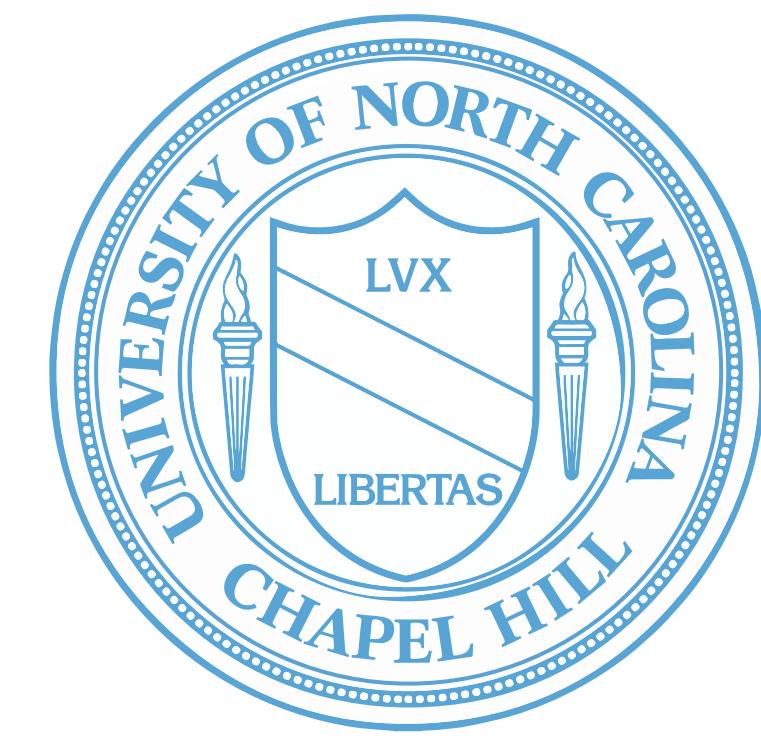




# Negative urgency blunts deliberative reasoning and invigorates pursuit of immediately valuable actions



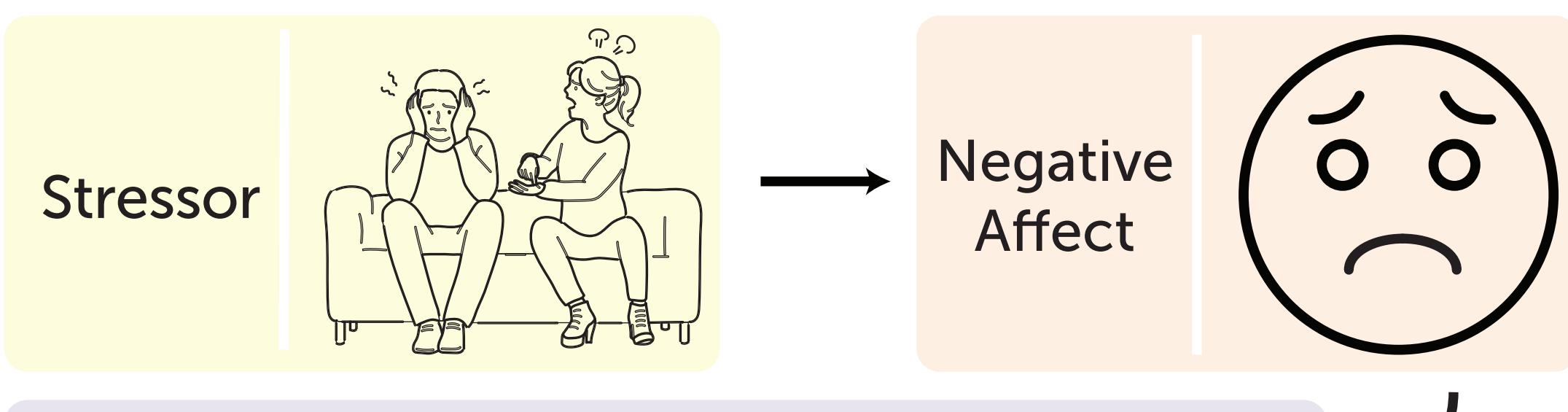
Alison Schreiber & Michael Hallquist  
University of North Carolina at Chapel Hill

