

A RANDOMIZED, DOUBLE-BLIND, PLACEBO-
CONTROLLED TRIAL EXAMINING
THE ACUTE EFFECTS OF NICOTINE ON
PHYSIOLOGICAL AND SUBJECTIVE
SEXUAL AROUSAL IN NONSMOKERS



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SMOKING AND ERECTILE DYSFUNCTION

- Erectile Dysfunction (ED) is significantly higher in current smokers versus those who had never smoked (*Dorey, 2001; Mannino et al., 1994*)
 - Odds ratio $\approx 1.5 - 2.0$

SMOKING AND FEMALE SEXUAL DYSFUNCTION

- One study found positive relationship
 - *Oksuz & Malhan, 2006*
 - Smoking most important risk factor for FSD (Odds ratio=2.41)

- Others found no relationship
 - *Cayan et al., 2004; Safarinejad, 2006*

Oksuz, E., & Malhan, S. (2006). *The Journal of Urology*, 175: 654-658.

Cayan S., Akbay E., Bozlu M, Canpolat B, Acar D, Ulusoy E. (2004). *Urol Int*, 72: 52-57.

Safarinejad, M. R. (2006). *Int J Impot Res*, 18: 382-395.

ACUTE EFFECTS OF SMOKING ON SEXUAL AROUSAL

- Only one study investigated acute effects of smoking on human sexual response (*Gilbert et al., 1986*)
 - Decrease in erection after smoking 3 cigarettes within 30 min compared to placebo
- Acute effects of smoking on female sexual arousal in humans or animals unknown

LIMITATIONS OF PRIOR RESEARCH

- Correlational
- Method of nicotine administration
- Smoking status

GOALS OF CURRENT STUDY

- Examine acute effects of isolated nicotine on:
 1. Physiological sexual arousal
 2. Subjective sexual arousal
 3. Concordance between physiological and subjective sexual responses

PARTICIPANTS

- 53 heterosexual participants (28 men, 25 women)
 - $M = 21$ years; Range: 18-27 years
- Screening criteria
 - <100 direct exposures nicotine
 - International Index of Erectile Function (IIEF) *(Rosen et al., 1997)*
 - IIEF erectile subscale > 25
 - Female Sexual Function Index (FSFI) *(Rosen et al., 2000)*
 - FSFI full scale > 26.5
 - FSFI arousal subscale > 4.0
 - Medications, medical conditions

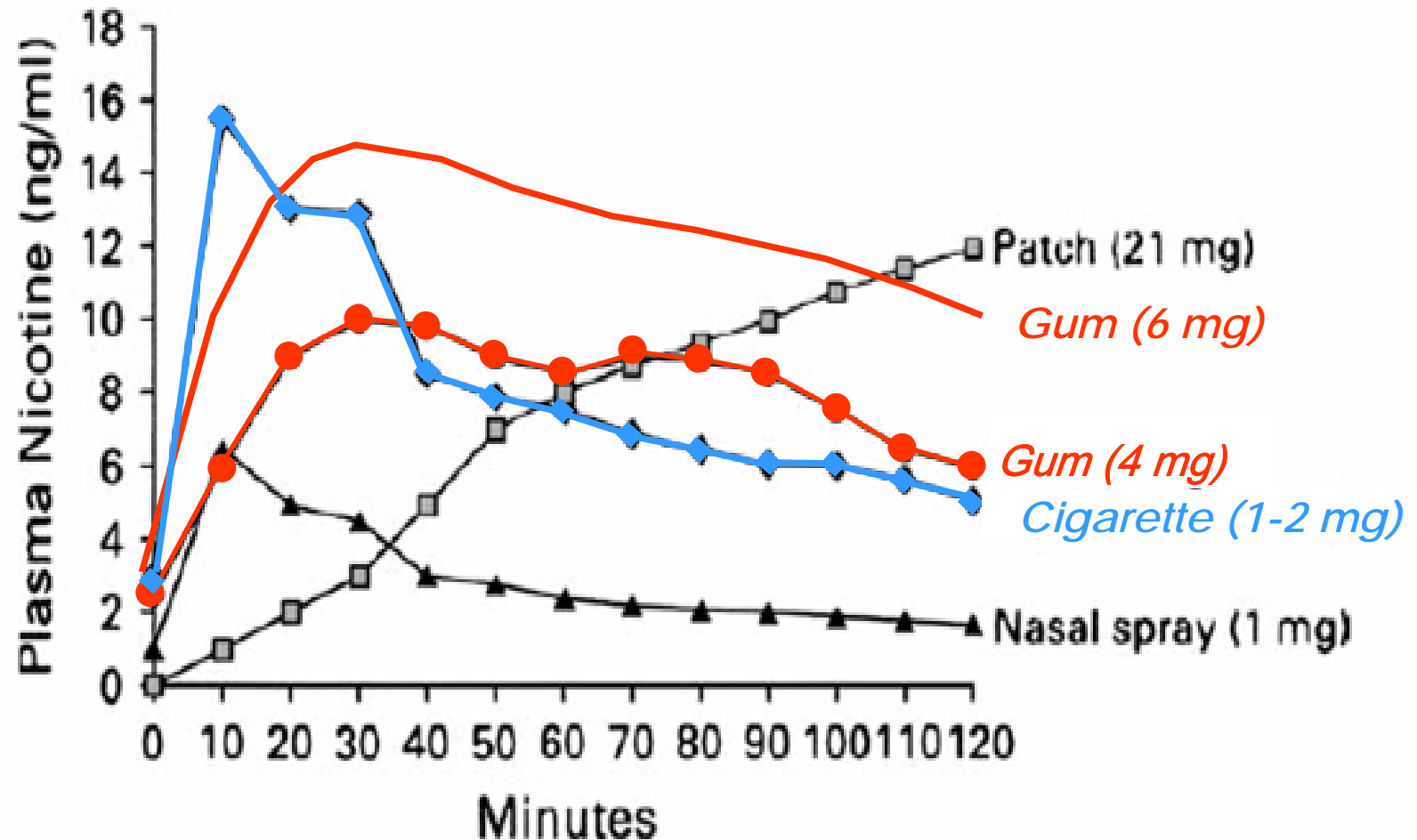
Rosen, R. C., Brown, C., Heiman, J., Leiblum, S., Meston, C. M., Shabsigh, R., Ferguson, D., & D'Agostino, R. (2000). *Journal of Sex & Marital Therapy*, 26: 191-208.

Rosen, R. C., Riley, A., Wagner, G., Osterloh, I. H., Kirkpatrick, J., & Mishra, A. (1997). *Urology*, 49: 822-830.

