

# **Sex and Gender Differences in Pain Across the Life Span**

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University of Washington**

**Sex Differences and Implications  
for Translational Neuroscience**

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# “Berkley’s List”

Berkley KJ, Behavioral and Brain Sciences 1997; 20:371-380

## FEMALE PREVALENCE

migraine headache with aura  
chronic tension headache  
post-dural puncture headache  
hemicrania continua  
cervicogenic headache  
tic douroureux  
temporomandibular joint disorder  
occipital neuralgia  
periapical periodontitis and abscess  
atypical odontalgia  
burning tongue  
carotidynia  
chronic paroxysmal hemicrania  
temporal arteritis  
carpal tunnel syndrome  
Raynaud's disease  
chilblains  
reflex sympathetic dystrophy  
hemicrania continua  
chronic venous insufficiency  
fibromyalgia syndrome  
esophagitis  
reflux esophagitis with peptic ulcer  
slipping rib syndrome  
twelfth rib syndrome  
gallbladder disease  
post-cholecystectomy syndrome  
irritable bowel syndrome  
interstitial cystitis  
acute intermittant porphyria  
proctalgia fugax  
chronic constipation  
pyriformis syndrome  
peroneal muscular atrophy  
multiple sclerosis  
rheumatoid arthritis  
pain of psychological origin

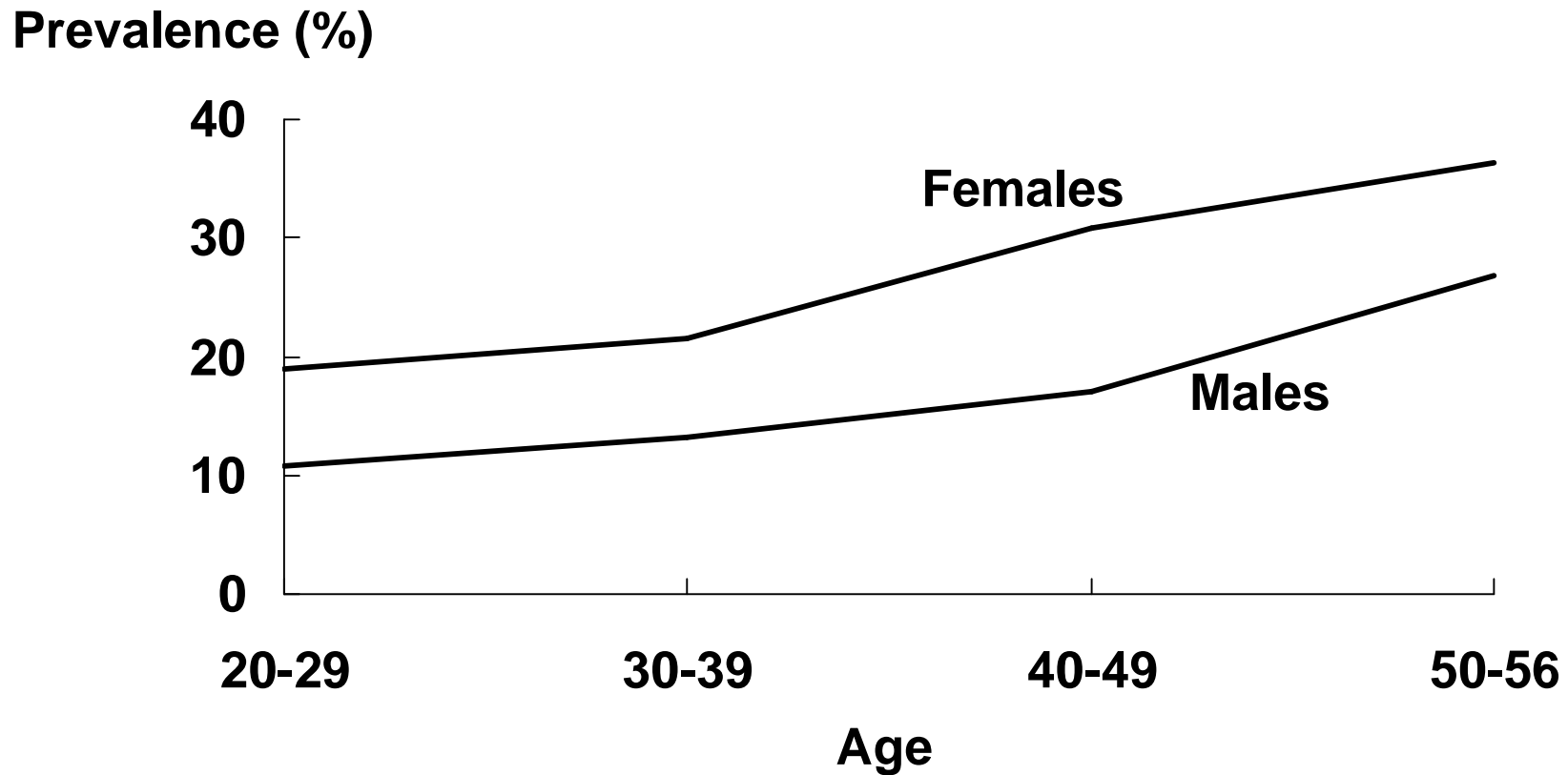
## MALE PREVALENCE

migraine without aura  
cluster headache  
post traumatic headache  
SUNCT syndrome  
Raeder's paratrigeminal syndrome  
Pancoast tumor  
thromboangiitis obliterans  
brachial plexus avulsion  
pancreatic disease  
duodenal ulcer  
abdominal migraine  
lateral femoral cutaneous neuropathy  
postherpetic neuralgia  
hemophilic arthropathy  
ankylosing spondylitis