## Introduction

Negative urgency - the tendency to behave impulsively when upset - heightens risk of engaging in maladaptive behaviors, which can have dire consequences (e.g., impulsive suicide attempts in BPD)

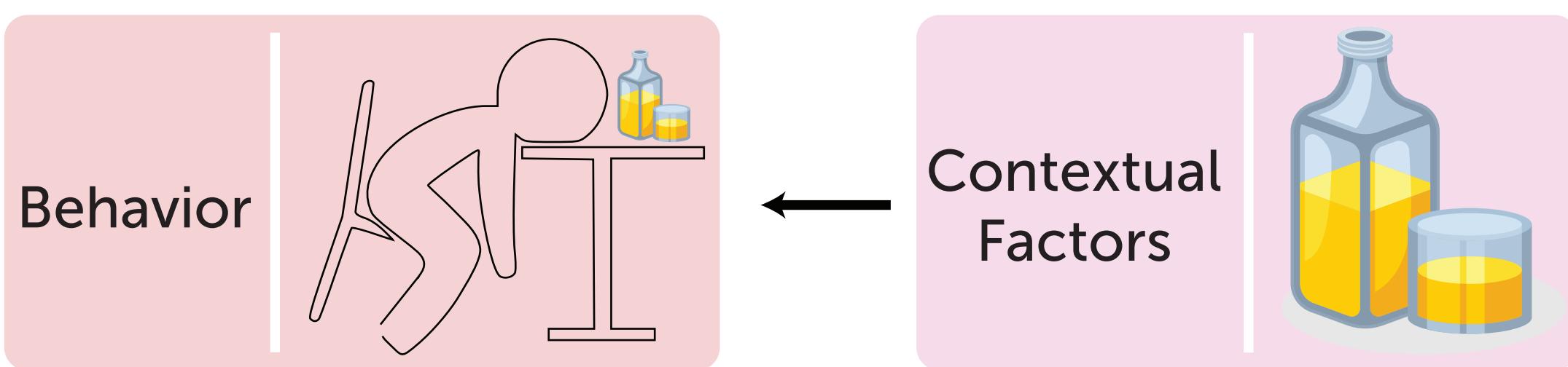
Cognitive mechanisms of negative urgency remain underspecified

We propose that engaging impulsive behaviors when upset reflects a shift of Pavlovian and goal-directed decision systems toward more Pavlovian influences



$$Q(s_t, a_t) = Q(s_t, a_t) + \alpha[r_{t+1} + \gamma * Q(s_{t+1}, a_{t+1}) - Q(s_t, a_t)]$$

Neurocomputational Systems



## Hypotheses

**H1.** Negative urgency will heighten the discounting of value for future actions and will amplify bias toward immediately valuable social actions

**H2.** Negative urgency will amplify vigor for valuable actions

**H3.** The effects of negative urgency on behavior will be amplified if exposed to the negative affect induction

## Methods

Recruited community sample of participants through Prolific. In Study 1, participants ( $N = 388$ ) completed the social decision-tree task (SDTT) following an incidental affect induction