DRUG ADMINISTRATION

- Nicotine: 6 mg total
 - One 4-mg and one 2-mg nicotine Nicorette[®] mint gum piece
- Placebo:
 - Two mint gum pieces
- All pieces individually wrapped with one peppermint gum stick

NICOTINE PHARMACOKINETICS



PROCEDURE – 2 COUNTER-BALANCED SESSIONS

20 min – Study Explanation



Gum Administration



20 min - Questionnaires



13 min - Film



Remove Gum



10 min – Questionnaires



30 min

MEASURES – SEXUAL AROUSAL

- Physiological sexual arousal
 - Women:
 - Vaginal Photoplethysmography
 - Vaginal Pulse Amplitude (VPA) in mv
 - Men:
 - Mercury in rubber strain gauge
 - Circumferential change in mm
- Subjective sexual arousal
 - Hand controlled device, recorded in 5 sec intervals
- Z-transformed within-subjects

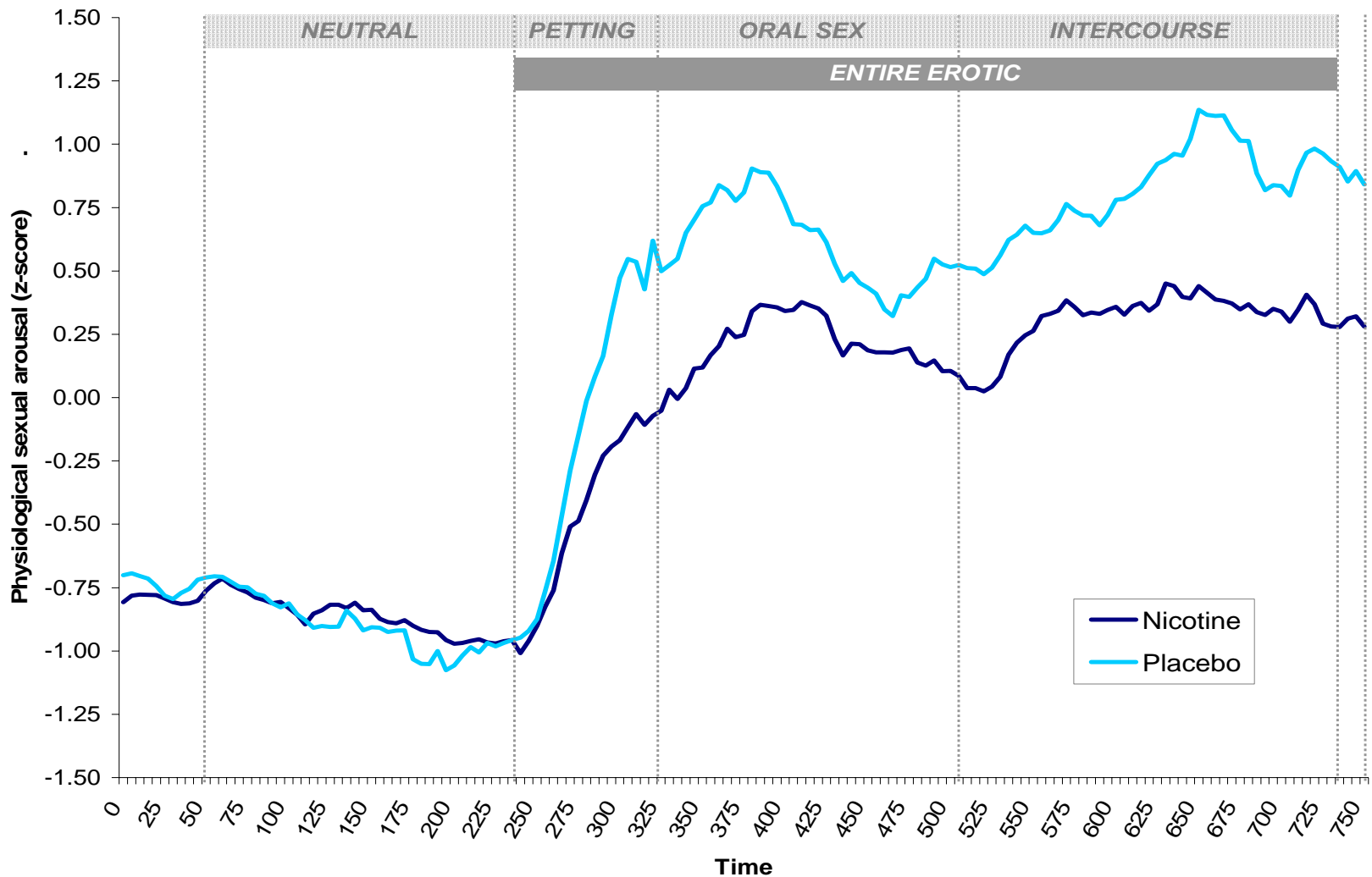
MEASURES – NICOTINE ADVERSE EFFECTS

- 10-item measure
 - Potential adverse effects:
 - Nausea
 - Light headedness
 - Throat irritation
 - Bogus adverse effects:
 - Fatigue
 - Dry eyes
 - Runny nose

QUESTION 1:

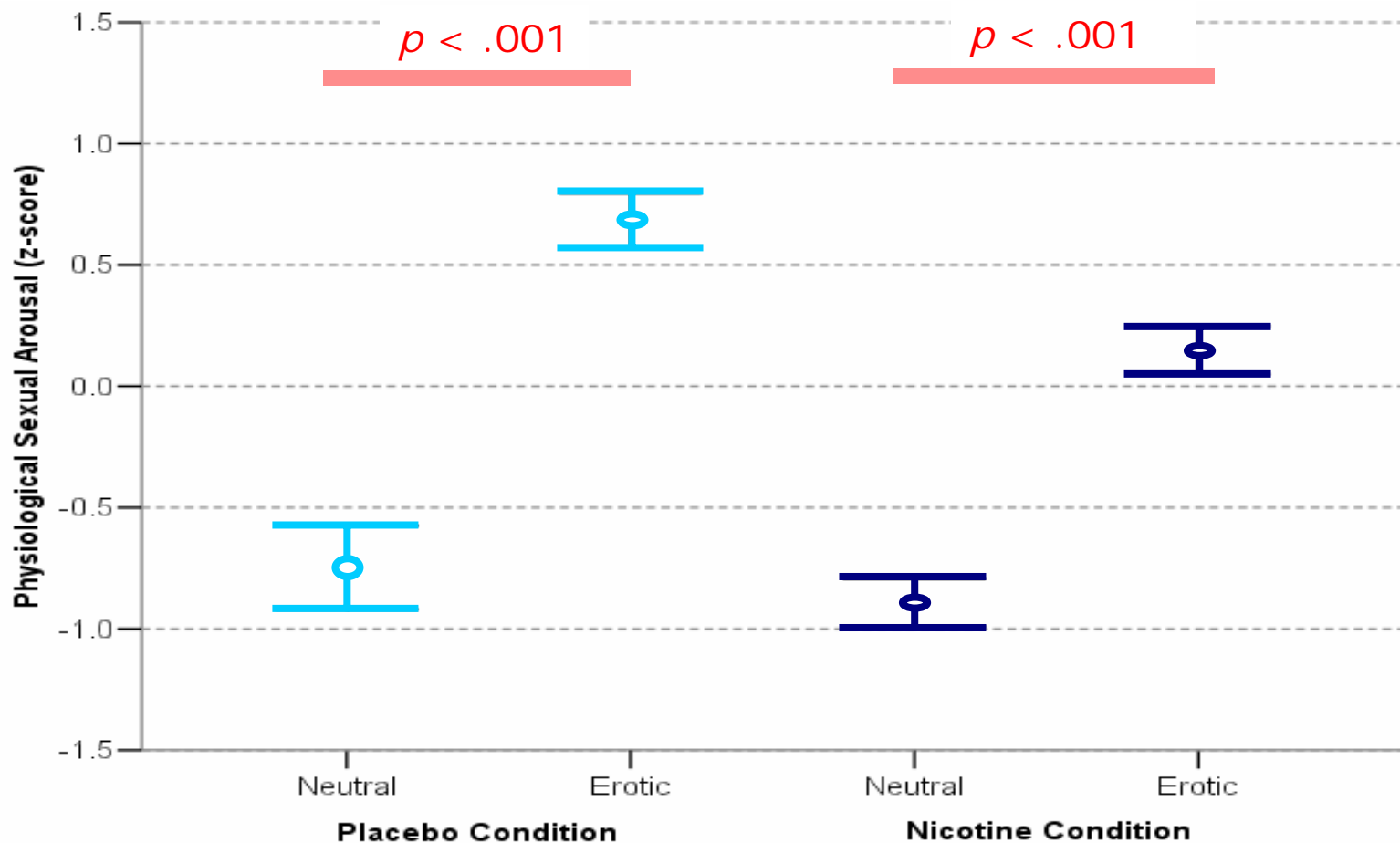
- Does nicotine acutely affect physiological sexual arousal in men and/or women?

