

# Birth control, cycle phase, and inflammatory response to an immunological stimulus

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## Background

- Cytokines are proteins involved in the body's inflammation response to pathogen threats (Dantzer, 2001)
- Long-term oral contraception use can increase generalized inflammation (Mongioli et al., 2001)
- Sickness symptoms and more sick effects (injection-site soreness, fatigue, muscle aches, etc.) post flu-shot are found in participants with higher cytokine levels (Dantzer & Kelley, 2007; Christian et al., 2015)

## Research Question

Is there a difference in post-flu shot cytokine levels and sick symptoms between naturally cycling women vs. women on hormonal birth control, and will phase of menstrual cycle influence inflammation levels?

## Measures

**MacArthur Scale of Subjective Social Status** (Goodman et al., 2001)  
Perceived socioeconomic status | 10 items | 10-rung ladder scale  
 $\alpha = 0.73$

**Childhood Household Unpredictability** (Mittal et al., 2015)  
3 items | Likert scale  
 $\alpha = 0.74$

**Subjective Childhood SES** (Griskevicius et al., 2011)  
3 items | Likert scale  
 $\alpha = 0.80$

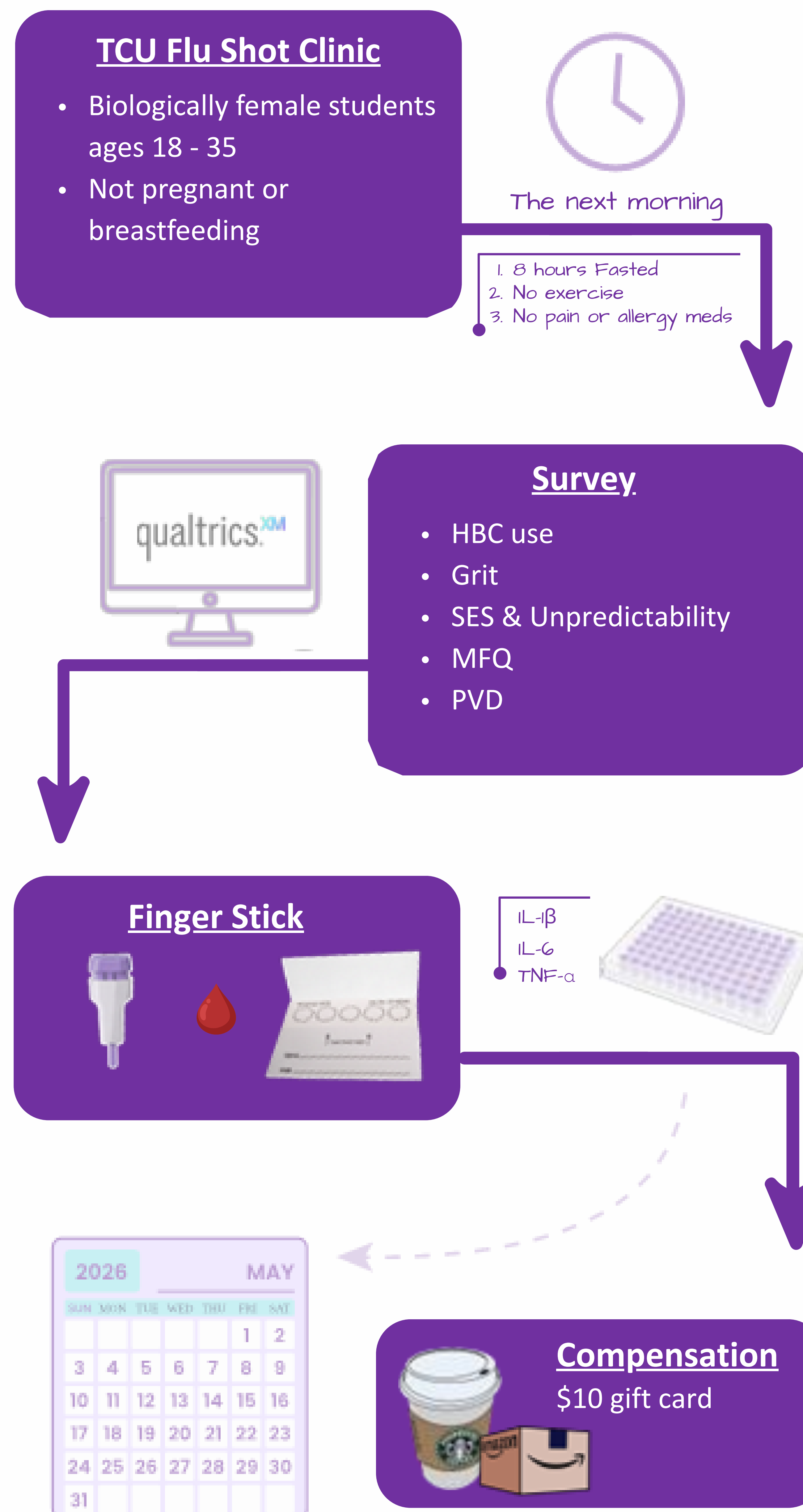
**Perceived Vulnerability to Disease (PVD)** (Karakulak et al., 2023)  
Subscales: Infectibility & Germ Aversion | 15 items | Likert scale  
 $\alpha = 0.83$

