

# Hormonal Predictors of Sexual Motivation in Naturally Cycling Young Women

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# Main Research Question

- Which hormonal signals, if any, predict variance in women's libido/sexual motivation?

Disclosure information: Nothing to declare

# What is Already Known?

- Evidence implicates hormones in women's libido:
  - Libido often falls with natural or surgical menopause (e.g., Dennerstein et al., 2002)
  - Libido often responds to HRT with estrogen, estrogen + testosterone or testosterone alone
  - Cycle phase shifts in libido
- However, very few studies have correlated hormones and libido in natural menstrual cycles
  - Small n, low power, inadequate statistics
  - No study has ever reported a within-woman correlation between changes in hormones and changes in libido
- Currently no model of the hormonal signals that regulate libido in natural menstrual cycles

# Methods

- 43 women (mean age = 18.76), heterosexual, not using hormonal contraceptives
- Collected daily saliva samples across 2 full menstrual cycles (n = 7 only 1 cycle) plus completed daily online survey
- Saliva samples assayed every day in 9-day window in middle of cycle, and on alternating days otherwise
- Saliva samples assayed for estradiol, testosterone, and progesterone (N = 3,621 assays)
- 2 dependent variables:
  - Desire: “How much did you desire sexual contact?” (1-7)
  - Behavior: Yes/No sexual behavior on a given day (“intercourse or other forms of genital stimulation with another person”)