RESULTS – MALE PHYSIOLOGICAL AROUSAL



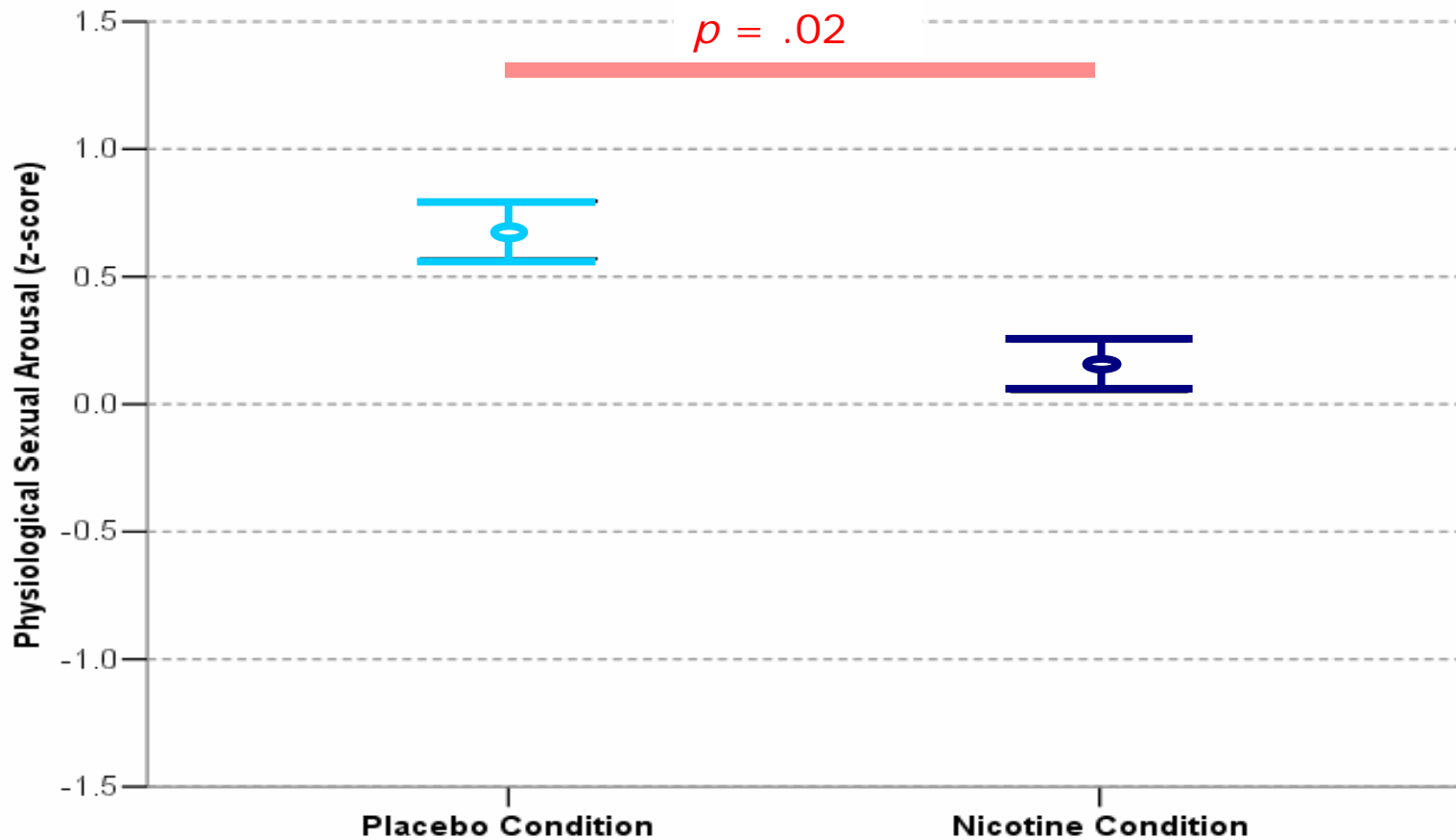
RESULTS – MALE PHYSIOLOGICAL AROUSAL

Condition X Film interaction, $F(1, 19) = 5.77, p = .03$

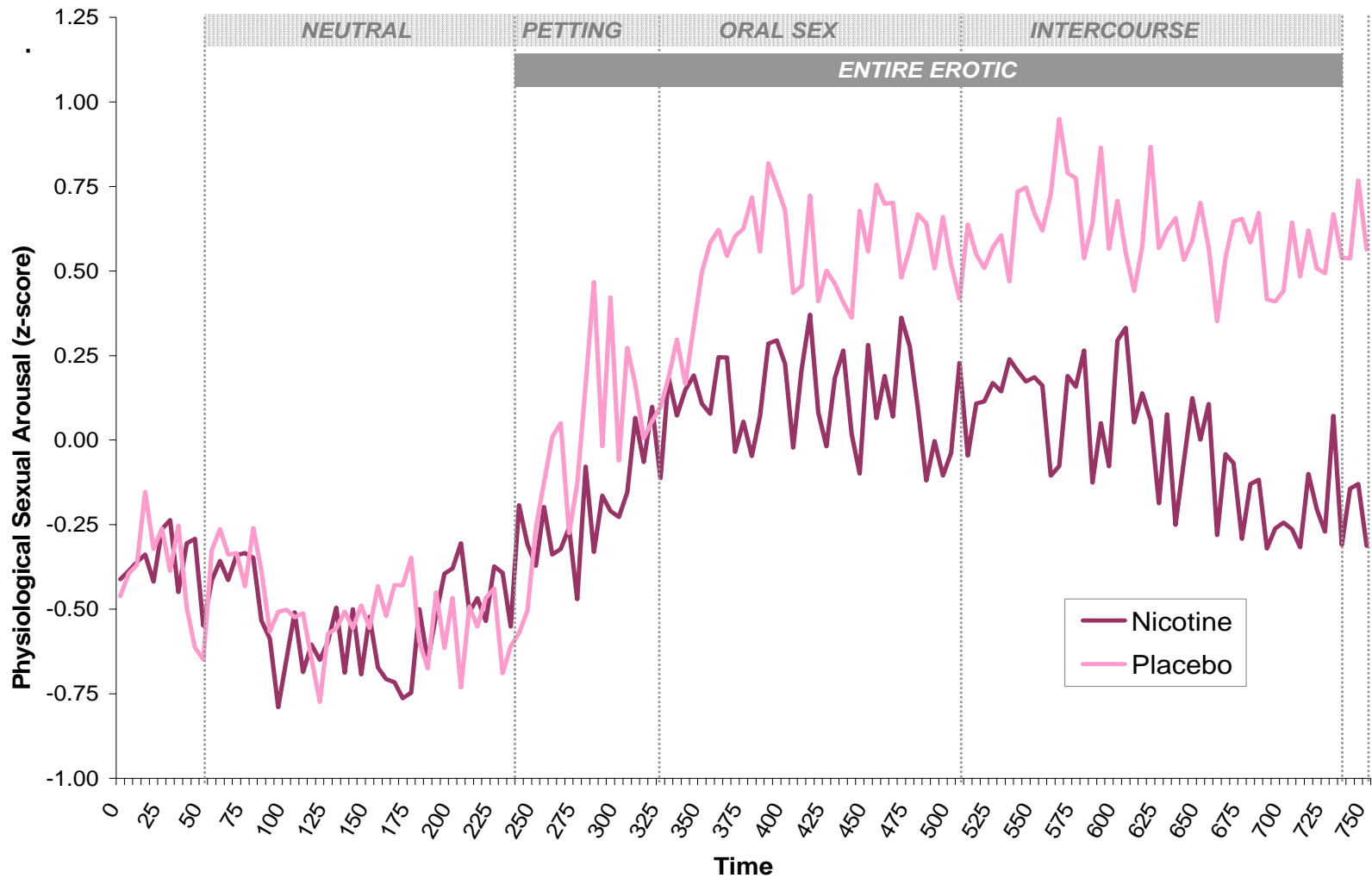


RESULTS – MALE PHYSIOLOGICAL AROUSAL

23% reduction