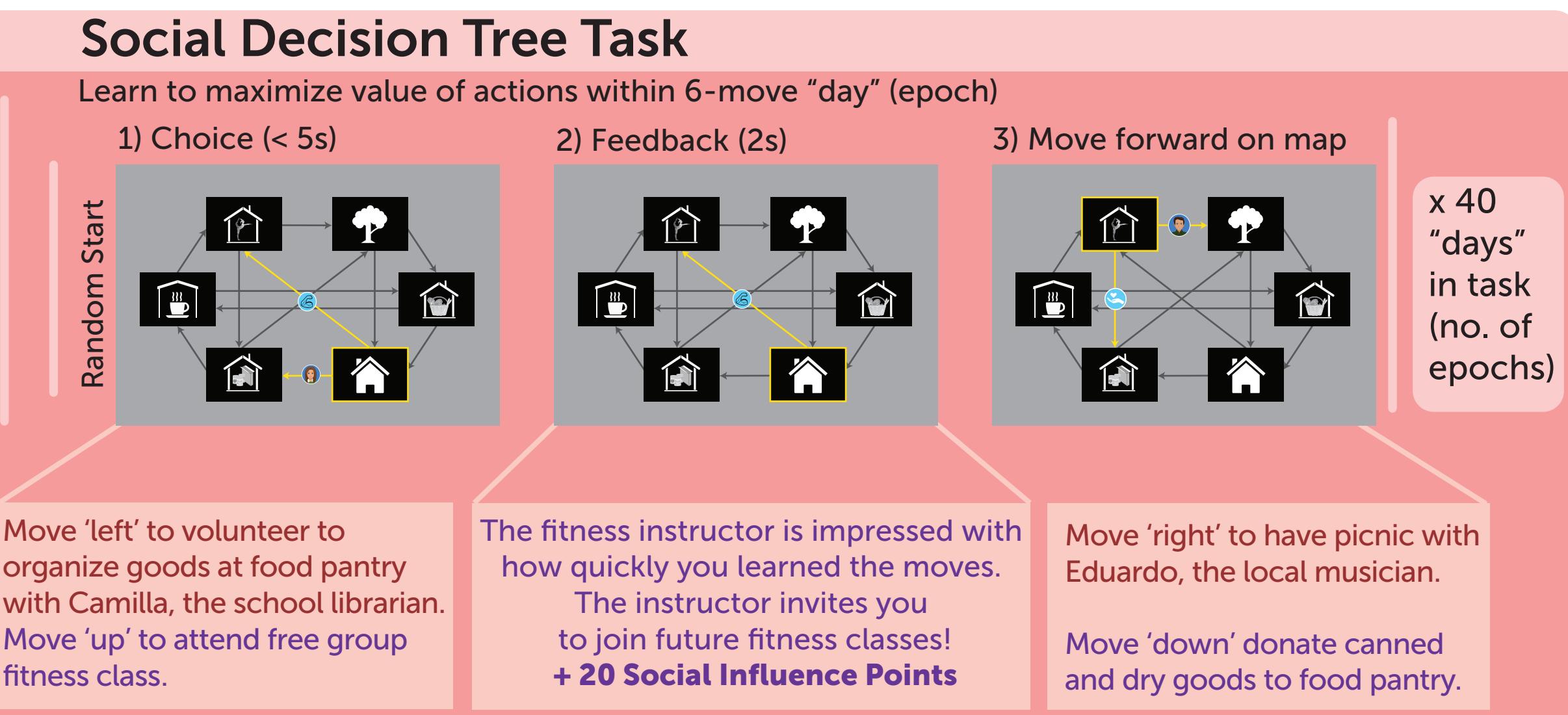
In Study 2, participants ( $N = 77$ ) completed a modified version of SDTT, which was designed to assess vigor, following an incidental affect induction

Incidental affect induction involved passive viewing of a standardized set of affective images (IAPS) while listening to affect-congruent music