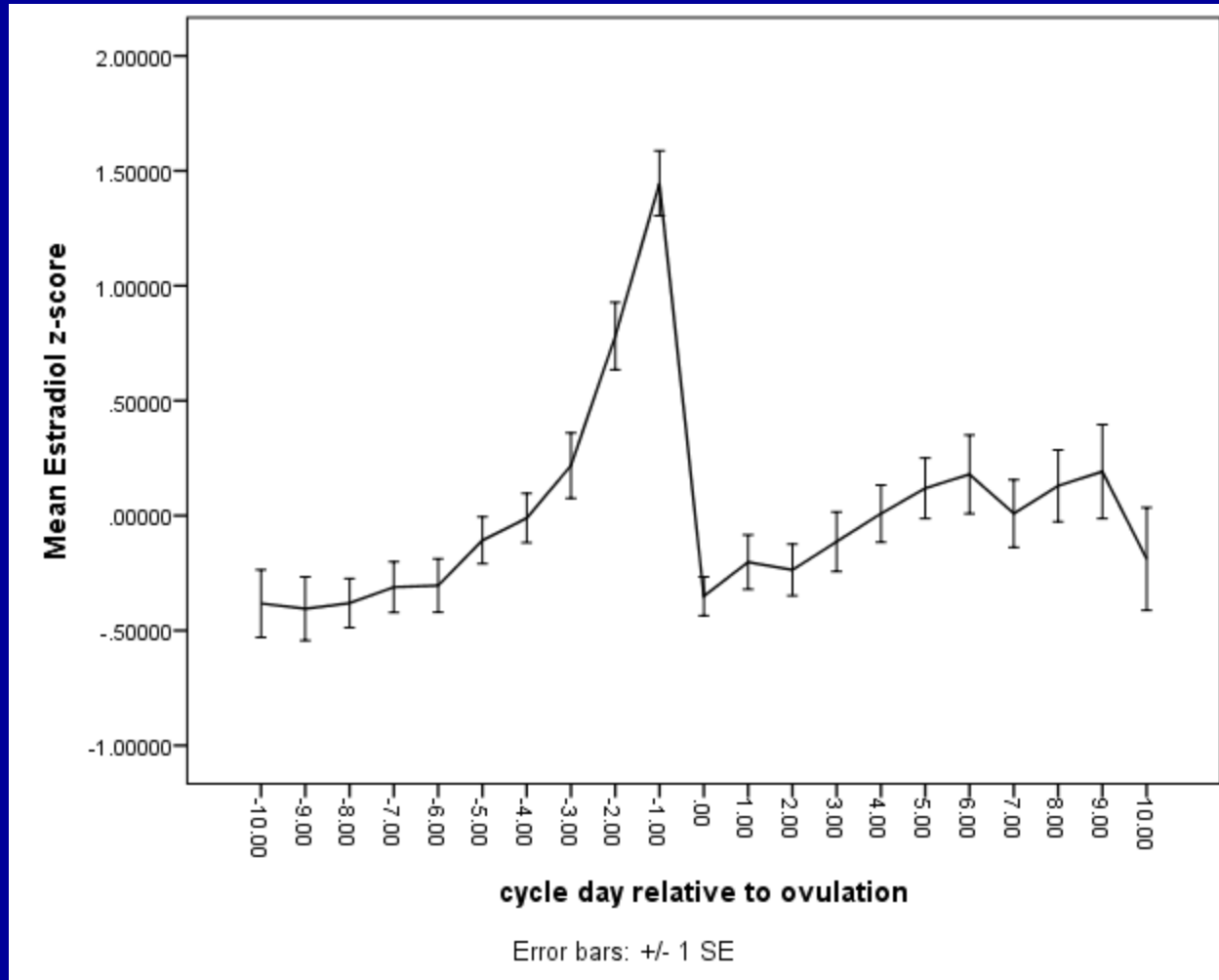
# Data Analysis

- Multi-level regression models (HLM):
  - Level-1 (within-cycle): Is libido higher on cycle days with higher relative estrogen?
  - Level-2 (within-women, between-cycle): For the same woman, is mean libido higher in the cycle with higher mean estrogen?
  - Level-3 (between-women): Is overall mean libido higher in women with higher mean estrogen?
- At Level-1, separate models testing current day hormones, 1 day lag hormones, and 2 day lag hormones
- Day of ovulation estimated from algorithm using estradiol drop and progesterone increase
  - Fertile window defined as days -5 to 0 (0 = day of ovulation)
  - Tested within-cycle effects of fertile window on sexual variables

