



Disgust, Inflammation, and Effort: Investigating the Immune System's Role in Motivation and Decision-Making



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BACKGROUND

Pathogens and Behavior

- As evidenced by the COVID-19 pandemic, pathogen threats can influence human behavior, including reduced motivation and task performance (Bettinger et al., 2017; Murphy & Stewart, 2017; Spencer & Temple, 2021)
- Prior research has primarily emphasized psychological and environmental explanations for such behavioral changes (Lakhan et al., 2020)

Behavioral and Biological Immune Systems

- Humans possess a behavioral immune system dedicated to detecting pathogen cues and promoting avoidance behaviors, like disgust, to reduce pathogen exposure
- Pathogen detection can also activate the biological immune system, triggering inflammation orchestrated by cytokines (Dantzer, 2001a; Dantzer, 2001b; Dantzer & Kelly, 2007; Schaller & Park, 2011).
- Inflammation is metabolically costly and often results in behavioral changes, such as social withdrawal, to conserve energy (Blascovich et al., 1999; Dickerson & Zoccola, 2013; Aubert et al., 1995; Dantzer, 2001a; Dantzer, 2001b; Dantzer & Kelly, 2007; Steptoe, 2006; Dantzer et al., 2008)

Pathogens, Inflammation, & Motivation

- Physiological stress and inflammation can reduce effort expenditure, influencing effort-based decision-making (Treadway et al., 2019; Draper et al., 2018)
- However, it is not yet established whether environmental pathogen cues alone can influence motivation through inflammatory responses

METHOD

Participants

- 271 undergraduate students recruited from TCU's SONA participant pool

Design

- Between-subjects experiment
- Participants randomly assigned to clean room (control) or dirty room (pathogen exposure) condition

Pathogen Exposure Manipulation

- Dirty room condition included foul odor, sticky surfaces, trash scattered around
- Clean room condition included sanitary surfaces with no pathogen cues

Measures

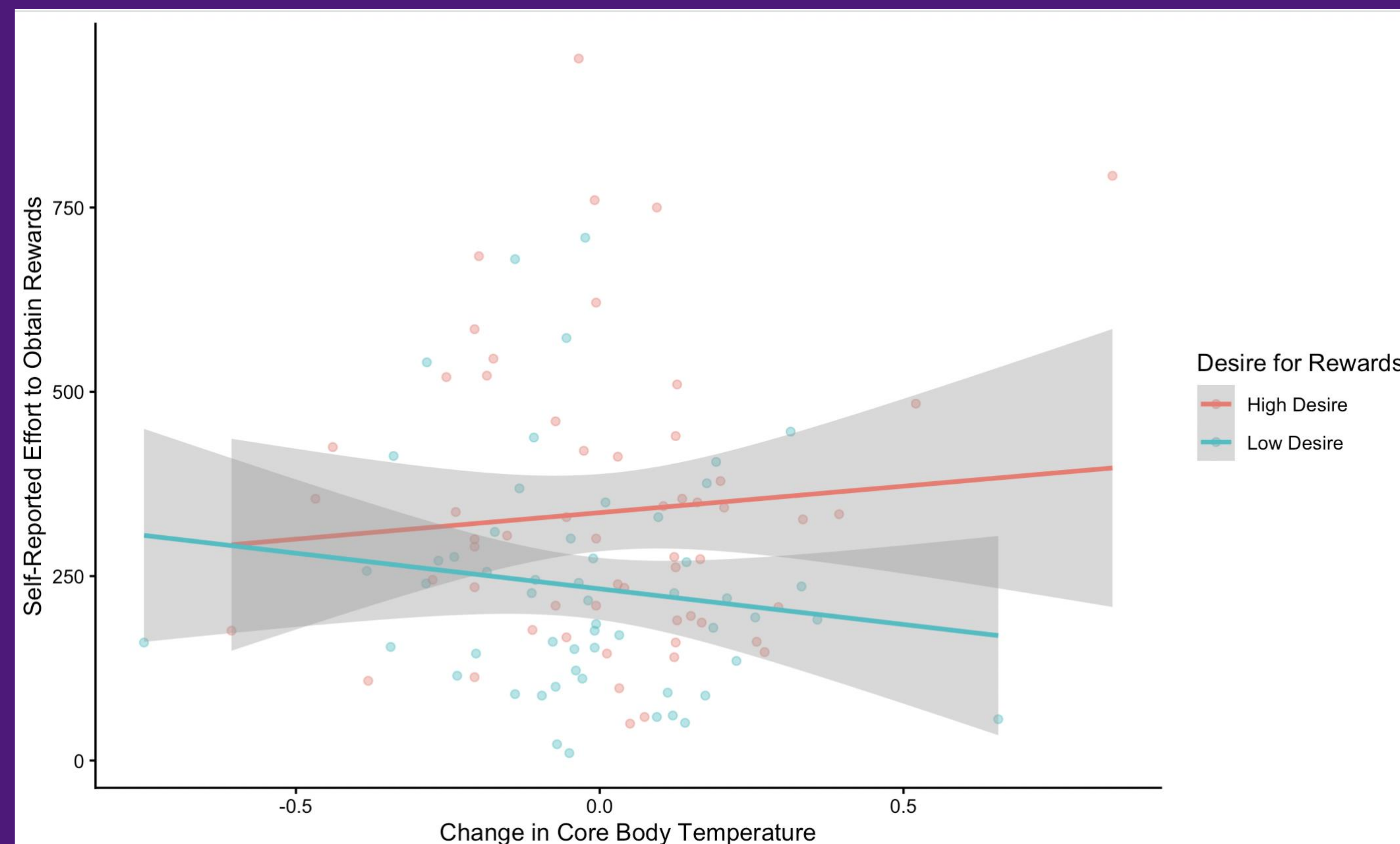
- Inflammation: measured using core body temperature
- Effort-Based Decision Making: measured using the Effort Expenditure for Rewards Task (EEfRT)
- Motivation: measured using surveys assessing reward and cost motivation

