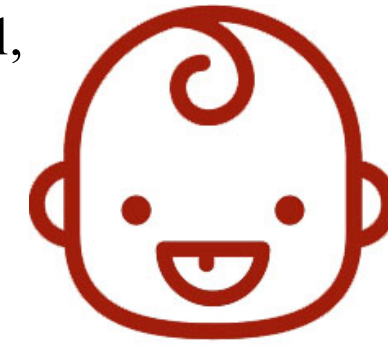


Prior reproductive experience modulates neural responses to infant faces

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INTRODUCTION

- The transition to motherhood is marked by social, neurophysiological, and cognitive change [1, 2]
- One change is in **infant cue processing**, which is necessary for sensitive and appropriate maternal care of the baby [3, 4]
- This processing can be impacted by many factors, including prior experience with infants as characterized by **parity** (the number of children that a mother has) [5, 6]
- Preliminary review has suggested that multiparous mothers (mothers with more than one child) process infant cues more efficiently than primiparous mothers (first-time mothers) [7]
- Maternal sensitivity and orienting to infant cues is a key part in the development of attachment, which has lasting consequences across the child's lifespan [3]
- Electroencephalography (EEG)** has high temporal specificity; useful in investigating the quick, intuitive, and adaptive process of caregiving and infant cue processing [8]
 - Using event-related potential (ERP) data, **the P300** (a unique component occurring approx. 200 to 600ms after stimulus onset) is implicated in attention allocation, and has been linked to attachment formation and parenting [9, 10]
- In primiparous (compared to multiparous) expectant and recent mothers at 2 months postpartum, the P300 has been shown to have a higher mean amplitude when viewing infant faces [11, 12]; this may be due to primary preoccupation in first-time mothers, a period in which first-time mothers become especially focused on the health and well-being of the baby, and show heightened responsiveness to infant cues [13, 14]
- Thus, the current study seeks to replicate and extend prior work [11] by examining how parity affects the P300 response to infant faces later in the postpartum period



PARTICIPANTS & PARADIGM

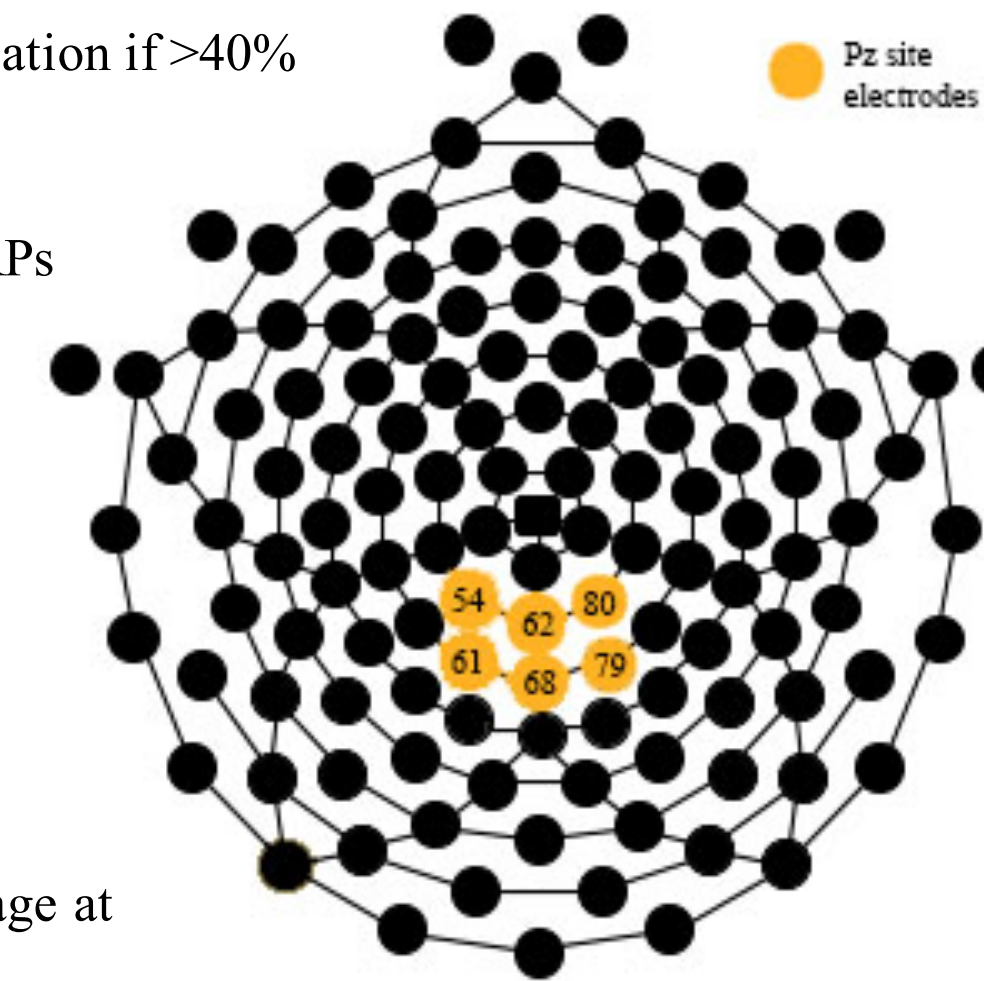
- 59 women (29 primiparous, 30 multiparous) returned to repeat the current paradigm at 7 months, having completed it prior at 2 months postpartum
- Education and infant age at the return visit differed between mothers, such that primiparous mothers had higher levels of education ($t(56) = 3.15, p = .02$) and multiparous mothers had older infants at the return visit ($t(57) = 4.18, p < .05$)
- ERP assessment consisted of 7 blocks of 42 trials (294 trials total), viewing infant face and cry stimuli amidst one-back catch trials (only infant faces used in analysis)