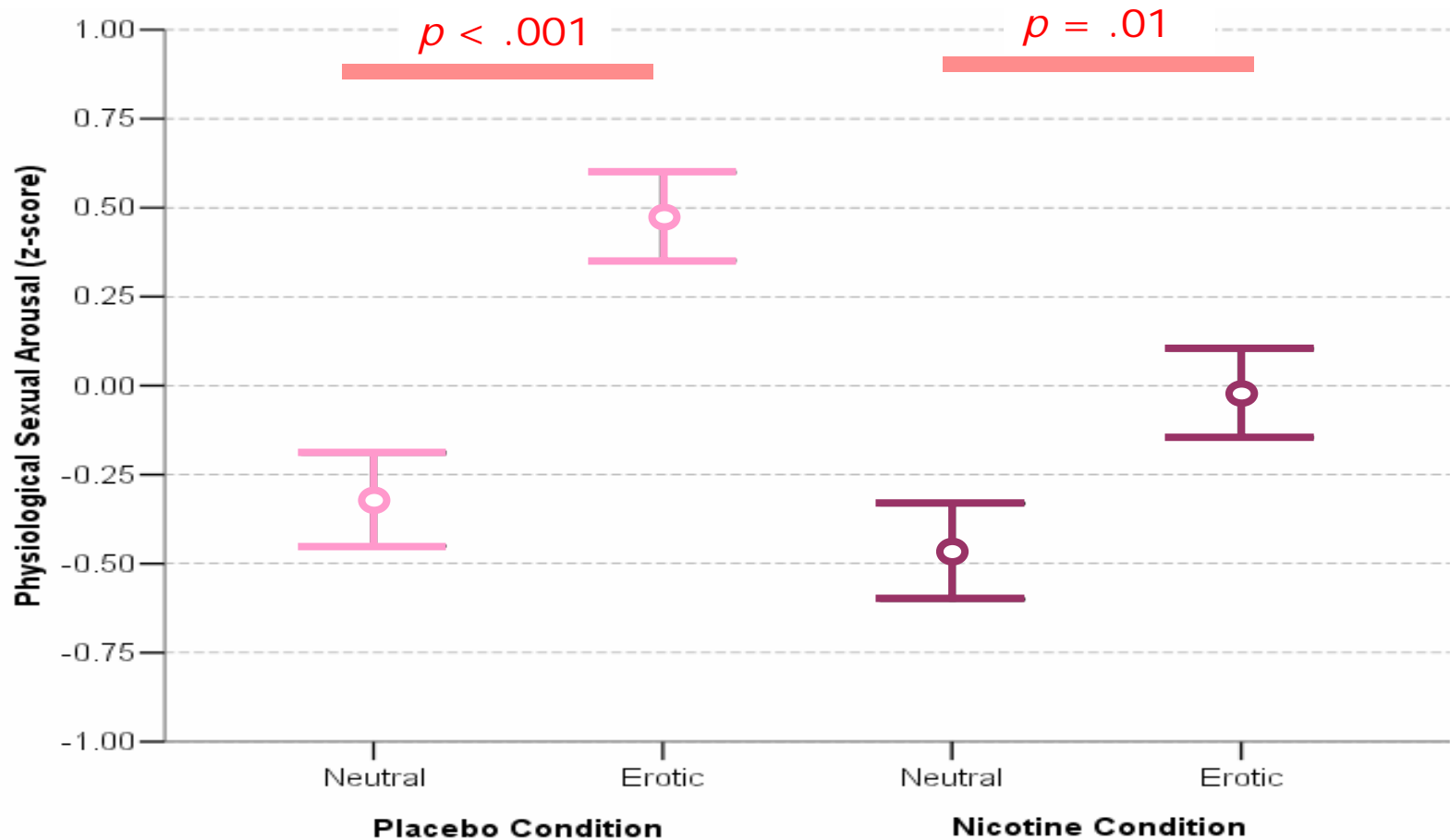


RESULTS – FEMALE PHYSIOLOGICAL AROUSAL



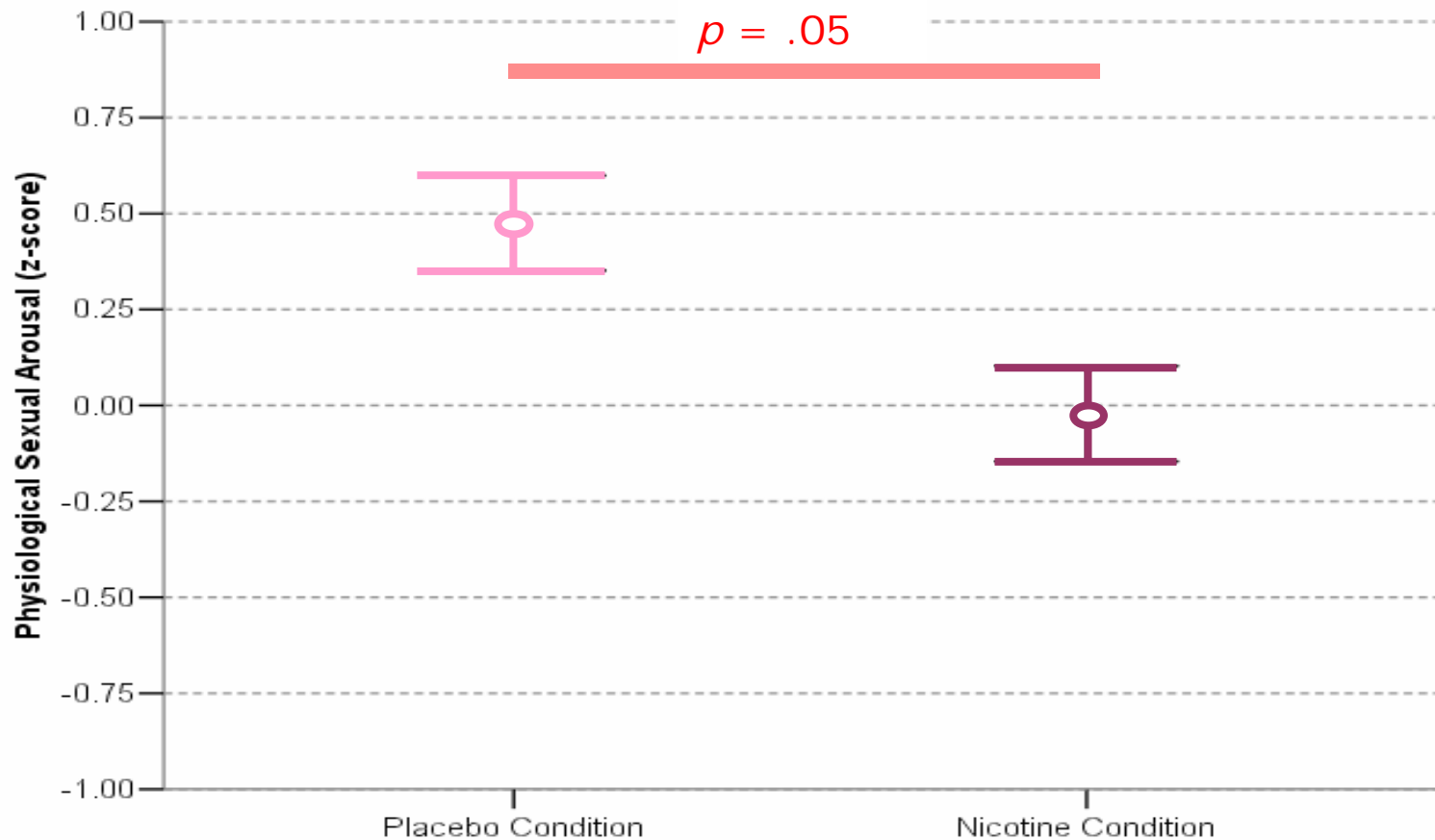
RESULTS – FEMALE PHYSIOLOGICAL AROUSAL

Condition X Film interaction, $F(1, 17) = 5.61, p = .03$



RESULTS – FEMALE PHYSIOLOGICAL AROUSAL

30% reduction