## NO SEX PREVALENCE

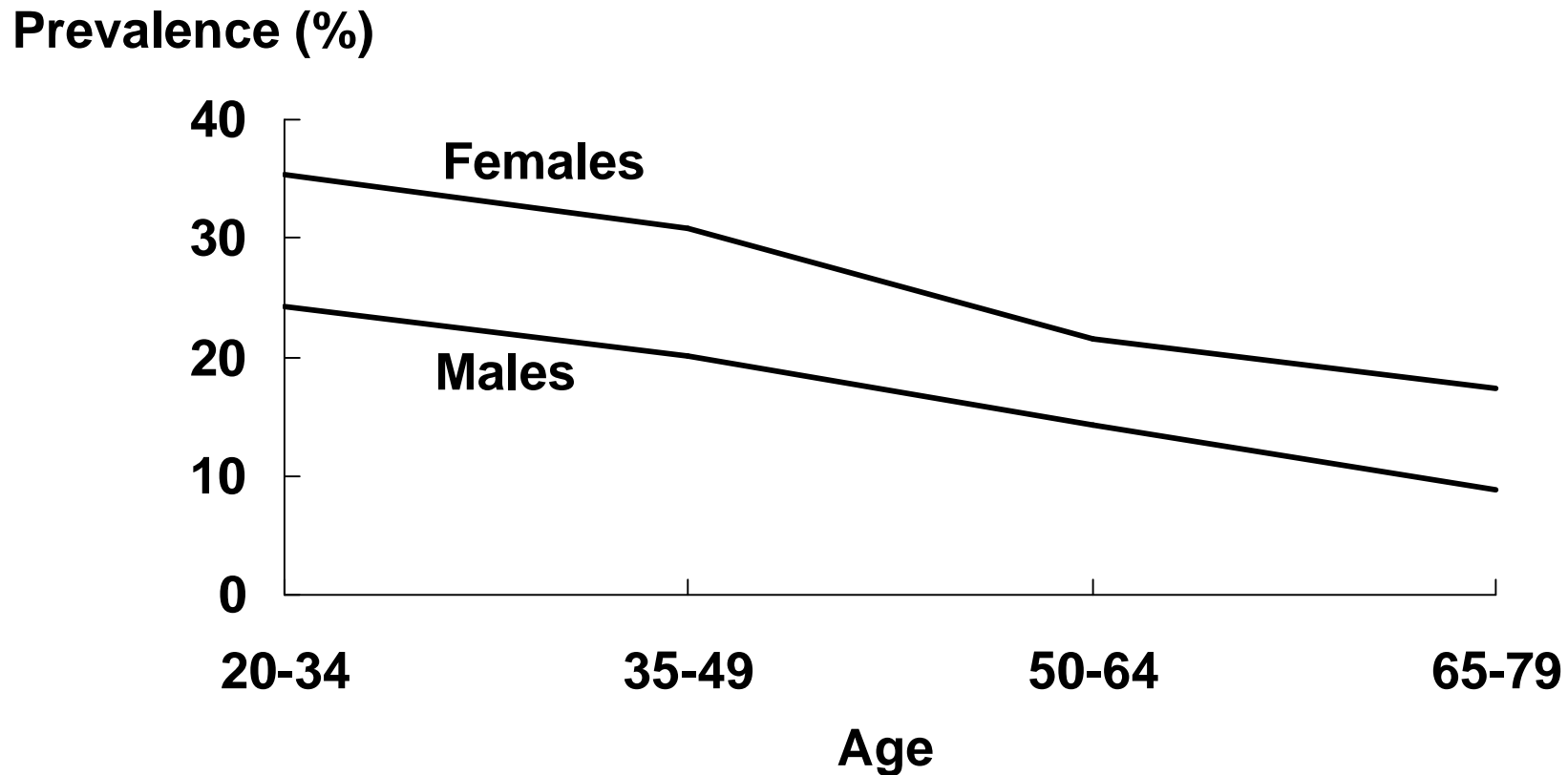
acute tension headache  
cluster-tic syndrome  
"jabs" and "jolts" syndrome  
secondary trigeminal neuralgia  
neuralgia of nervus intermedius  
painful ophthalmoplegia  
maxillary sinusitis  
toothache due to dentino-enamel defects  
toothache due to pulpitis  
cracked tooth syndrome  
dry socket  
vagus nerve neuralgia  
stylohyoid process syndrome  
thoracic outlet syndrome  
brachial plexus tumors  
esophageal motility disorders  
chronic gastric ulcer  
Crohn's disease  
diverticular disease of colon  
carcinoma of the colon  
familial Mediterranean fever  
hereditary corproporphyria  
acute herpes zoster  
burns