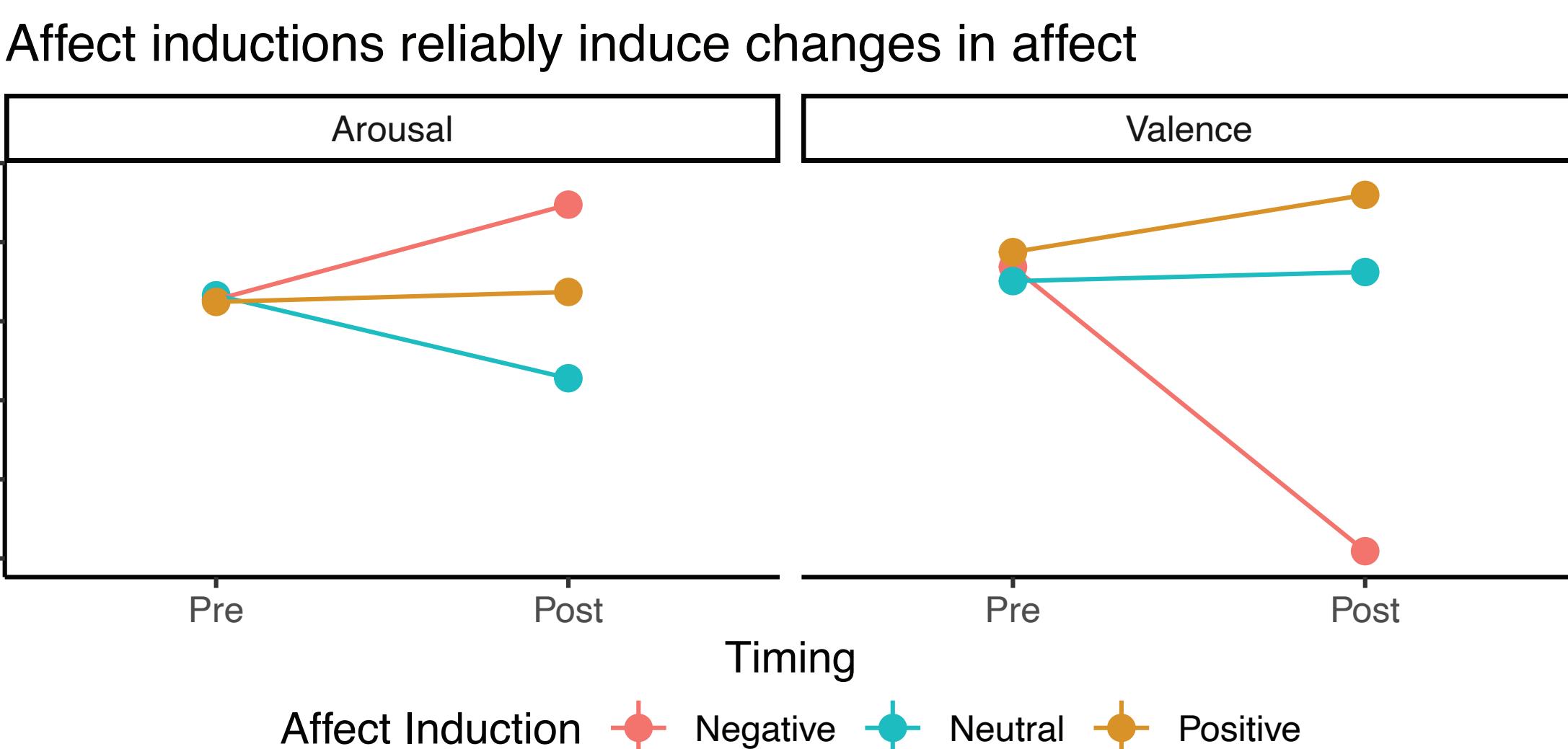
Participants were randomly assigned to negative, neutral, or positive affect induction conditions

UPPS collected on all participants

Mixed-effects analyses examined choice behavior and vigor. Computational reinforcement learning models fit behavior to different learning rules, and parameters from models correlated with negative urgency subscale of UPPS