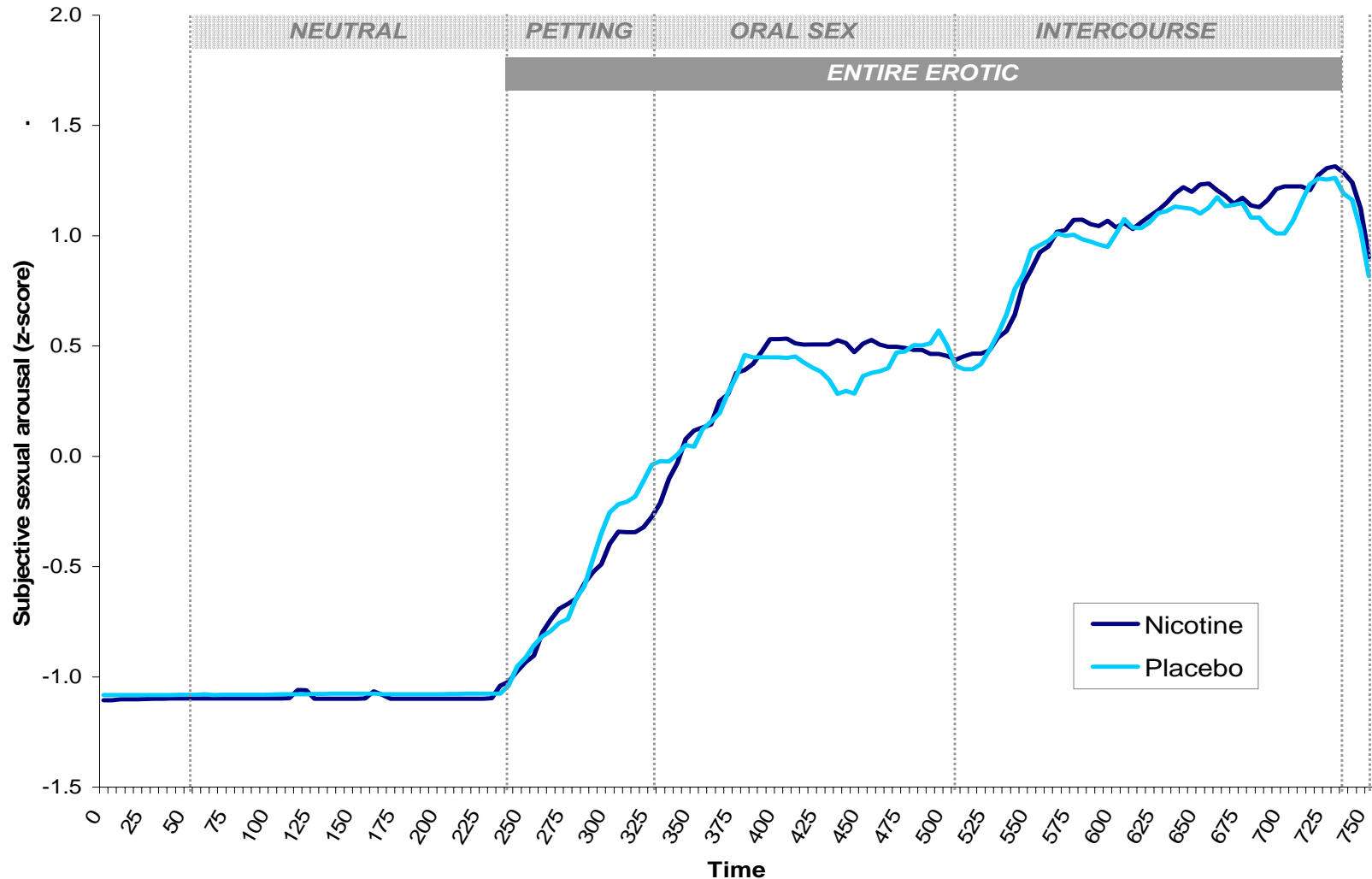
CONCLUSION – PHYSIOLOGICAL AROUSAL

- Nicotine significantly reduced sexual arousal in men and women

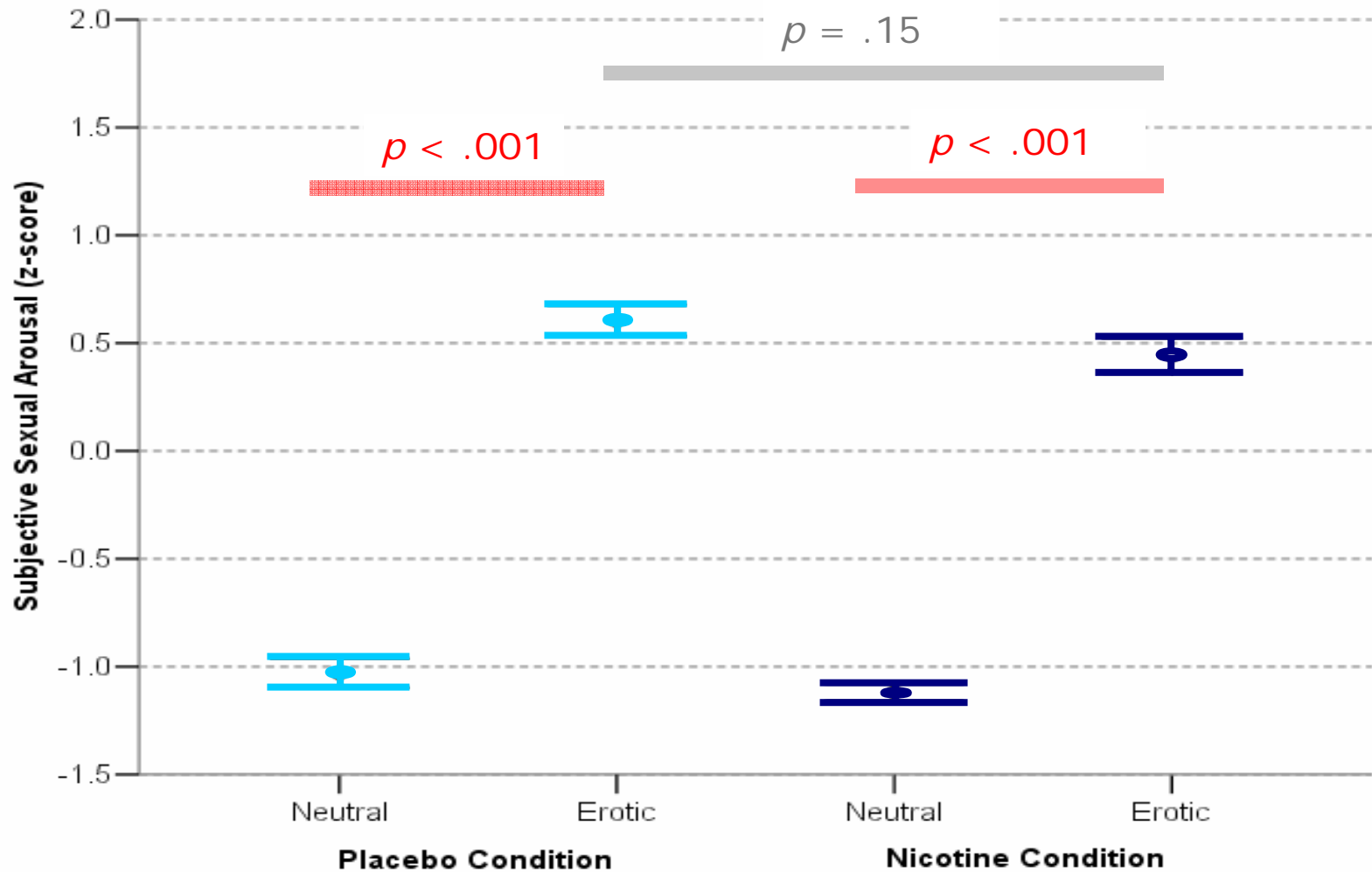
QUESTION 2:

- Does nicotine acutely affect subjective sexual arousal in men and/or women?