# Age-Sex Specific 1-week Prevalence: Neck/Shoulder Pain (Tromso, n = 17,650)



Hasvold & Johnsen, 1993

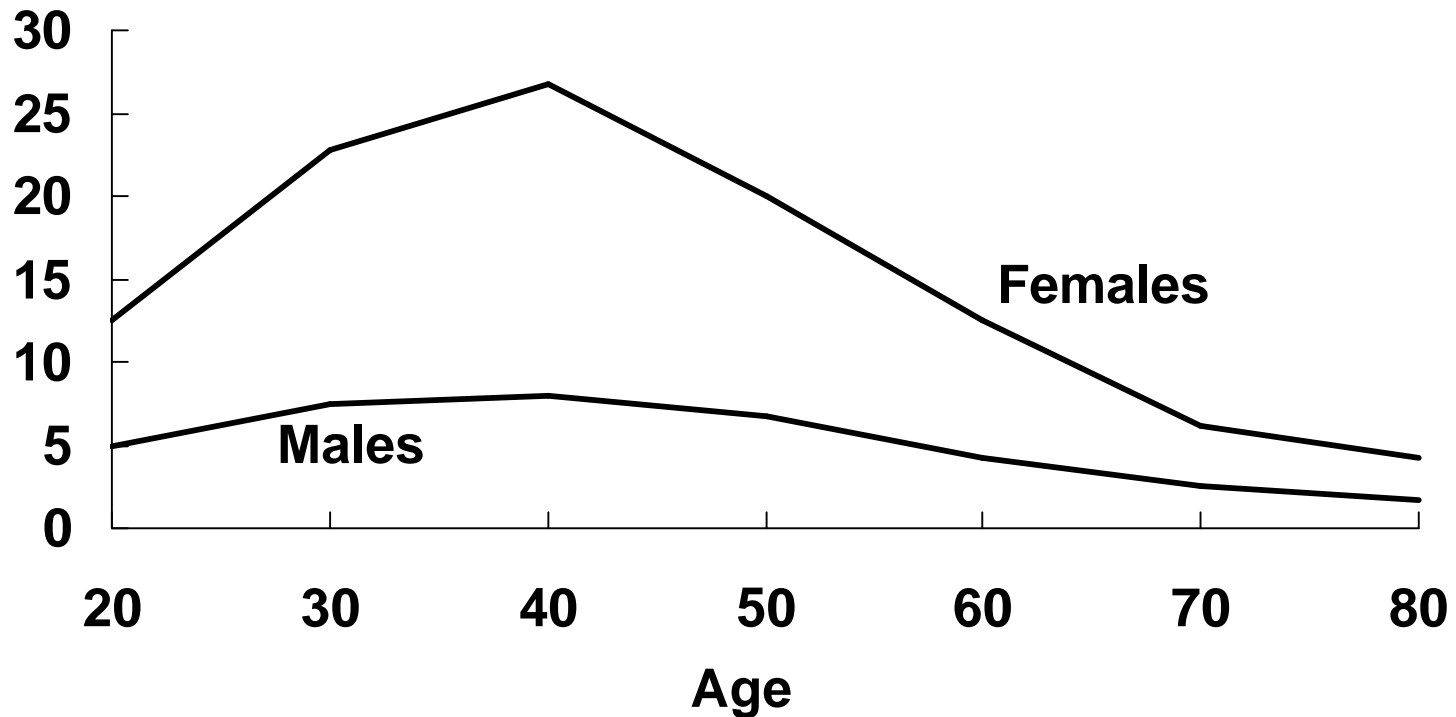
# Age-Sex Specific 1-year Prevalence: Mid-Abdominal Pain (Östhammar, n = 1,290)



Agréus, et al., 1994

# Age-Sex Specific 1-year Prevalence: Migraine Headache (USA, n = 20,468)

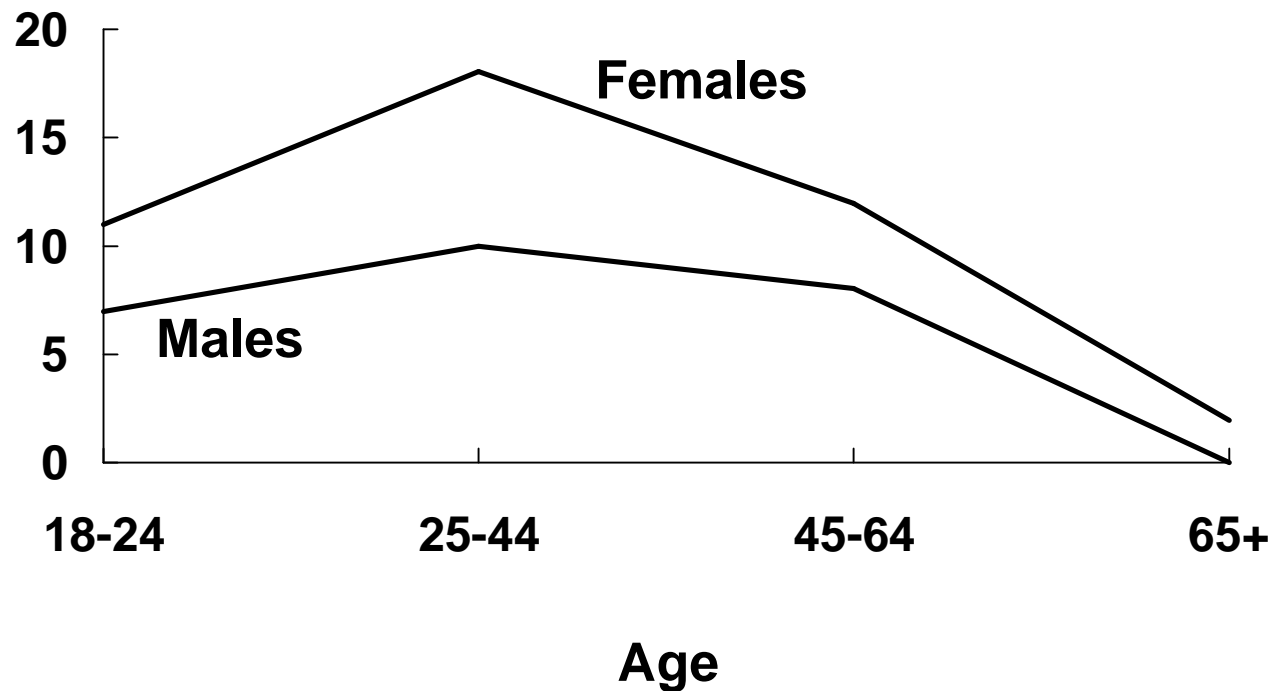
Prevalence (%)



Stewart, et al., 1992

# Age-Sex Specific 6-month Prevalence: TMD (Facial) Pain (Seattle, n = 1,016)

Prevalence (%)