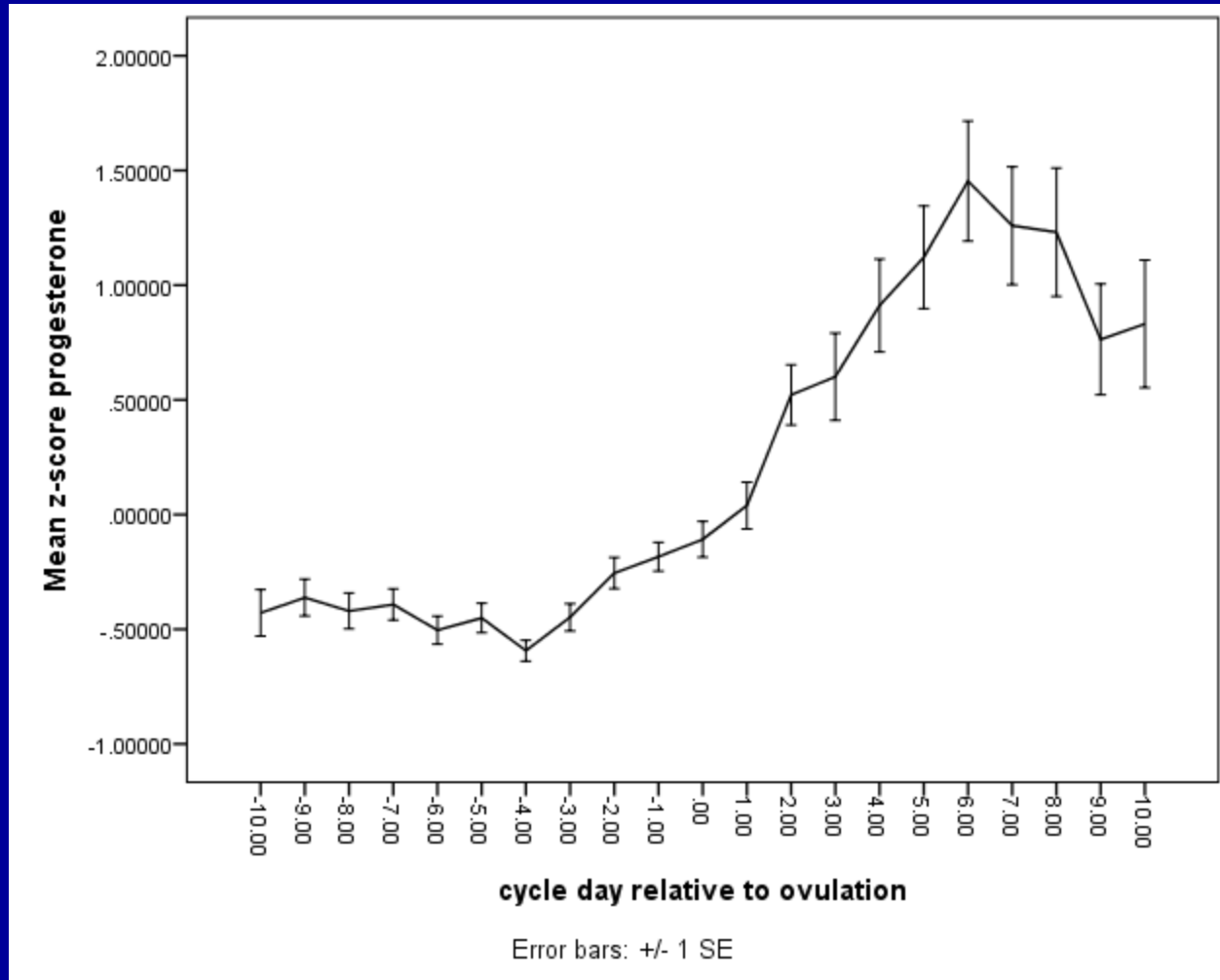
# Results: Response Rates

- Women completed a total of 1905 daily online surveys out of 2079 eligible cycle days for an overall compliance rate of 92%
- 29 out of the 43 women reported at least one episode of sexual behavior over the course of the study
- A total of 178 total episodes of sexual behavior across the 29 women