**Grit Scale** (Duckworth et al., 2007)  
Perceived perseverance of effort | 4 items | Likert scale  
 $\alpha = 0.85$

**Mood & Feelings Questionnaire** (Angold & Costello, 1987)  
Perceived depressive symptoms | 15 items | Likert scale  
 $\alpha = 0.85$

**Sick Symptoms** (Christian et al., 2015)  
Subjective sick symptoms | 4 items | Likert scale, free response

## Procedure



## Pilot Correlations

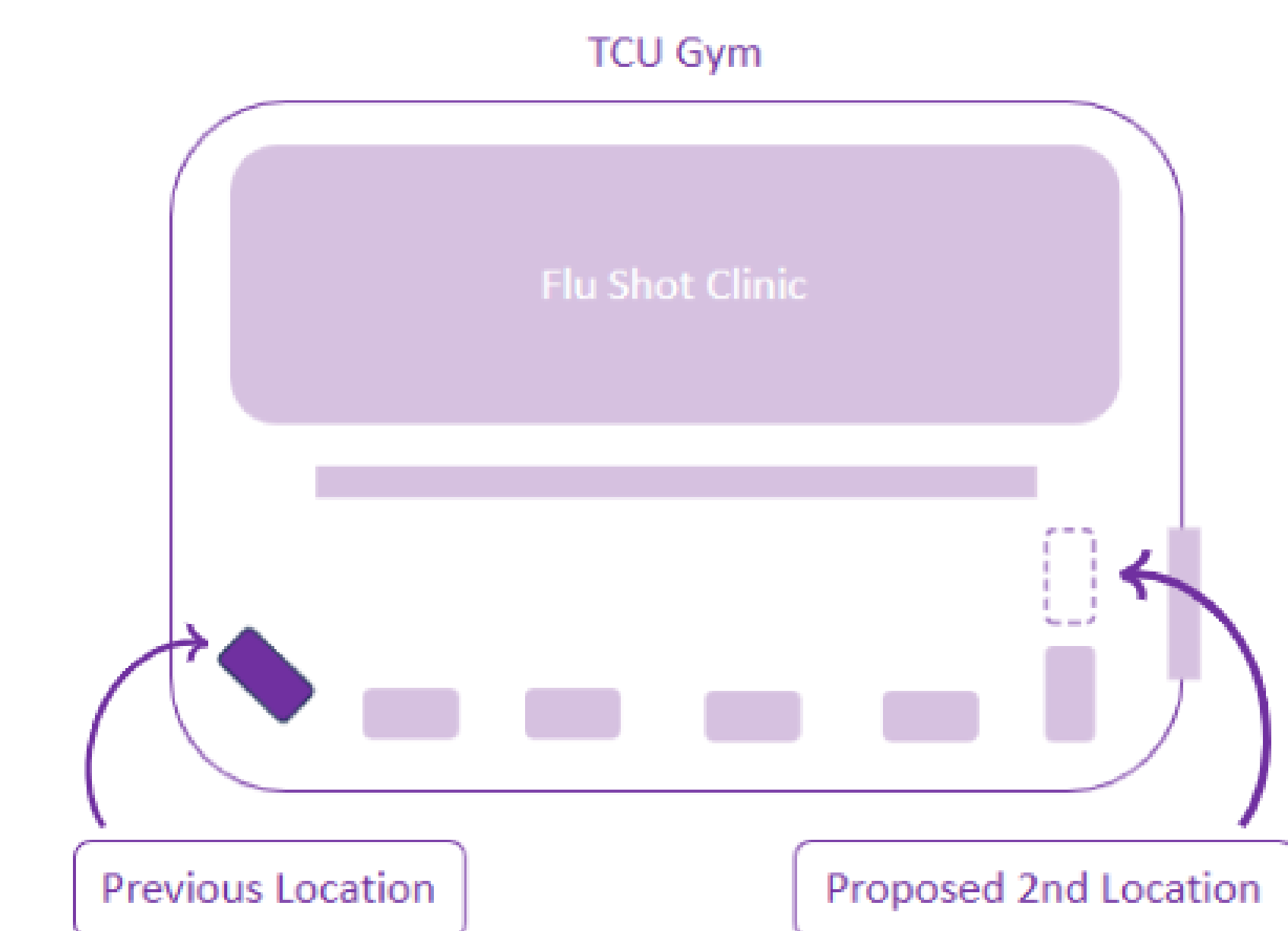
**Table 1**  
Correlations for Study Variables

	HBC Use	PVD	MFQ	GRIT
HBC Use	1	-	-	-
PVD	.03	1	-	-
MFQ	-.35*	.12	1	-
GRIT	.36*	.00	-.53**	1

\*  $p < 0.05$

\*\*  $p < 0.01$

## Future Directions



- Study 2 will be conducted in Fall 2026
- TCU Flu Shot Clinic + community clinics
- Improved sampling flow

## Limitations

Cross-sectional, small sample size (recruitment flow, attrition, exclusion criteria), biased sample (PWI, WEIRD, college students), forward counting