Influences of Different Degrees of Social Exclusion on Neural Activity

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Introduction

Social Exclusion

Although recent research has made strides in understanding the behavioral impact of varying degrees of social exclusion on targets of exclusion, little is known about the ongoing neural dynamics present during the exclusion process. Importantly, previous research has shown differences in neural activity during exclusionary and inclusionary interactions as well as to exclusionary and inclusionary social events. However, no examinations have investigated whether these differences are sensitive to different degrees of social inclusion or exclusion.

Current Study

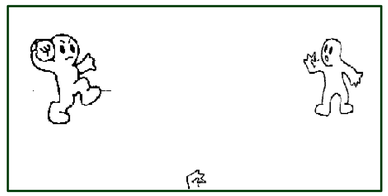
To examine the potential impact of varying degrees of social exclusion on neural activity related to being the target of exclusion, we utilized the Cyberball paradigm to assess participants' event-related brain potentials (ERPs) to both inclusionary and exclusionary events occurring within two social interaction blocks (inclusion, exclusion). Each event consisted of a series of throw frames that showed a ball moving across the screen from player to player.

Procedure

Cyberball Paradigm

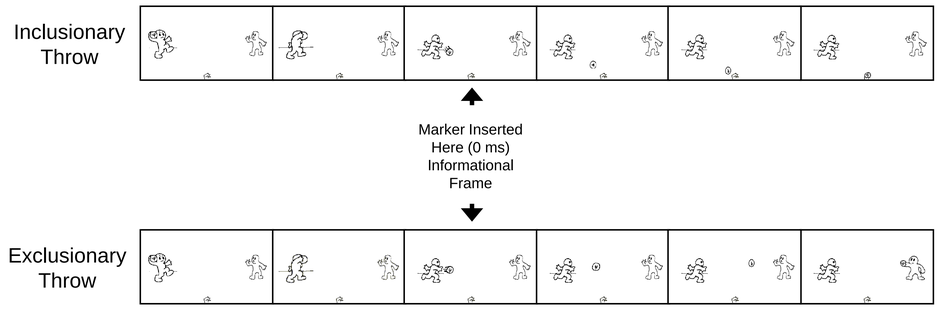
- Participants completed two blocks of the Cyberball paradigm, throwing the ball with the other players. In each interaction, the human participant was represented by the hand at the bottom of the screen (see below). Following each interaction, participants completed the Need-Threat Scale (NTS; Williams et al., 2000; Zadro et al., 2004), Positive and Negative Affect Schedule (PANAS), and the State-Trait Anxiety Inventory (STAI).

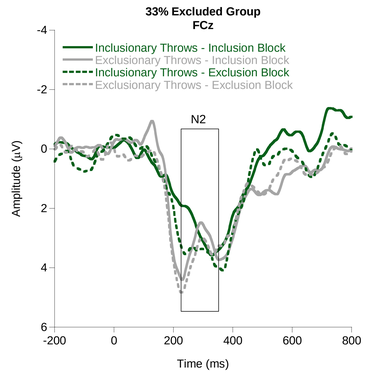
  - In the first block (inclusion), participants had an equal probability of receiving the ball as the other players throughout the interaction.
  - In the second block (exclusion), participants were randomly assigned to one of three groups. Each group was included during the first portion of the interaction, but was then completely excluded for the last portion of the social interaction. One group was excluded for the last 66%, a second group was excluded for the last 50%, and a third group was excluded for the last 33% of the social interaction.