# Assay Validation: Estrogen



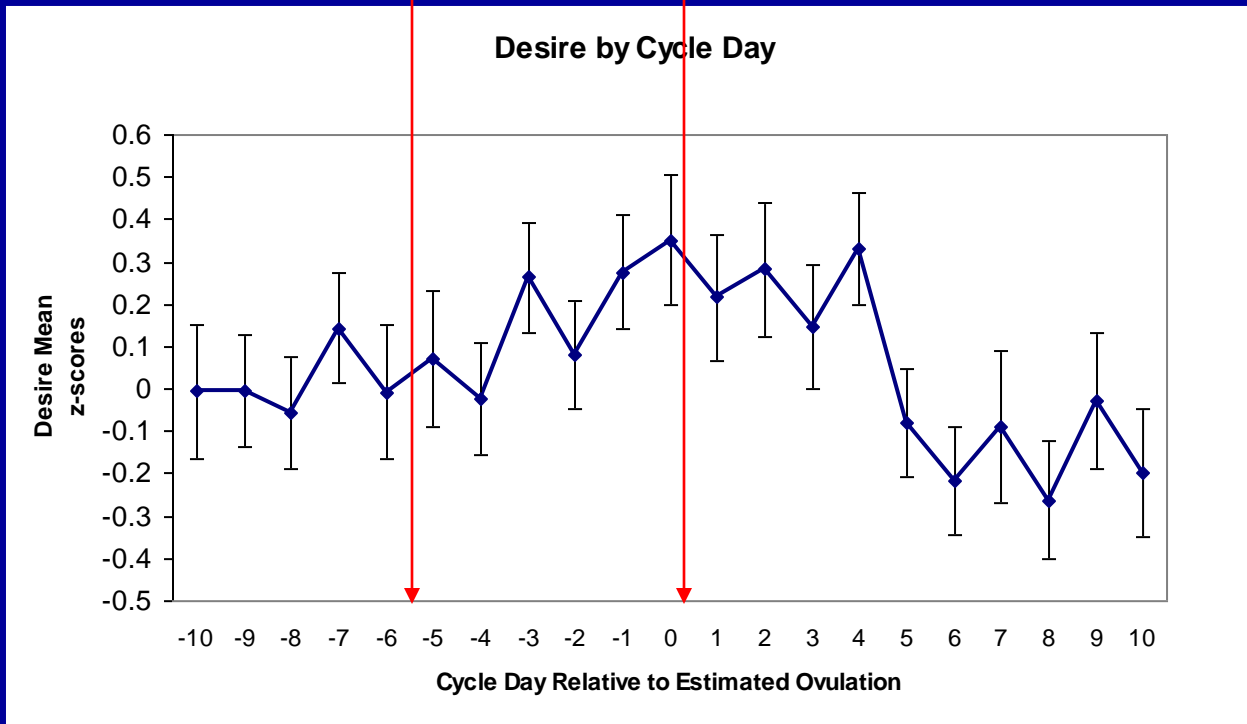
# Assay Validation: Progesterone





# Results: Sexual Desire by Cycle Day

Fertile Window

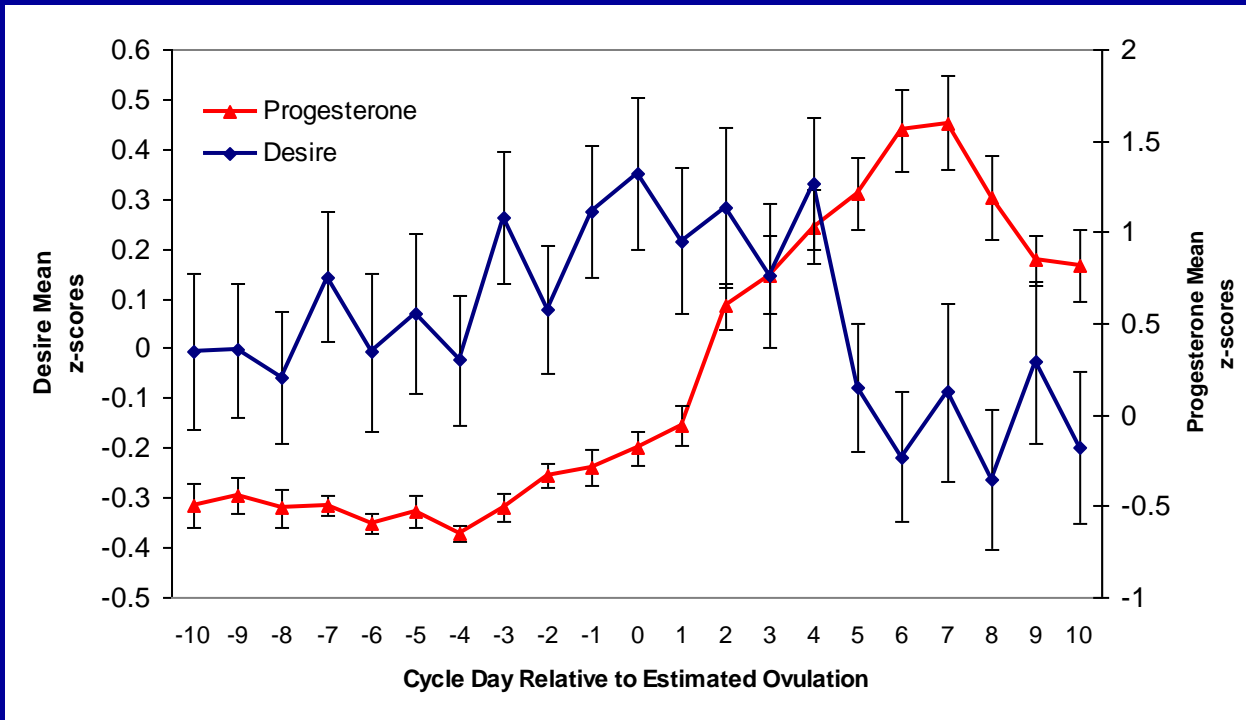


Fertile Window:  $b = .26$ ,  $p = .02$

# Hormonal Predictors of Desire

- Level-1 (within-cycle) Predictors:
  - Estradiol: 2-day lag:  $b = .16$ ,  $p = .01$
  - Progesterone:
    - 2-day lag:  $b = -.20$ ,  $p = .0001$
    - 1-day lag:  $b = -.11$ ,  $p = .04$
    - Current day:  $b = -.13$ ,  $p = .01$