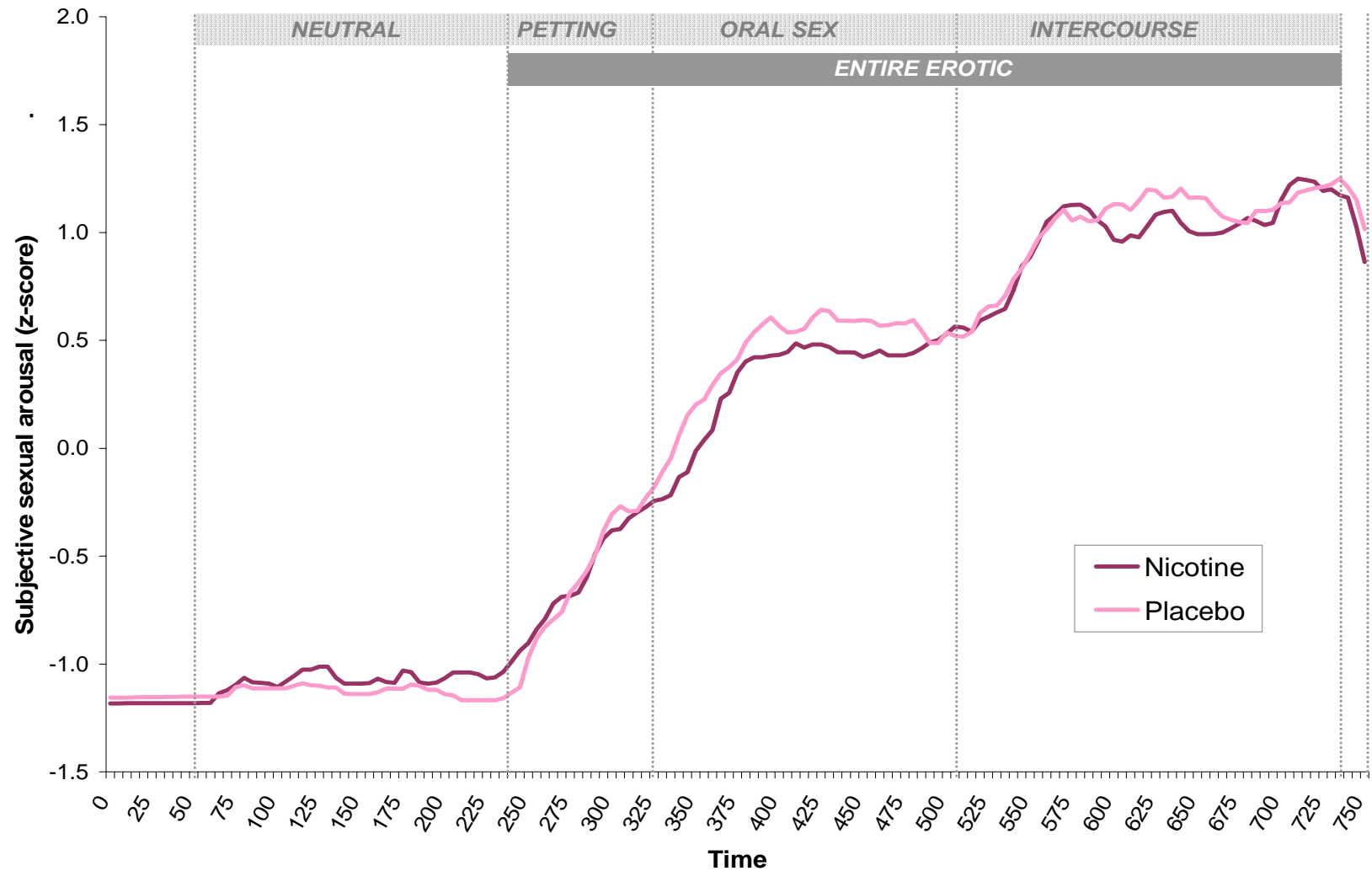
RESULTS – MALE SUBJECTIVE AROUSAL



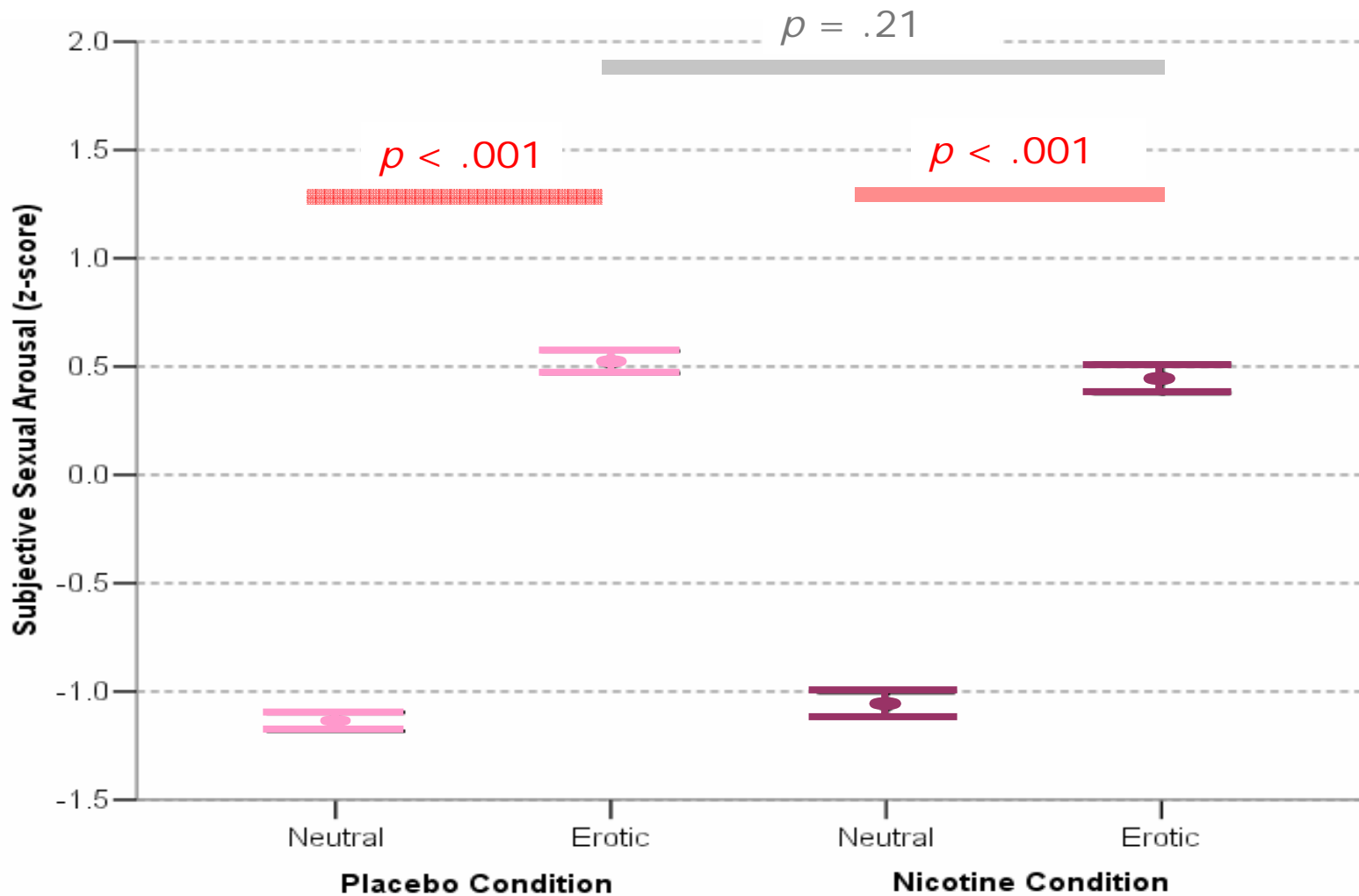
RESULTS – MALE SUBJECTIVE AROUSAL



RESULTS – FEMALE SUBJECTIVE AROUSAL



RESULTS – FEMALE SUBJECTIVE AROUSAL



CONCLUSION – SUBJECTIVE AROUSAL

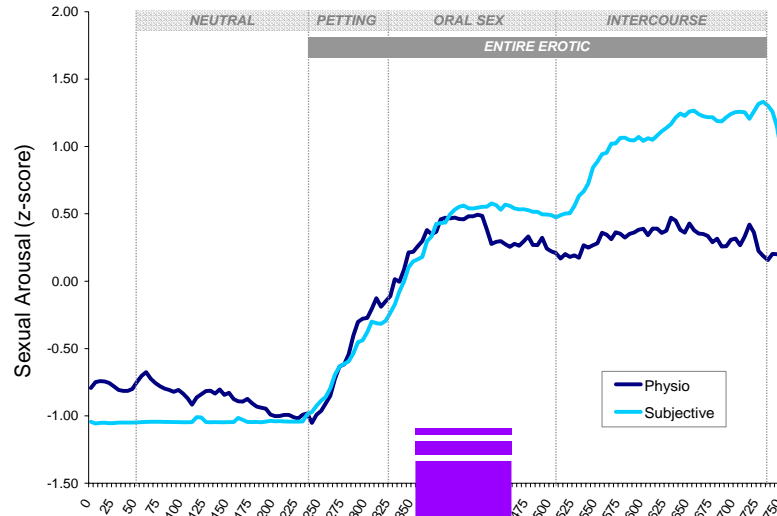