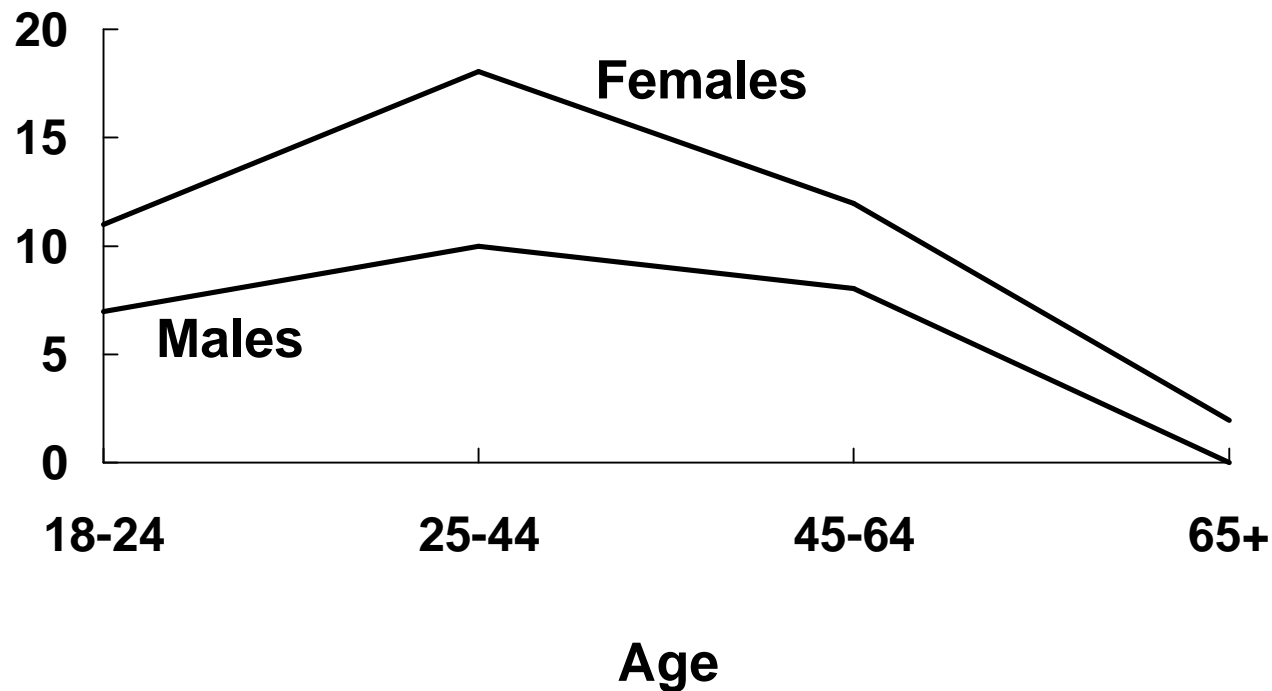
Von Korff, et al., 1988

# **Conclusions from Epidemiologic Studies**

- **Specific pain conditions show different prevalence patterns across the life span**
- **Pain prevalence rates are higher for women than for men, but sex ratios vary by pain condition and life stage**

# Age-Sex Specific 6-month Prevalence: TMD (Facial) Pain (Seattle, n = 1,016)

Prevalence (%)



Von Korff, et al., 1988

# **Pain/Hormone Relationships in Women**

- **Initial studies suggested a relationship between HRT use and facial pain**
- **Later studies examine relationships between endogenous hormone patterns and pain**

# **Pain in Adolescents**

## **Aim:**

**Determine whether gender differences in pain begin in adolescence and are associated with pubertal development.**

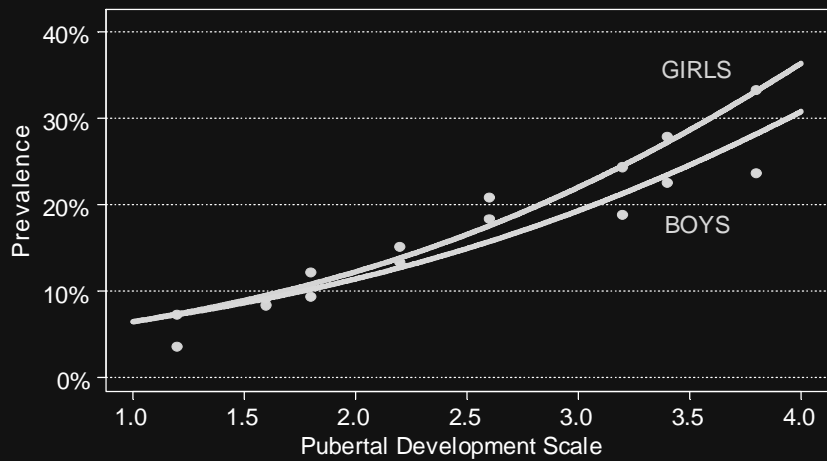
## **Design:**

**Cross-sectional telephone survey of 3,101 adolescents**

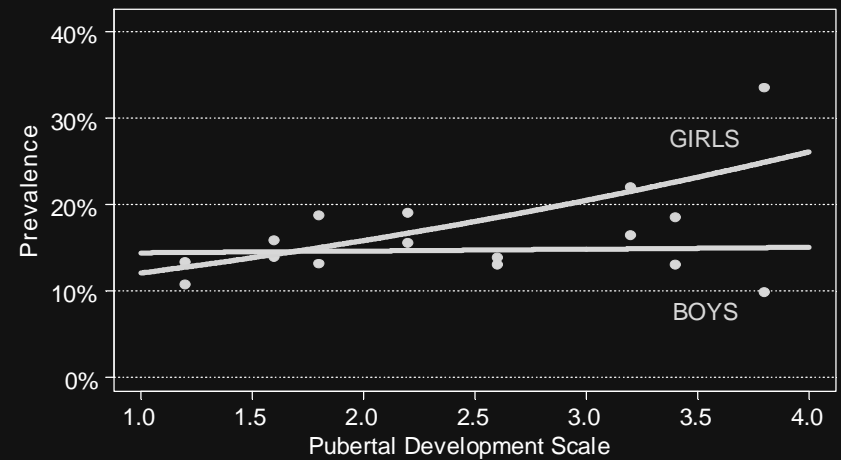
**Longitudinal follow up of 1,336 11-year olds**