Analysis

- Moderation analysis was run using PROCESS in R

CURRENT RESEARCH

Does exposure to pathogen cues increase inflammation and reduce willingness to exert effort to obtain rewards or avoid costs?



Manipulation Check

Participants in the dirty room reported significantly more disgust ($M = 3.32, SD = 2.07$) than those in the clean room ($M = 1.40, SD = 1.00$), $t(221.45) = -9.99, p < .001, d = -1.19$.

Analysis: Two-way moderated regression (PROCESS Model 1, Hayes, 2025) tested whether desire for rewards or desire to avoid costs moderated the effect of change in core body temperature on self-reported effort.



RESULTS

Effort to obtain rewards:

- Overall model: $F(3, 267) = 8.84, p < .001, R^2 = .090$
- Desire for rewards** predicted higher effort: $b = 10.47, SE = 2.60, t = 4.03, p < .001$
- Change in core body temperature** alone did not predict effort: $b = 13.15, p = .589$
- Significant interaction:** $b = 13.67, SE = 5.38, t = 2.54, p = .012$
- Simple slopes: temperature change **↑ effort only for high desire participants (+1 SD),** $b = 67.84, p = .004$

Effort to avoid costs:

- Overall model: $F(3, 267) = 7.55, p < .001, R^2 = .078$
- Desire to avoid costs** predicted lower effort: $b = -6.80, SE = 1.93, t = -3.52, p < .001$.
- No main effect of temperature:** $b = 12.08, p = .818$
- No interaction:** $b = -2.74, p = .483$

Takeaways:

- Desire for rewards moderates** the effect of temperature change on effort to obtain rewards.
- Effort to avoid costs is predicted by desire,** but temperature change does **not** moderate this relationship.

FUTURE DIRECTIONS

- Study 2 is currently being conducted
- Follows the same experimental design and data analysis as Study 1, however, inflammation is being measured via blood cytokine levels, rather than core body temperature

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