- Nicotine did not significantly impact subjective sexual arousal in men or in women

QUESTION 3:

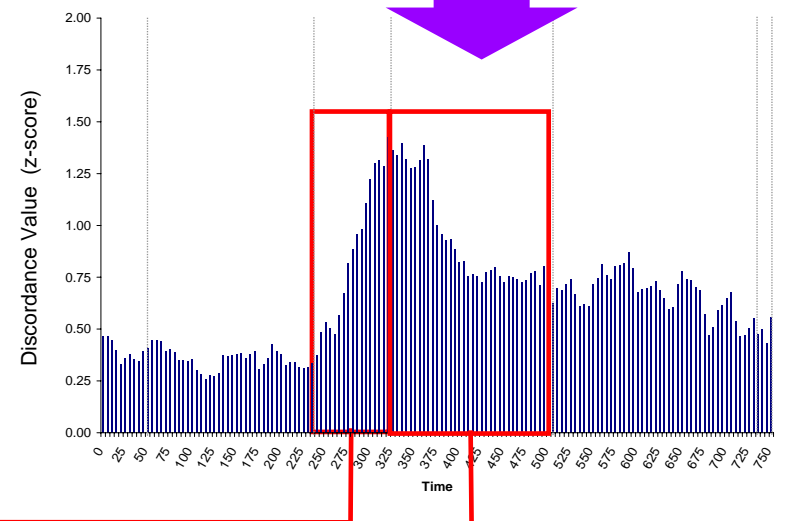
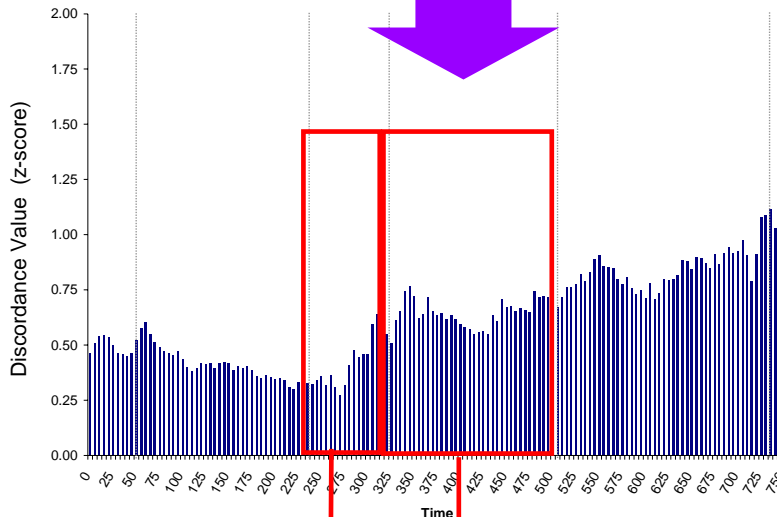
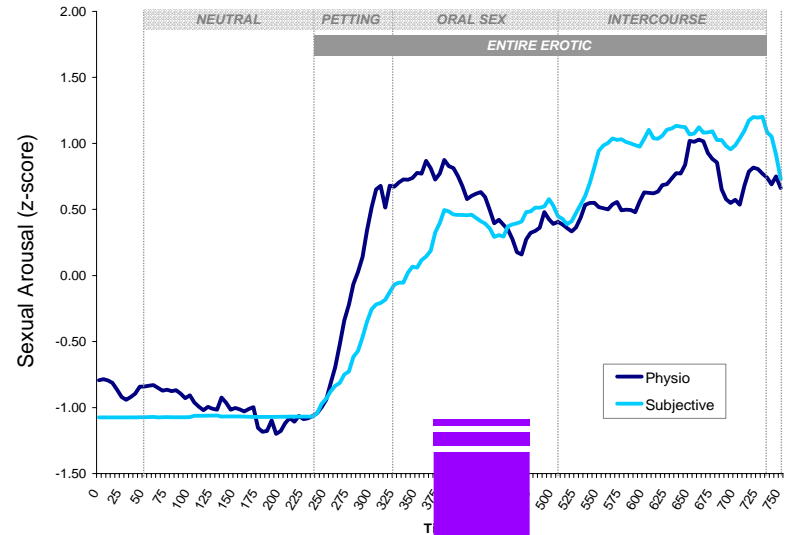
- Does nicotine affect the concordance between physiological and subjective sexual responses in men and/or women?