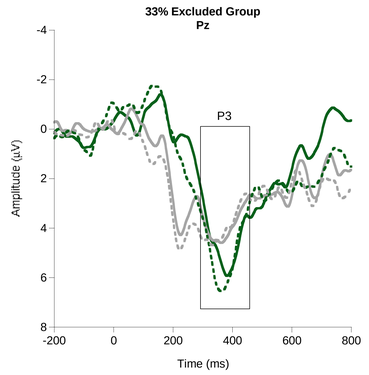


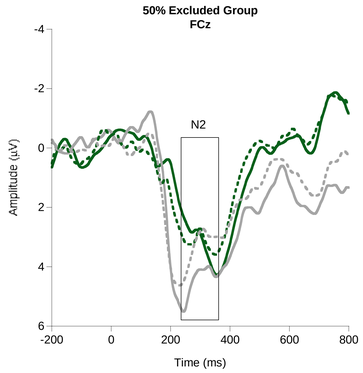
Neural Assessment – Informational Frame

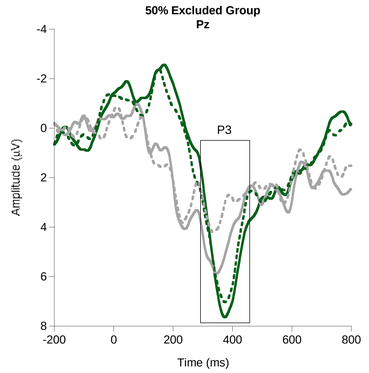
- EEG activity was measured from 64 midline and lateral sites.
- N2 was quantified as the average negative deflecting amplitude between 200-320 ms post-stimulus at the FCz electrode site.
- P3 was quantified as the average positive deflecting amplitude between 320-450 ms post-stimulus at the Pz electrode site.
- The stimulus was defined as the first informational frame in the ball toss that indicated where the ball was being thrown. Throws to the participant were defined as inclusionary throws and throws to the computerized players were defined as exclusionary throws.

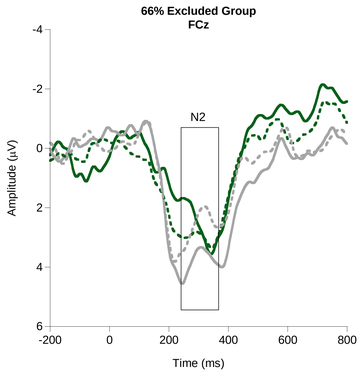


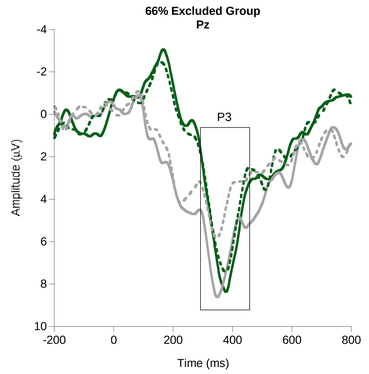












Results

Self-Report Measures

- Similar to previous research, all groups reported decreases in needs fulfillment and positive affect, as well as increases in state anxiety and negative affect following social exclusion.
  - Group differences existed between the 66% excluded group and the 33% excluded group in relation to self-reported needs fulfillment after exclusion, with the 66% excluded group report lower needs fulfillment compared to the 33% excluded group. The 50% excluded group was not different from either other group following exclusion, with self-reported needs fulfillment scores falling between the scores reported for the 33% excluded and 66% excluded groups.

Neural Measures

- Replicating previous studies, exclusionary events were associated with larger N2 and smaller P3 amplitudes compared to inclusionary events, regardless of the nature of the social interaction.
- Analyses also revealed group differences in both N2 and P3 amplitudes.
  - For the 66% exclusion group:
    - N2 amplitude increased to exclusionary throws and decreased to inclusionary throws during exclusion (throw x block interaction).
    - P3 amplitude showed no throw by block effects.
  - For the 50% exclusion group:
    - N2 amplitude showed no throw by block effects.
    - P3 amplitude increased to exclusionary throws and decreased to inclusionary throws during exclusion (throw x block interaction).
  - For the 33% exclusion group:
    - N2 amplitude showed no throw by block effects.
    - P3 amplitude increased to exclusionary throws and decreased to inclusionary throws during exclusion (throw x block interaction).

Conclusion

This study examined the relationship between social exclusion and event-related brain potentials across differing degrees of social exclusion. Results replicated previous research indicating both N2 and P3 differences between inclusionary and exclusionary events regardless of the larger contexts (overall inclusion, overall exclusion) of the interactions.

- Additional findings across the different degrees of social exclusion suggest that neural activity present in response to discrete events within social interactions may be more sensitive to differences in exclusionary interactions and may provide additional insights into exclusion beyond basic behavioral measures.
- Specifically, patterns of neural activation obtained during the social interactions differentiated the more generally excluded group (the 66% excluded group) from the other two groups of participants while the self-report measures collected following the interactions only showed differences between the two extreme groups, with the 50% excluded group showing no significant differences from either extreme group.

The current study provides evidence that both neural and self-reported indices of social exclusion are sensitive to differences in exclusionary experiences and these differences are not consistent across the types of measures as neural measures differentiating the most excluded group from the other groups while self-report measures only differentiated the excluded group from the generally included group.

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