# Pain Prevalence by Pubertal Development

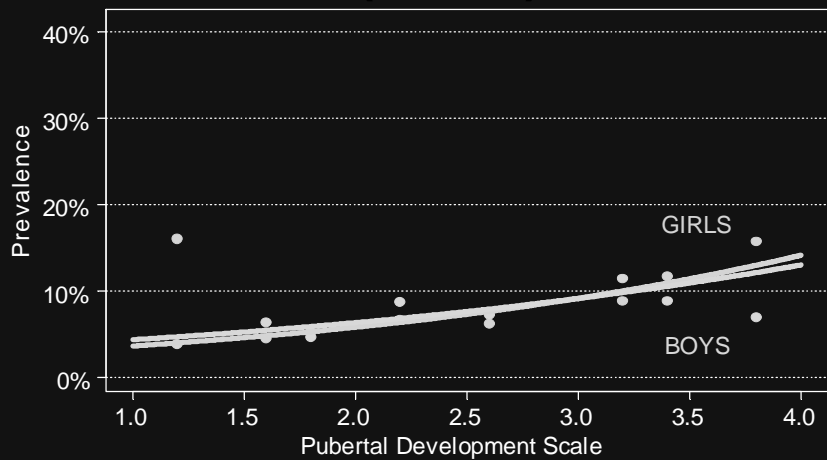
## Back Pain



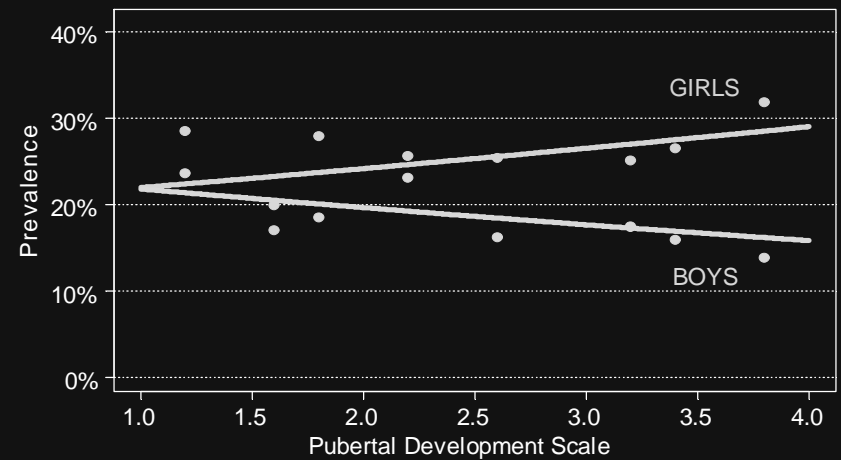
## Headache



## TMD (Facial) Pain



## Stomach Pain



# **Menstrual Cycle Effects on Facial (TMD) Pain**

## **Aim:**

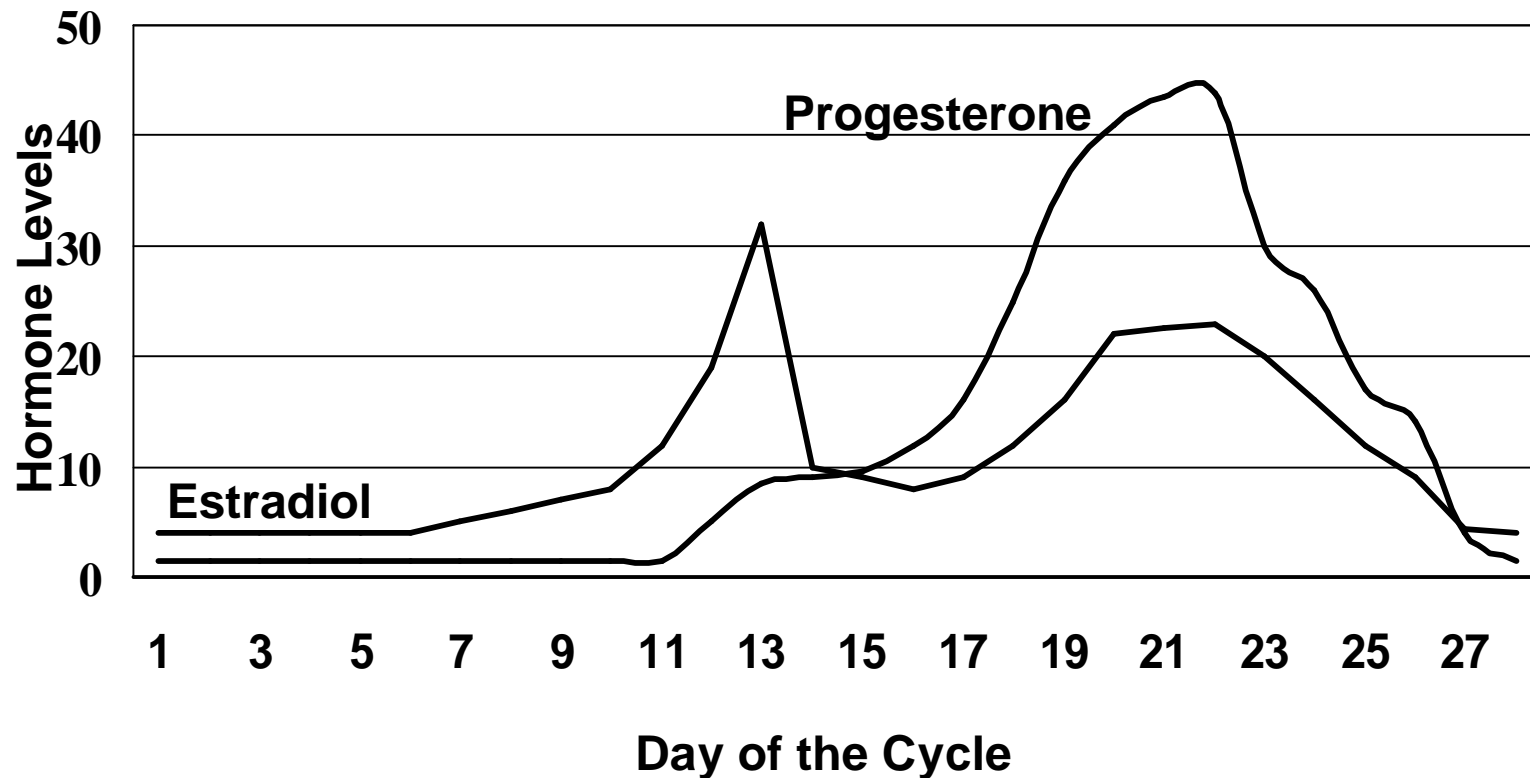
**Assess whether cyclic changes in levels of reproductive hormones are related to pain in female TMD patients.**