Progesterone =

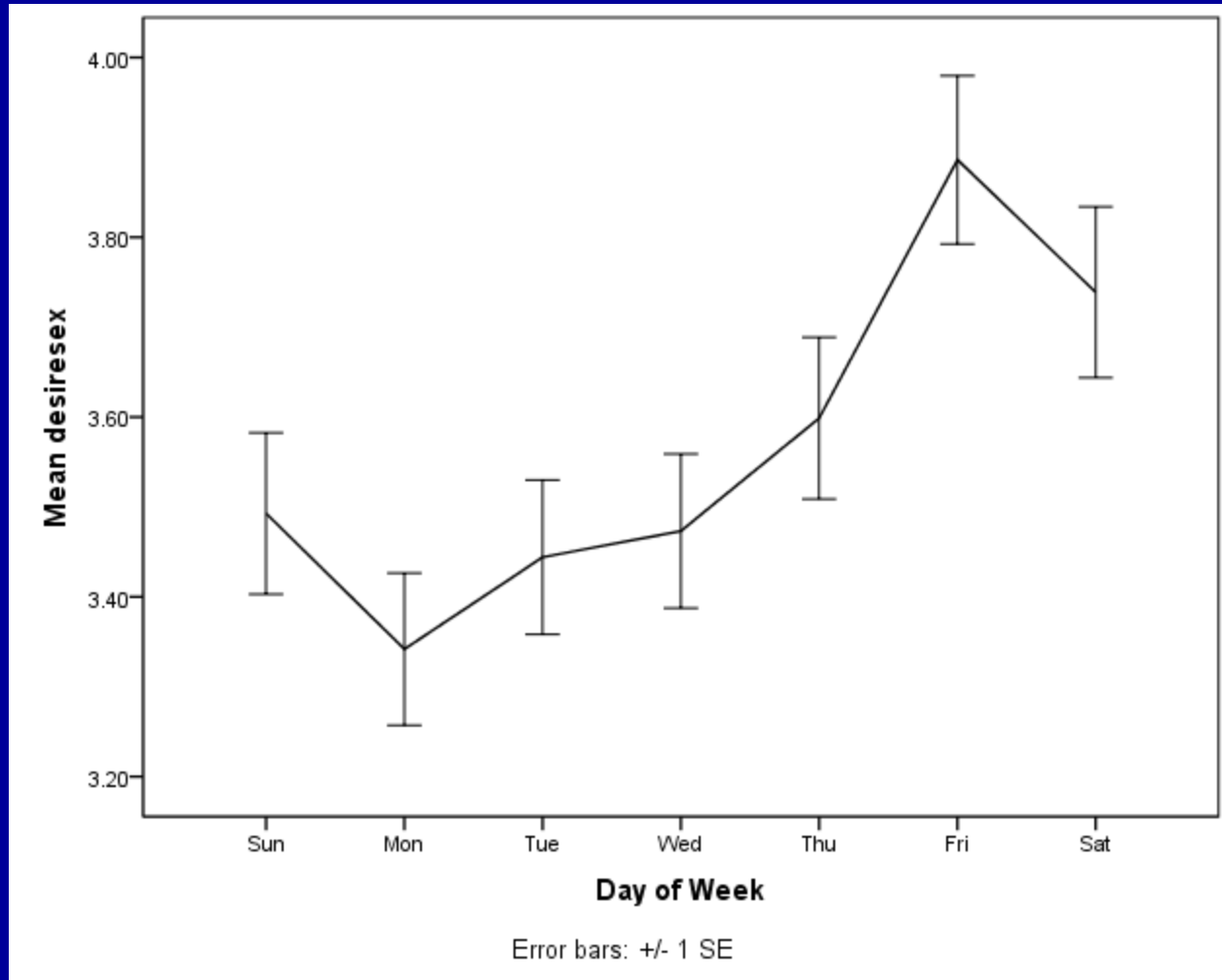


Progesterone alone mediated drop in desire from fertile window to luteal phase

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    - Current day:  $b = -.13$ ,  $p = .01$
  - No effects of testosterone at any time-scale
  - Weekend timing:  $b = .40$ ,  $p < .0001$

