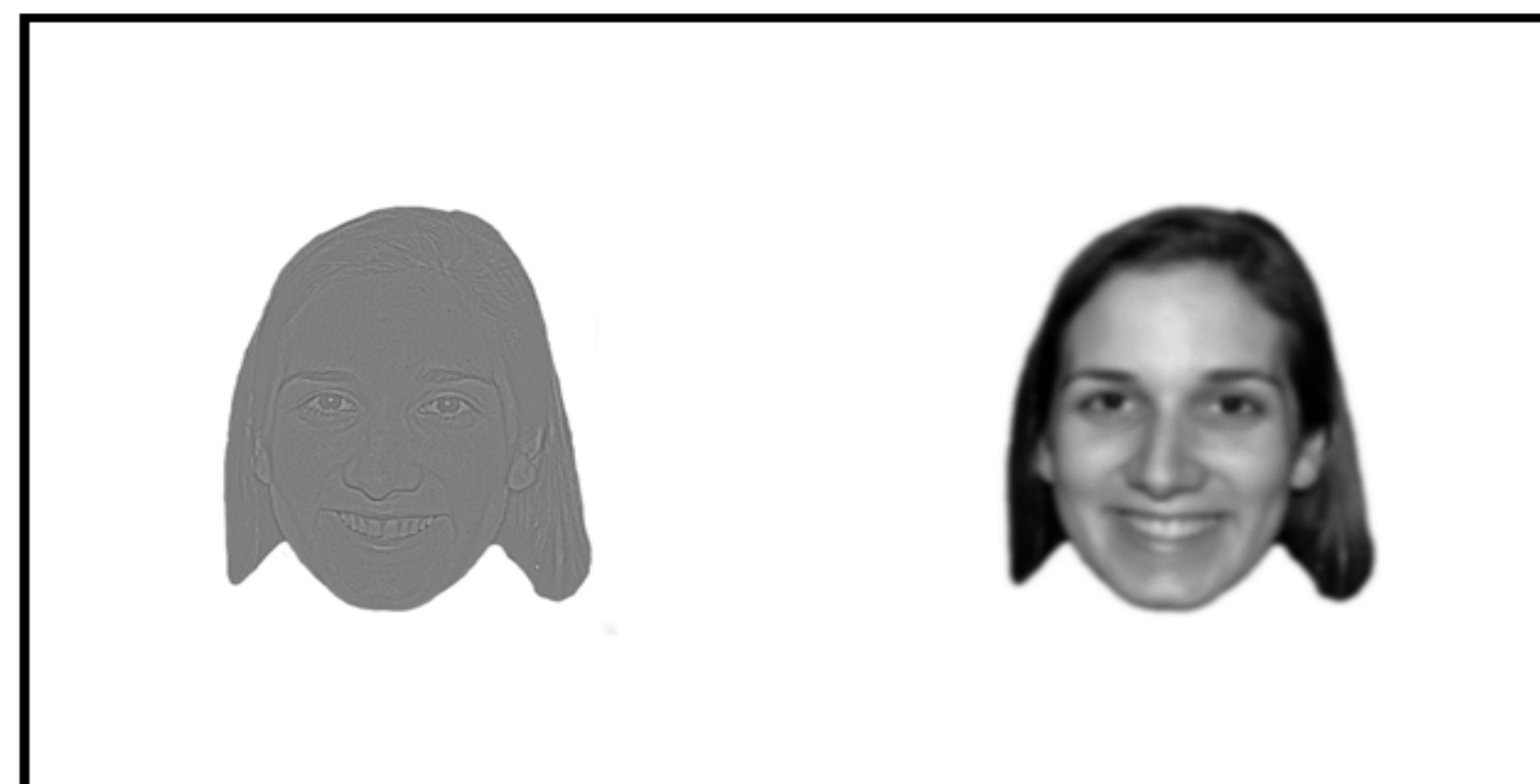
- Secondary analysis of data from a visual acuity test
- Infants saw 4, 8 second trials consisting of two faces
- Each image was repeated twice
- Infants' looks were recorded by a Tobii TX300 Eye-tracker
- DV = Habituation (Fixation duration for first presentation – Fixation Duration for second presentation)
- Cortisol was assayed from saliva and corrected for time of day

Figure 1



Notes: Cortisol was measured in $\mu\text{g/dl}$, regressed onto time of day, and the unstandardized residuals were used for analysis. For ease of presentation, cortisol values were shifted 0.27 units and habituation scores were shifted 9.89 units to make the minimum score 0 for both metrics.

Sample Stimuli



Results

Results

- Cortisol levels were not significantly associated with habituation scores, $R(92) = -.02, p = .82$.
- This is possibly due to relatively low levels of habituation in the sample (51% of infants actually showed increased looking on the second presentation)

Discussion

The results of this study indicate that basal cortisol levels are not significantly associated with visual recognition memory in infants at three months of age. This could be because the impact of stress in the infants' environments has not yet reached the threshold to disrupt memory processes. Alternatively, the lack of significance may be due to the task not being sensitive enough to detect differences in habituation speeds due to its brief nature. Future studies with more extensive testing protocols (such as peak habituation) should be implemented in order to differentiate these alternatives. Further understanding how early exposure to stress impacts infant cognitive development will be critical for determining the conditions necessary in order to ensure optimal brain growth for learning, memory and other higher-order functioning.

References

1. Becker, L., & Rohleder, N. (2019). Time course of the physiological stress response to an acute stressor and its associations with the primacy and recency effect of the serial position curve. *PLOS ONE*, 14(5). doi:10.1371/journal.pone.0213883
2. Wirkner, J., Ventura-Bort, C., Schwabe, L., Hamm, A. O., & Weymar, M. (2019). Chronic stress and emotion: Differential effects on attentional processing and recognition memory. *Psychoneuroendocrinology*, 107, 93-97. doi:10.1016/j.psyneuen.2019.05.008