## **Design:**

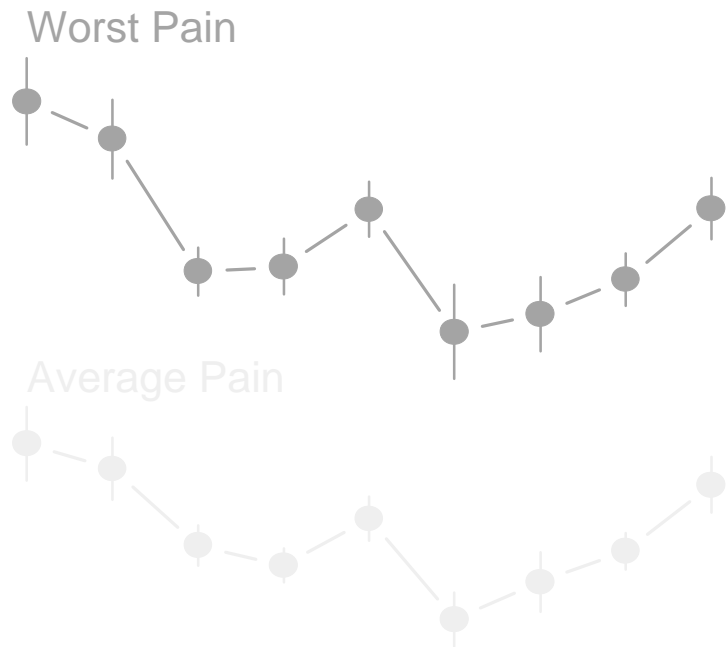
**Daily pain diary for 3 cycles/ovulation testing**

**Ovulating women, women on OCP's, men**

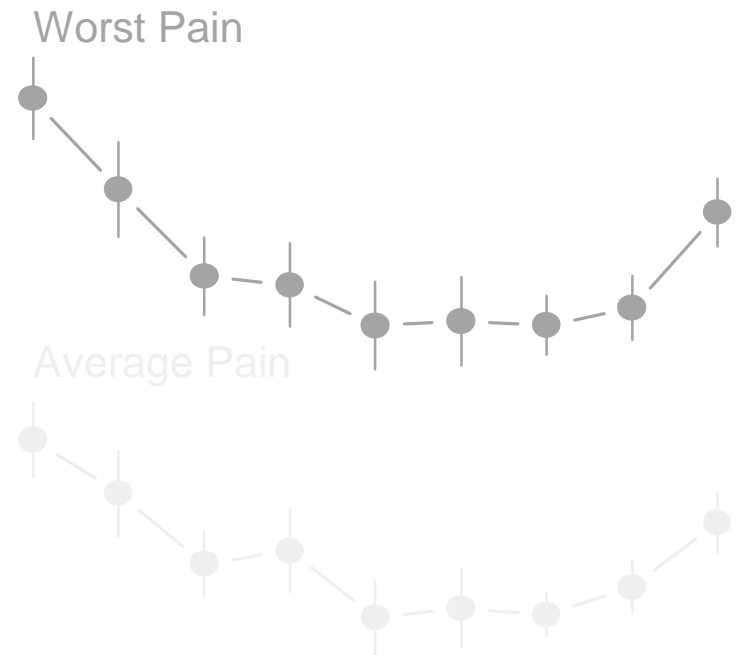
# Changes in Reproductive Hormones Across the Menstrual Cycle