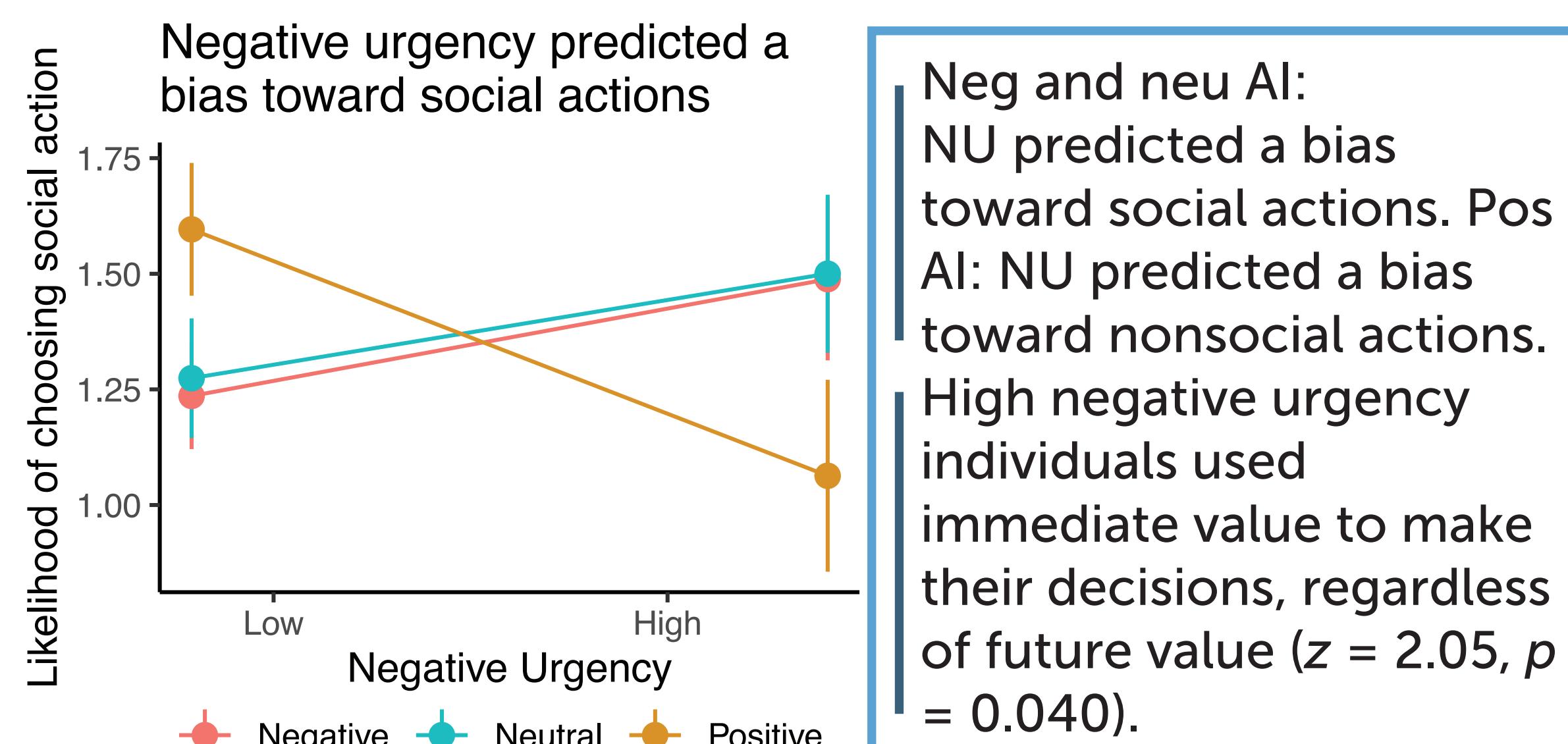