# Desire for Sex by Day of Week

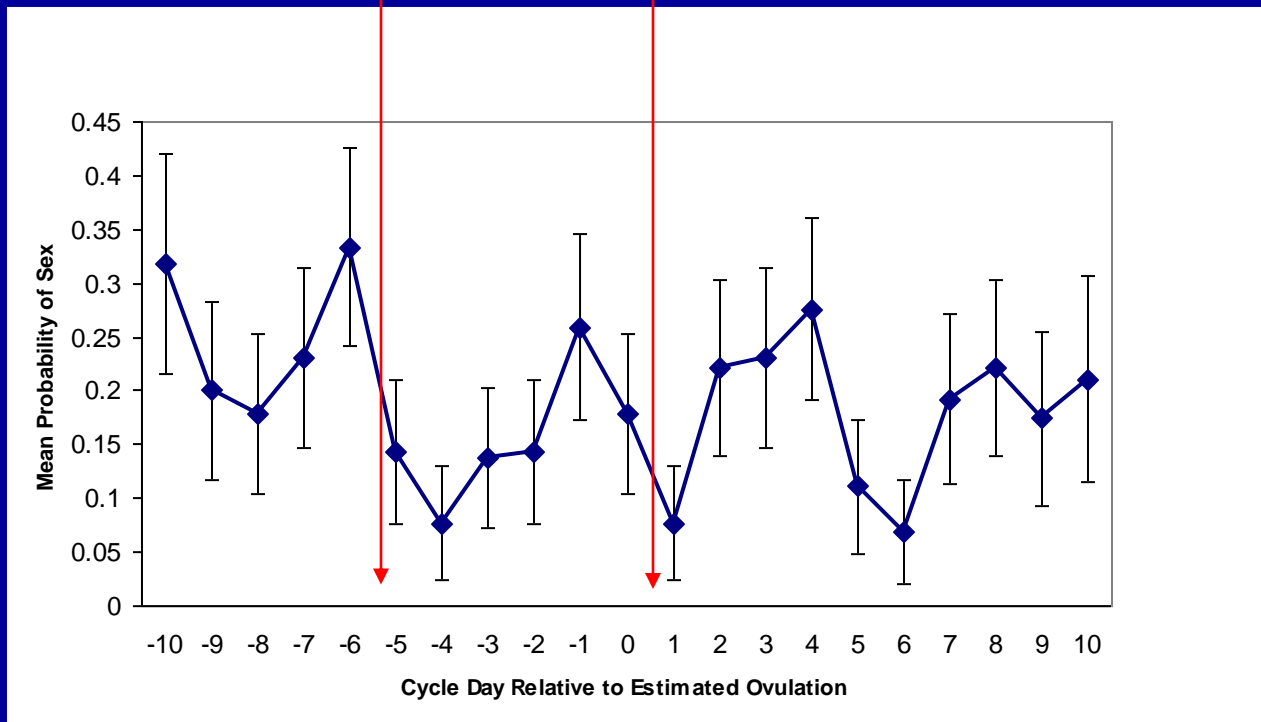


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  - No effects of testosterone at any time-scale
  - Weekend timing:  $b = .40$ ,  $p < .0001$ 
    - Independent of hormone effects
    - Desire may be independently regulated by: (1) endogenous hormone changes, and (2) external social stimuli

# Sexual Behavior by Cycle Day

Fertile Window



# Hormonal Predictors of Sexual Behavior

- Level-1 (within-cycle) Hormone Predictors:
  - Current day estradiol:  $b = .30$ ,  $p = .02$ ; OR = 1.34
- Level-1 weekend timing:  $b = 1.15$ ,  $p < .0001$ , OR = 3.17



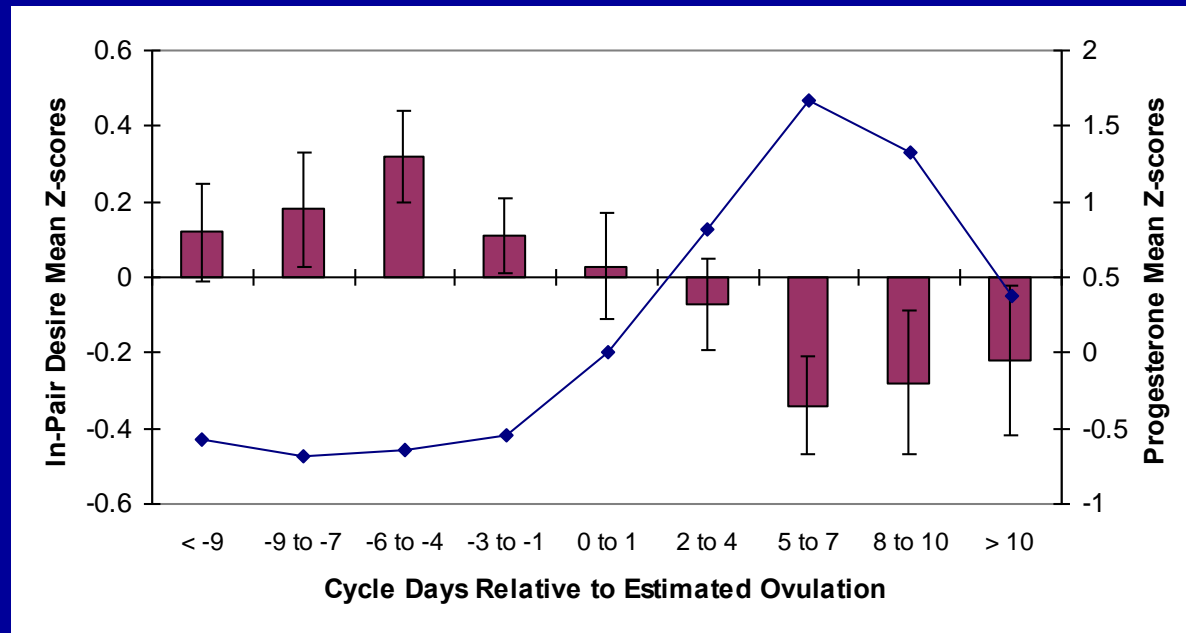
# Target-Specificity

- Results so far pertain to general “desire”
- Grebe et al. (2016) argued that women’s desire for their own partners may be higher in the luteal phase to promote pair-bonding
  - 2 saliva samples 1 week apart, progesterone positively predicted desire for own partners
  - Estradiol negatively predicted desire for own partners
- Perhaps a special hormonal regulation of “in-pair” desire

# Testing Target-Specific Desire

- 14 women in cycle 1 and 10 women in cycle 2 reported being in long-term relationships
- In-pair desire: (1) “How much did you fantasize about your current partner?” and (2) “How much did you feel sexual attraction toward your current partner?” (mean of 2 items)
- Extra-pair desire: “How much did you fantasize about people you have seen in person (strangers, friends, classmates, past partners, etc.), other than your current partner?”