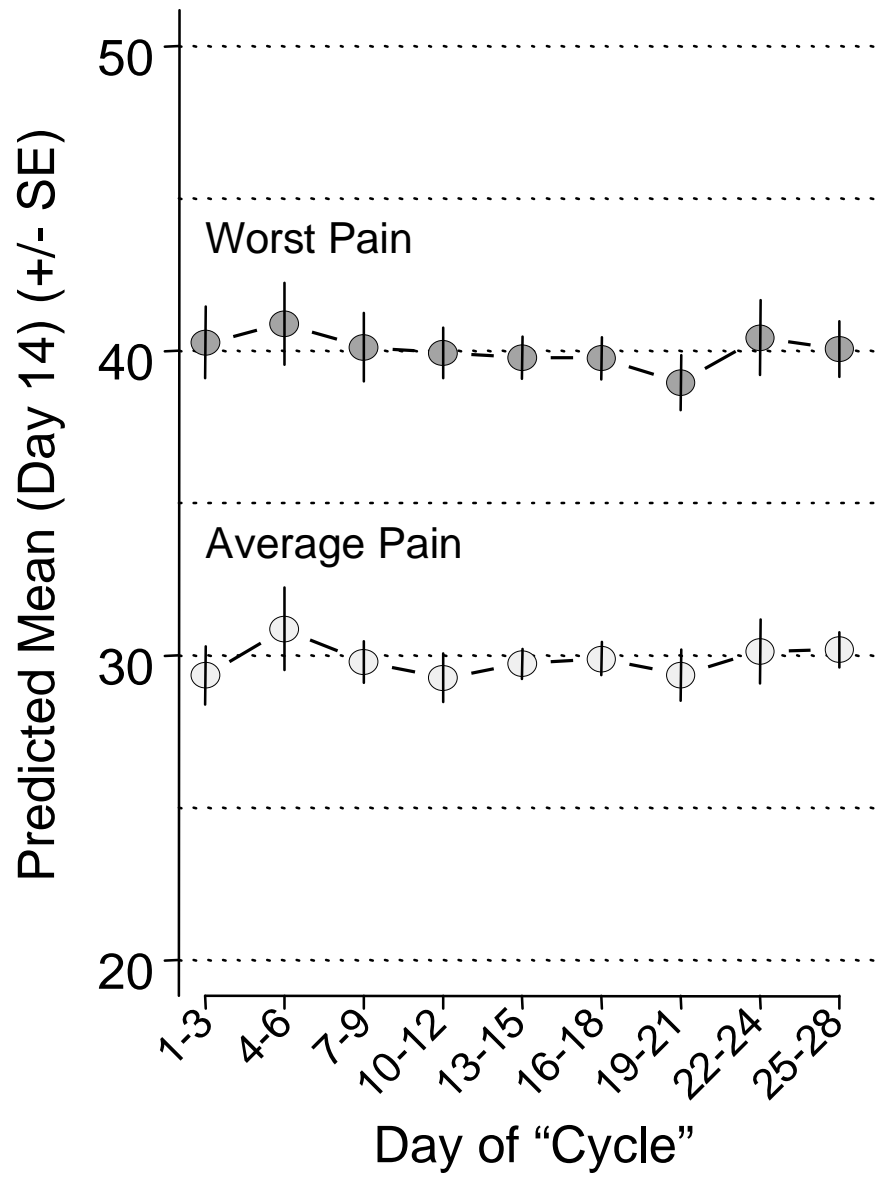
(n=35)



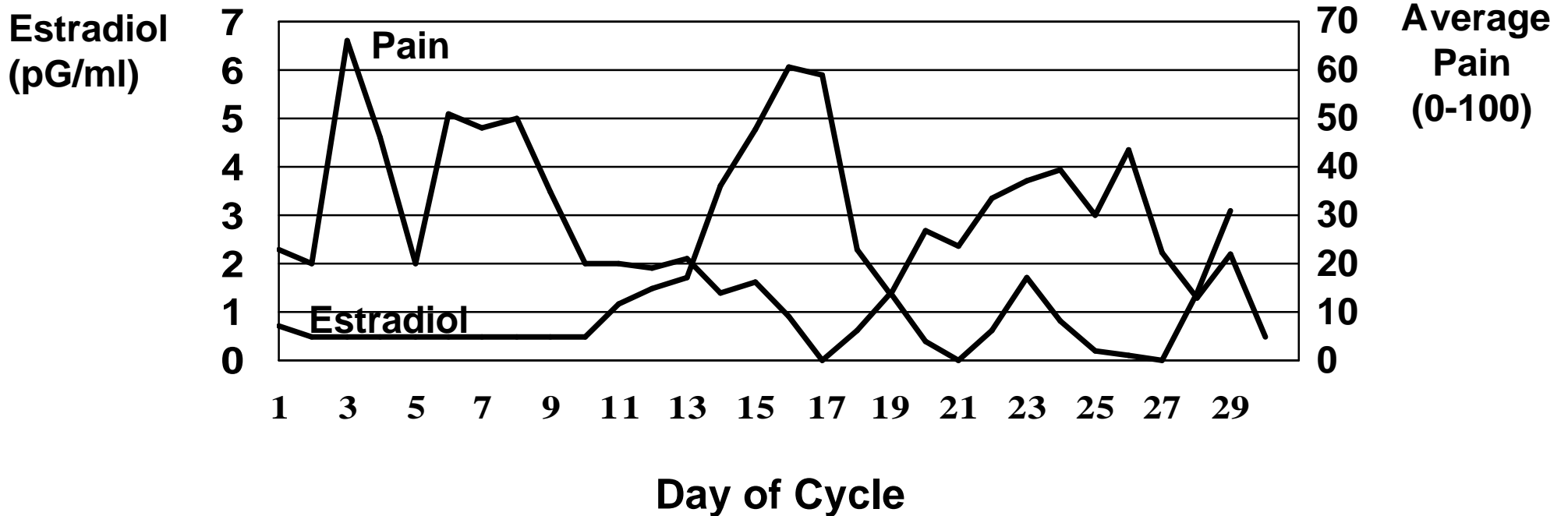
(n=35)