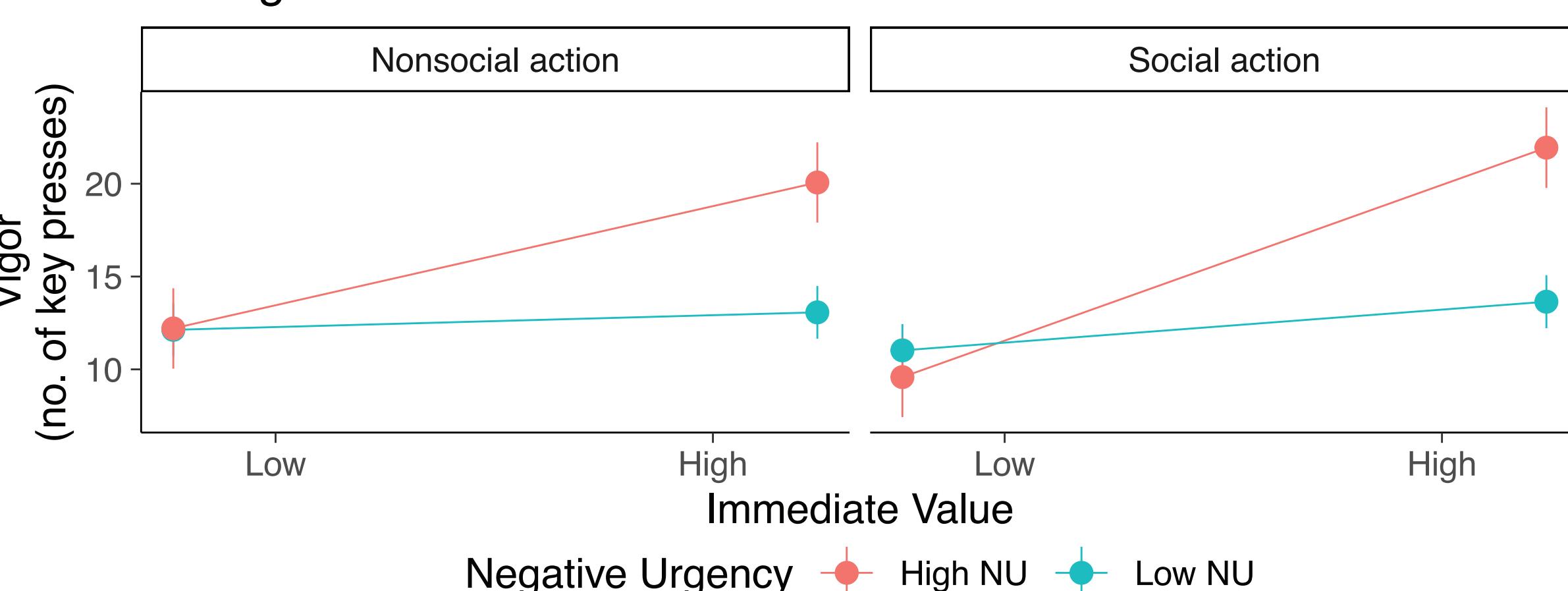