# In-Pair Desire

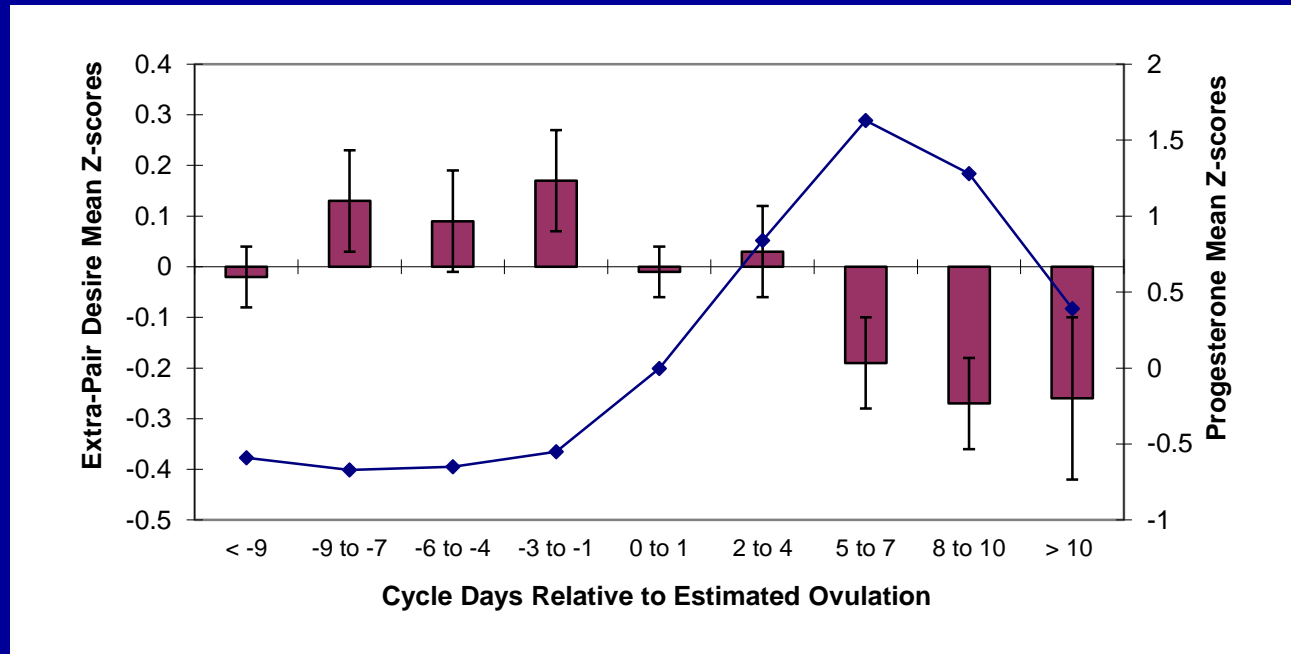


Progesterone:  $b = -.12$ ,  $p = .006$

Fertile Window:  $b = .21$ ,  $p = .017$

Roney & Simmons (submitted)