RESULTS — MALE CONCORDANCE

PHYSIOLOGICAL AND SUBJECTIVE AROUSAL CONCORDANCE -
NICOTINE CONDITION

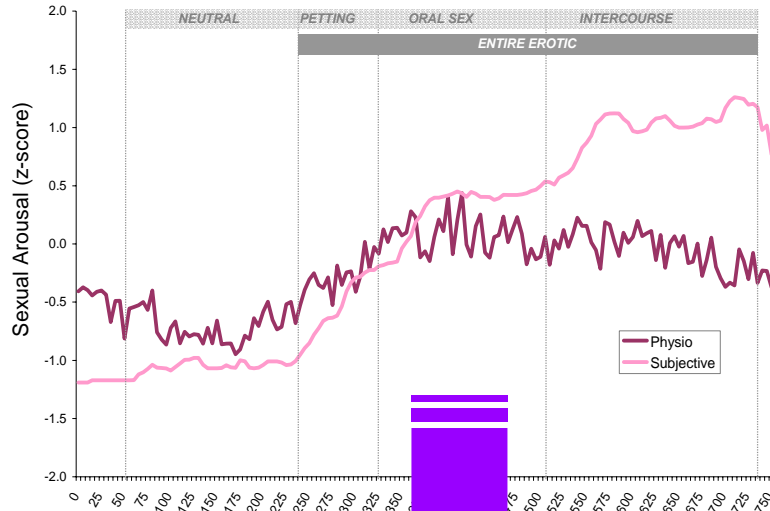


PHYSIOLOGICAL AND SUBJECTIVE AROUSAL CONCORDANCE -
PLACEBO CONDITION

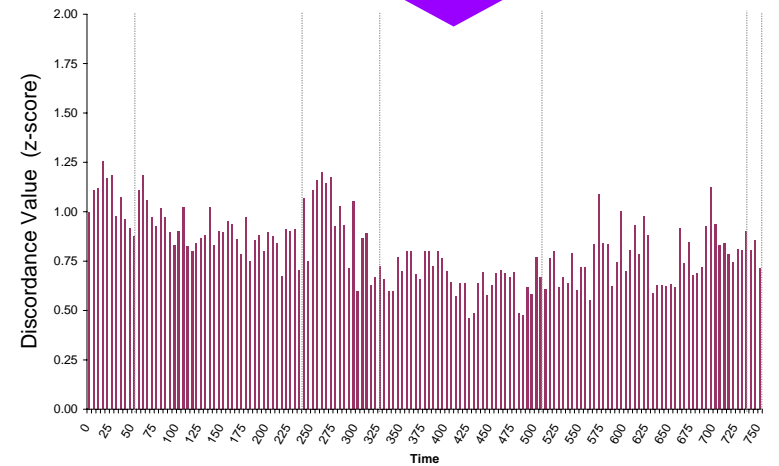
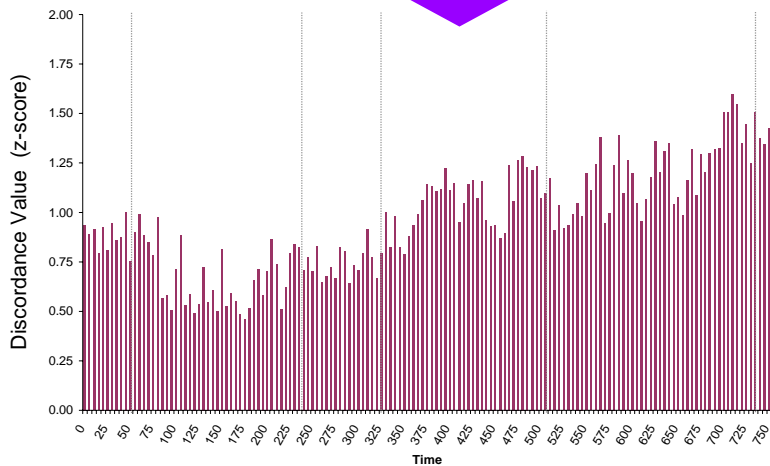
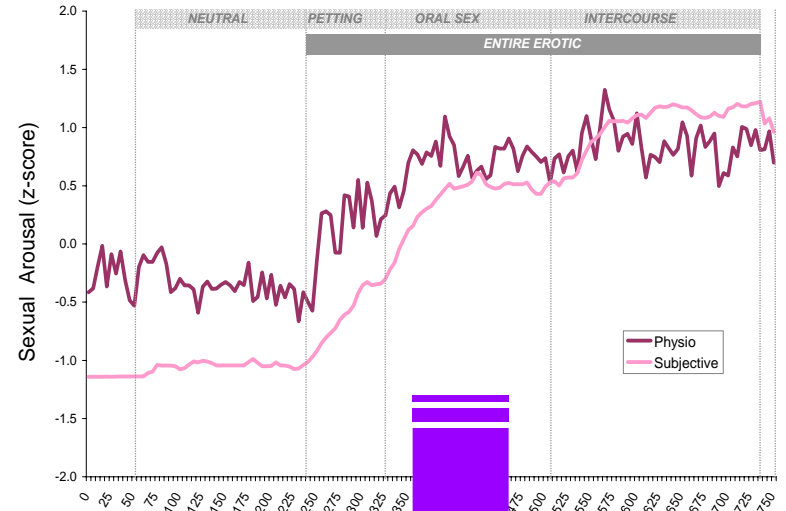


RESULTS — FEMALE CONCORDANCE

PHYSIOLOGICAL AND SUBJECTIVE AROUSAL CONCORDANCE -
NICOTINE CONDITION



PHYSIOLOGICAL AND SUBJECTIVE AROUSAL CONCORDANCE -
PLACEBO CONDITION



CONCLUSION – CONCORDANCE OF SEXUAL RESPONSES

- ❑ In response to nicotine, men and women exhibited a reduced initial physiological response, and reduced ability to maintain physiological arousal.
- ❑ However, this pattern only reached statistical significance in men.

GENERAL CONCLUSIONS

- ❑ Nicotine significantly reduces physiological sexual arousal in healthy, sexually functional, nonsmoking men and women
- ❑ No effect on subjective arousal in men and women
- ❑ Not epiphenomena of nicotine-induced adverse effects

GENERAL CONCLUSIONS

- Nicotine may disrupt activity of 2nd messenger system responsible for vasocongestion (eNOS, NO) *(McVary et al., 2001)*
- Result in a decrease in genital arterial inflow and disruptions in outflow

CLINICAL IMPLICATIONS

- ❑ First empirical evidence that isolated nicotine reduces physiological sexual arousal in healthy, young, nonsmoking men and women
- ❑ Used as public health claim to assist in the prevention and cessation of cigarette smoking in adolescents and adults.

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