## Results

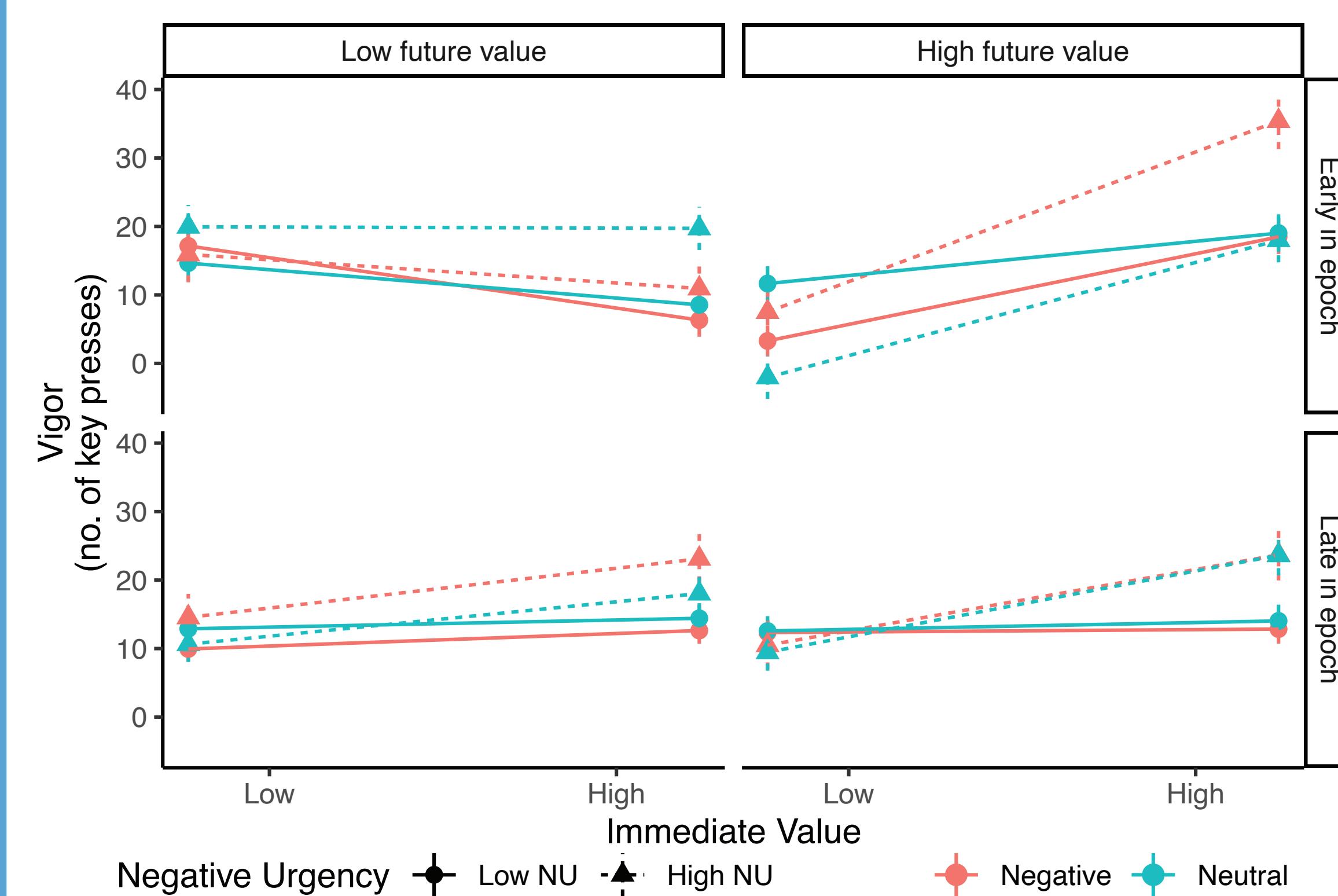


## Mixed-Effects Analyses

Negative urgency amplified the effect of immediate value on vigor for social actions