# Extra-Pair Desire



Progesterone:  $b = -.12, p < .001$

Estradiol:  $b = .08, p = .04$

Fertile Window:  $b = .13, p = .03$

# Discussion

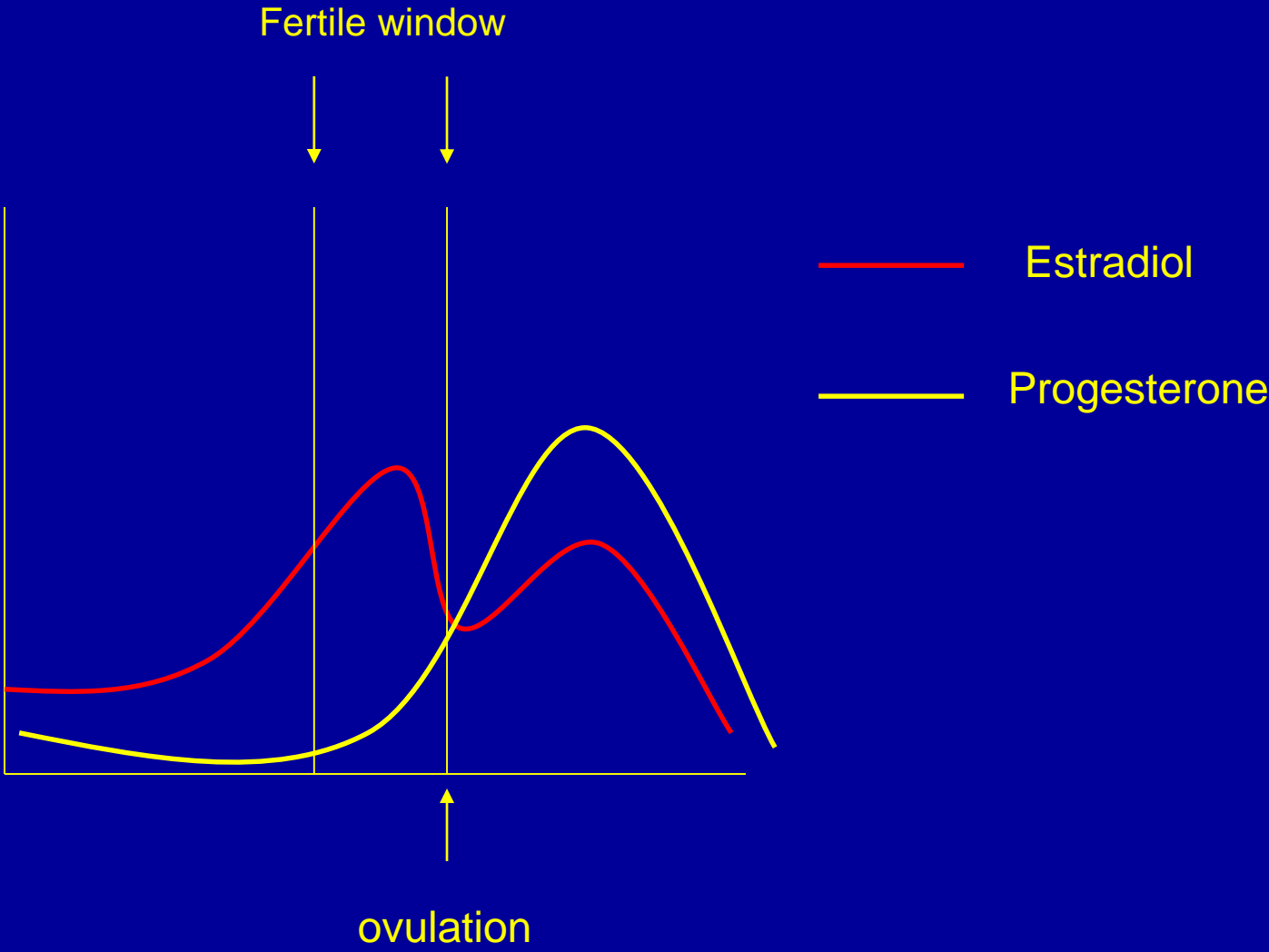
- First evidence for hormonal predictors of within-cycle fluctuations in sexual motivation:
  - Positive effects of estradiol on desire/behavior
  - Consistent negative effects of progesterone on desire
- Patterns are highly consistent with data in rhesus macaques
  - Estradiol (+), progesterone (-), testosterone (null)
  - Suggests homologous mechanisms

# Discussion

- Null effects of testosterone
  - Testosterone widely thought to be main regulator of women's libido
  - HRT results support positive effects of testosterone
  - HRT may reflect pharmacological effects even if T not regulate libido in natural cycles
- Sexual motivation appears to respond to combination of endogenous and exogenous influences:
  - Hormone fluctuations are endogenous predictors
  - Weekend timing suggests independent responses to social stimuli
  - Other non-hormonal factors: New relationship status, relationship quality

# Discussion

- Our findings replicated fertile window increases in sexual desire
  - As in nonhuman species, desire may peak when conception is possible
  - Suggests that estradiol and progesterone may be read as signals of fecundity by brain mechanisms





# Limitations and Future Research

- Undergraduate subject population and issue of generalization
- Replication in community samples of partnered women
- Such studies could measure many relationships variables and assess their effects relative to hormonal influences

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# Functions of Hormonal Regulation of Libido

- Functionality of calibrating libido to fertility
- Within-cycles:
  - Sex likely had costs ancestrally
    - STI or injury
    - Opportunity costs in terms of other behaviors
  - Conception is benefit of sex that is absent to weigh against costs during luteal phase (Benefit: cost ratio declines)
    - Decrease motivation = lower probability of sex in luteal phase, to decrease costs
    - Calibration of desire to both hormones and external social stimuli independently (e.g., pair-bond maintenance) allows for “extended sexuality” when functional
  - Attention allocation function:
    - Allocate greater attention/motivation to nonsexual tasks during the luteal phase; greater attention to mating and sexuality during follicular phase when sexuality has greater consequences
    - Similar to hunger and desire for food: reduce motivation for food when sated so can focus on other tasks of currently greater importance