When We Need Others Most: Daily Social Need Predicts Neural Responses to Ostracism

Cailee M. Nelson[1-3], Aren Tucker[1], Donna L. Coffman[1], Yuan Zhang[4], Mengya Xia[4], & Caitlin M. Hudac[1-3]

1 Department of Psychology, University of South Carolina; 2 Carolina Autism & Neurodevelopment Center, University of South Carolina;
3 Institute for Mind and Brain, University of South Carolina, 4 T. Denny Sanford School of Social and Family Dynamics, Arizona State University

Brain Research Across Development Laboratory
PI: Dr. Caitlin Hudac
www.b-radlab.com

Funding: R01HD107593

SCAN ME

BACKGROUND

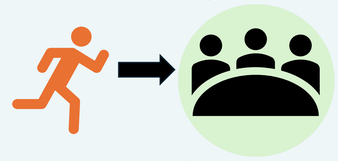
Ostracism (or social exclusion) is especially painful in adolescence[1]

Being excluded threatens many psychological needs, including ***belonging***[2]

The brain ***rapidly*** detects social significance[3]

The ***N2*** ERP component (~ 200 ms after stimulus presentation) is linked to conflict monitoring[4] and is sensitive to social threat[5]

Need to belong (as a trait) motivates social connection[6] and modulates brain responses to exclusion[7]



Need for belonging also fluctuates ***day-to-day (as a state)***[8], though limited research has investigated what contributes to fluctuations

THE GAP

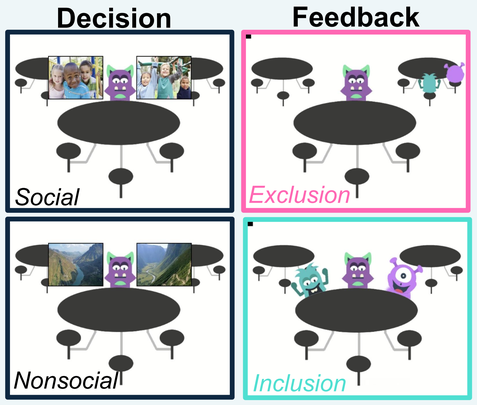
Do brain responses to inclusion/exclusion predict need to belong (as a state)?

METHOD

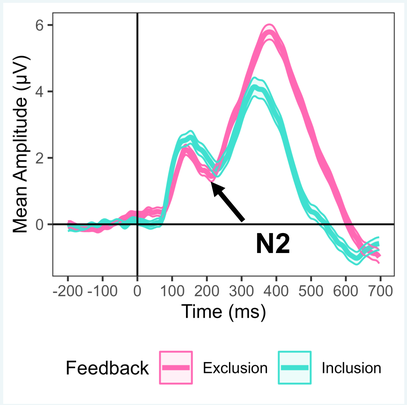
BASELINE EEG

Scan for details

EEG during ***Lunchroom Ostracism*** Task



Measuring ***N2*** responses to exclusion and inclusion



DAILY DIARIES

14 consecutive days Measuring ***daily needs to belong***:

- **General**
- **Family**
- **Friend**

Reflect on how you felt TODAY, please indicate to what extent you…

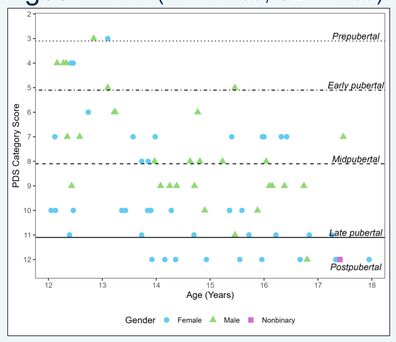
- Wanted to spend time with someone in person
- Wanted to talk on the phone with someone virtually
- Wanted to get emotional support from someone
- Wanted to be able to talk about how you felt with someone
- Wanted to be accepted
- Wanted to be included
- Felt I have a strong need to belong to my family
- Felt I have a strong need to belong to my friends

Not at all (1) — As usual — Very much (10)

SAMPLE

79 Adolescents

55% Female, 62% White
Ages 12-17 (*M* = 14.65; *SD* = 1.60)



~ 83% of days were ***completed***, on average

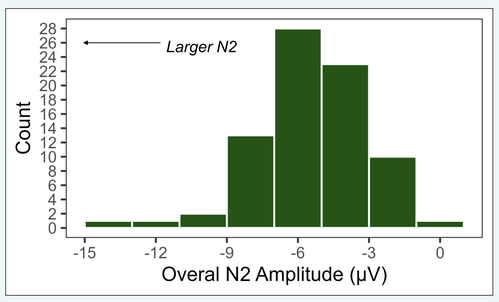
~27% of adolescents attempted ***all 14 daily diaries***

HYPOTHESIS 1

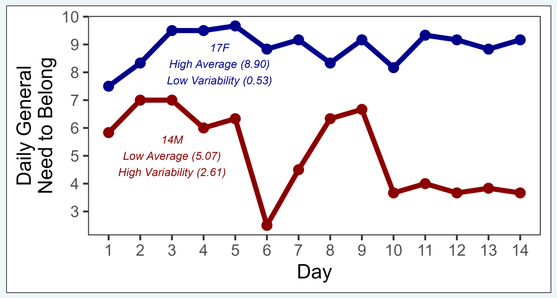
Overall N2
average across exclusion & inclusion