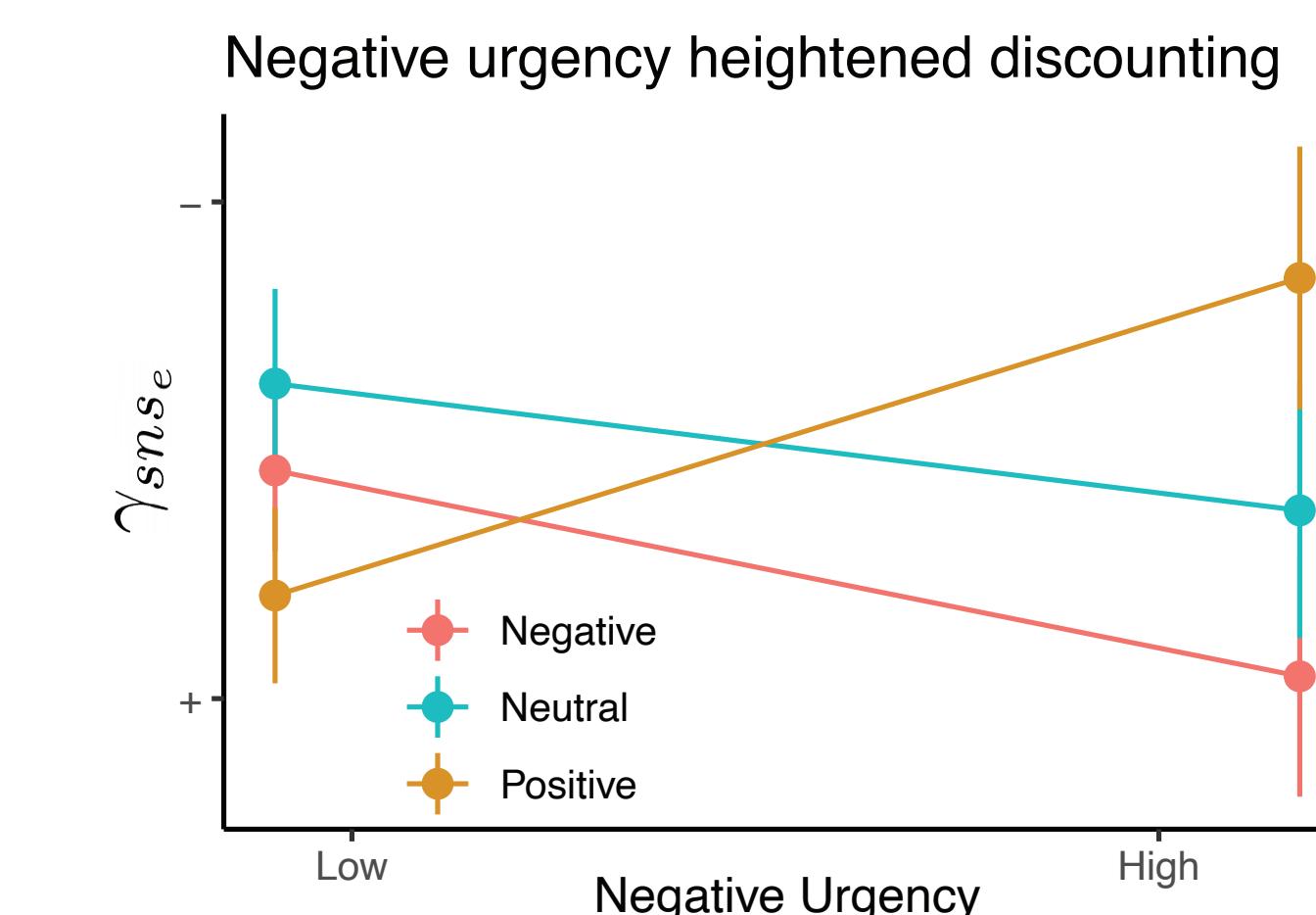


Among those exposed to negative affect induction, negative urgency amplified multiplicative effect between immediate and future value



## Reinforcement Learning Analyses

	Current trial	Subsequent trial	Stage of learning	$\gamma$
$\gamma =$	Social	Social	Early	$\gamma_{sse}$
			Late	$\gamma_{ssi}$
	Nonsocial	Nonsocial	Early	$\gamma_{snsse}$
			Late	$\gamma_{snsli}$
	Social	Nonsocial	Early	$\gamma_{nssse}$
			Late	$\gamma_{nssi}$
			Early	$\gamma_{nsnse}$
			Late	$\gamma_{nsnsi}$



Negative urgency heightened discounting of future value when choosing a social action on the current trial ( $t(348) = -2.00, p = 0.047$ ).

## Discussion

Negative urgency heightened sensitivity to immediate value, partly reflecting greater discounting of future rewards.

Negative urgency amplified the effect of value on vigor. These effects were particularly true when exposed to a negative affect induction.

In the context of psychopathology, negative urgency may heighten risk for maladaptive impulsive behavior via these computational mechanisms.

Future research may extend these findings by interrogating the neural systems involved in these decision processes.