- Infant faces were color photographs of unfamiliar infants ranging in age five to ten months; balanced for gender and race (Caucasian and African American) with three emotional categories (happy, neutral, and sad)

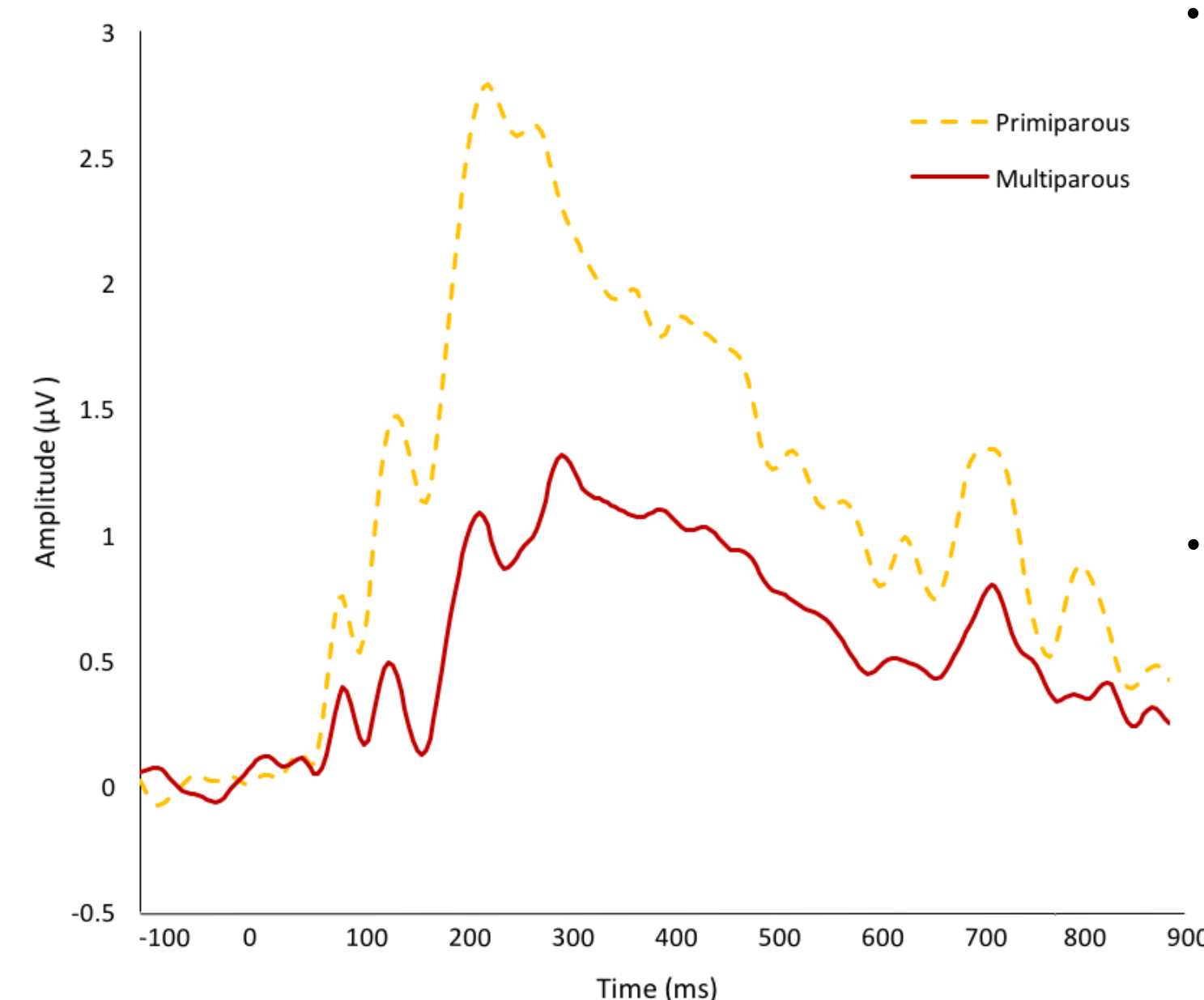
DATA COLLECTION & ANALYSIS

- Continuous EEG data was recorded in Net Station 4.2.1 using an EGI 128 Geodesic Sensor Net, with a 250 Hz sampling rate and high impedance amplifiers (filters: 0.1 Hz high-pass, 100 Hz low-pass)
- Data was pre-processed in Net Station 4.5; EEG was 30 Hz filtered and then segmented into 1-second epochs (-100ms to 900ms after stimulus onset); artifact detection of 200 μ V for bad channels, 150 μ V for eye blinks, and 150 μ V for eye movements; channels with artifacts replaced with spline interpolation if >40% trials had artifacts
- EEG data averaged within each condition; P300 ERPs in response to faces averaged around Pz site at electrodes 54, 61, 62, 68, 79, 80 with mean amplitude within 200 to 600ms after stimulus onset
- ANOVA conducted with time (visit 1, visit 2) and condition (happy, neutral, sad) as within-subject variables, parity (primiparous vs. multiparous) as a between-subject factor, and education and infant age at visit 2 as covariates



RESULTS

- Mean P300 amplitude per condition was not significantly different [$F(2, 53) = 1.05, p = .36$], so ERPs across conditions were collapsed



- Primiparous mothers had a larger P300 amplitude in response to infant faces compared to multiparous mothers [$F(2, 53) = 6.92, p = .01$]
- No effect of education or infant age on P300 response; no covariate interactions with condition, time, or parity

DISCUSSION