↓

Average Needs to Belong
average across 14 days



EXAMPLE DATA

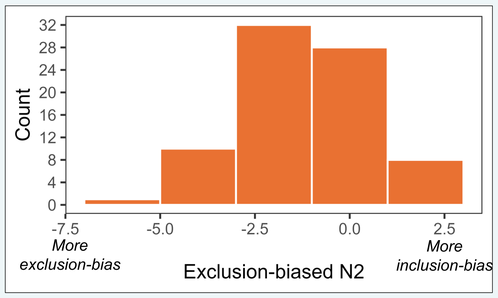


HYPOTHESIS 2

Exclusion-biased N2
exclusion – inclusion

↓

Variable Needs to Belong
Mean square successive difference (MSSD) across 14 days



H1 RESULTS

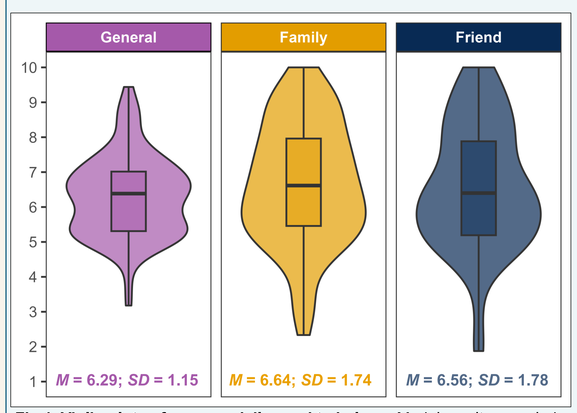


Fig 1. Violin plots of average daily need to belong. Model results revealed no significant differences, after FDR correction ($p > .065$).

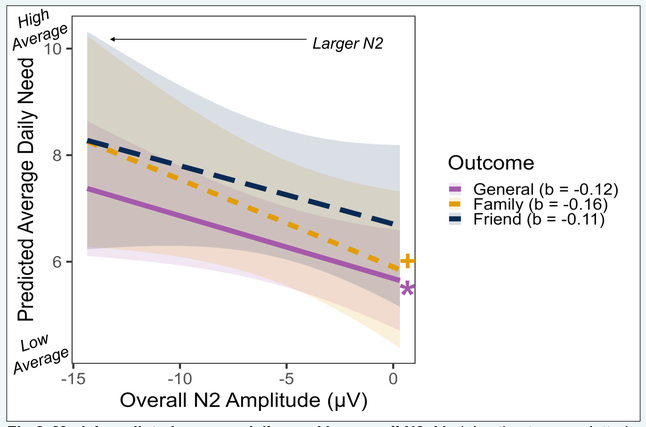


Fig 2. Model predicted average daily need by overall N2. Model estimates are plotted. Asterisks indicate FDR-corrected significant relationships: * $p < .050$ ⁺ trending $p = .060$

H2 RESULTS

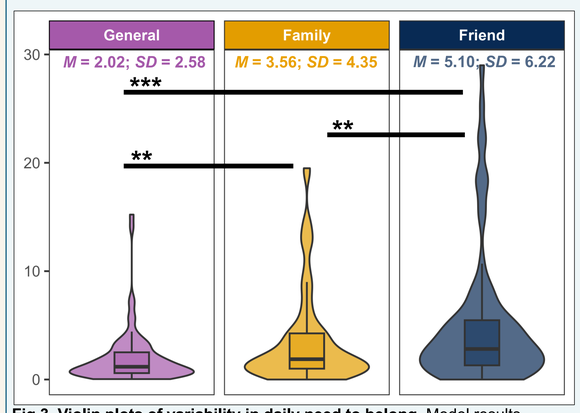


Fig 3. Violin plots of variability in daily need to belong. Model results revealed significant differences between all types of need to belong, following FDR correction: *** $p < .001$; ** $p < .010$

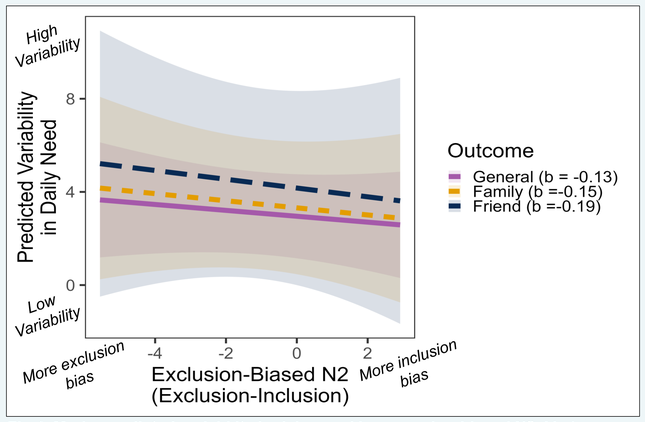


Fig 4. Model predicted variability in daily need by exclusion-biased N2. Model estimates are plotted. FDR-corrected results indicated no significant effects, ($p > .508$).

Takeaway: Neural sensitivity *across social contexts*, rather than exclusion-specific sensitivity, predicts adolescents' *average day-to-day* need to belong.

References: **1** Kiuru, N., et al., (2024). *Child Psychiatry Hum. Dev., 56(6).* **2** Williams, K.D. & Nida, S.A. (2011). *Curr. Dir. Psychol. Sci., 2.* **3** Adolphs, R. (2009). *Annu. Rev. Psychol., 60.* **4** Yeung, N., et al. (2004). *Psychol. Rev., 111(4).* **5.** Politte-Corn, M., et al. (2026). *J. Child Adolesc. Psychopharmacol.* **6.** Baumeister, R.F. & Leary, M.R. (1995). *Psychol. Bull., 117(3).* **7** Nelson, C.M., et al. (2026). *NeuroImage, 338.* **8** Gillen-O'Neel, C. (2021). *Res. High. Educ., 62*