- Current study replicates previous findings at 2 months postpartum [11] and extends them to 7 months postpartum
 - This suggests that heightened infant cue processing in mothers may be more of a trait-like construct that is prolonged after the birth of the first child, rather than a temporary response to the birth
- Findings are novel as a majority of neurophysiological studies regarding the role of prior reproductive experience utilize animal models, rather than human models [e.g. 15]
- Difference in P300 amplitude can be interpreted in multiple ways:
 - Enhancement of primiparous mothers' response due to increased levels of effort or attention as infant facial cues are less familiar, yet more salient and engaging
 - This enhancement interpretation is supported by broader psychological ideas concerning primary preoccupation in first-time mothers, as first-time mothers are more intensely preoccupied with the infant's wellbeing [13, 14]
 - However, current research also suggests that the first-time mothers preoccupation period extends for a longer time than previously thought (to at least 7 months, rather than 3-4 months) [14]
- Attenuation of multiparous mothers' response due to greater infant experience, thus leading to less cognitive effort and more efficient cue processing [7]

FUTURE DIRECTIONS & LIMITATIONS

- Additional research may also investigate how far into the postpartum period this differentiated response extends, and when (if ever) responses become similar
- Further research should link neurophysiological responses to caregiving behavior, providing insight into how differences in cue processing may impact mother-infant interaction

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