# Men



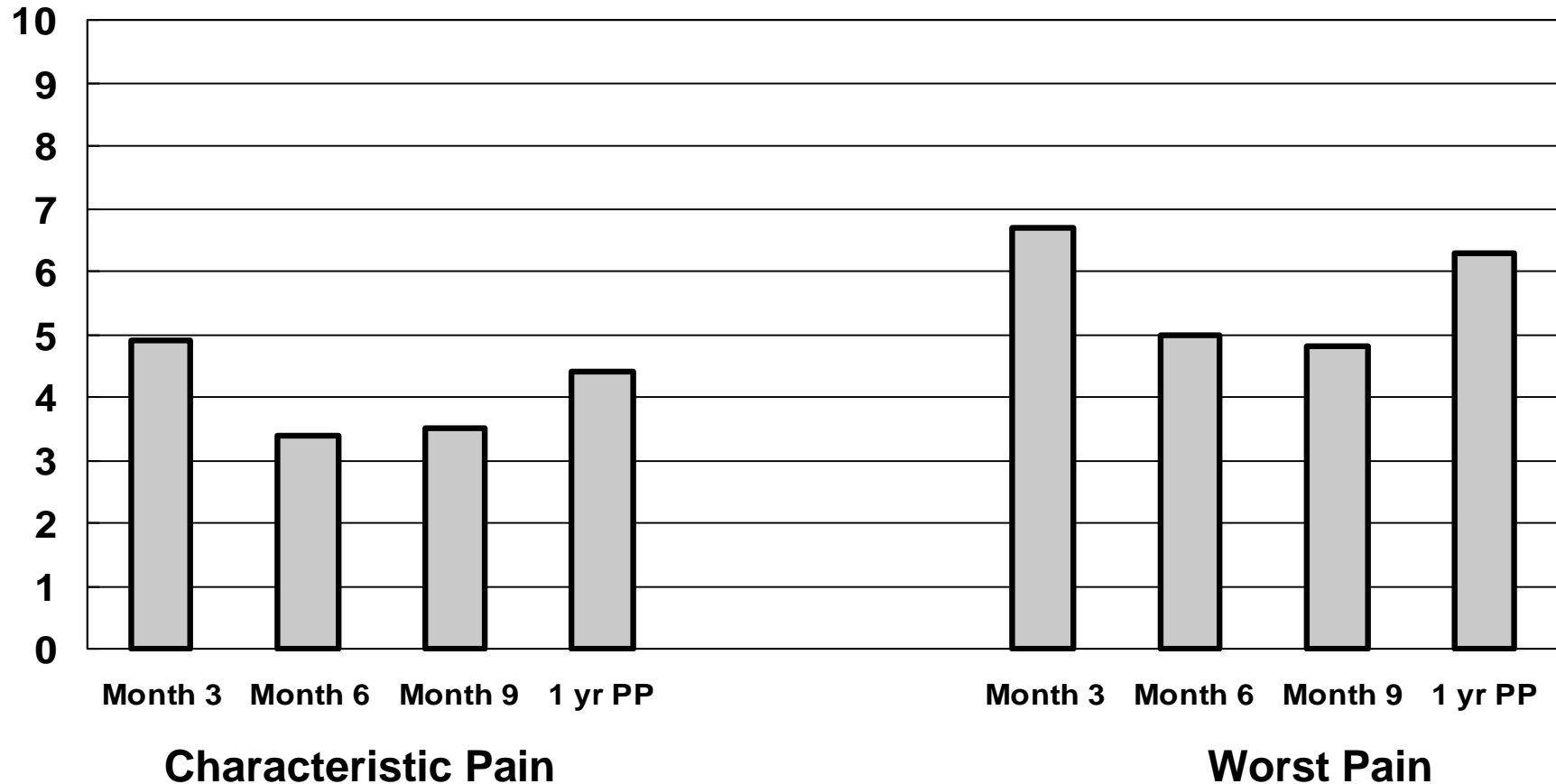
# Pain Ratings and Salivary Estradiol Levels Across One Menstrual Cycle: Subject B



$r_s = -.77$

# TMD Pain During Pregnancy and 1 yr Postpartum: Longitudinal Study, n=19

Pain Intensity



LeResche et al., 2005

Median intra-individual correlation,  
salivary E2 and Worst Pain = -0.40

# **Conclusions from Pain/Hormone Studies**

- **Hormone (especially estradiol) levels are related to the presence and intensity of pain in women.**
  - **Are these relationships strong enough to be taken into account in research and treatment?**
  - **Large individual differences exist in tightness of the correlation between pain and hormone levels, suggesting avenues for research**

# Collaborators

## University of Washington:

Samuel Dworkin , DDS, PhD

Mark Drangsholt, DDS, PhD

Lloyd Mancl, PhD

Jeffrey Sherman, PhD

Kimberly Huggins, BS, RDH

Beatrice Gandara, DDS, MSD

Greg Huang, DMD, MSD, MPH

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Laura Richardson, MD, MPH

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## Group Health:

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Kathleen Saunders, JD

Survey Program

**Supported by:**

**National Institute of Dental and Craniofacial  
Research**

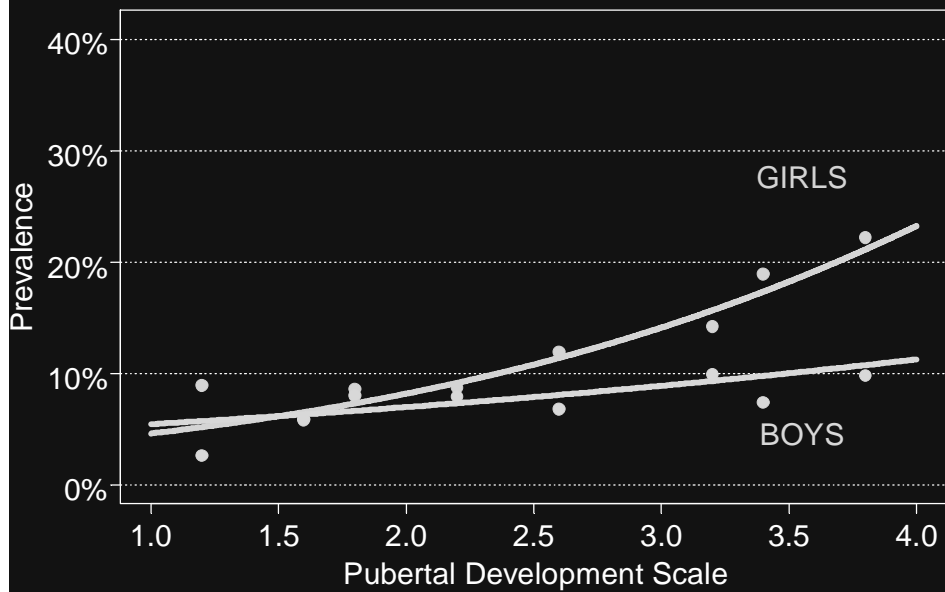
**NIH Office of Research on Women's Health**

**Grant Nos. P01 DE 08773, R01 DE 12470,  
R01 DE 016212**

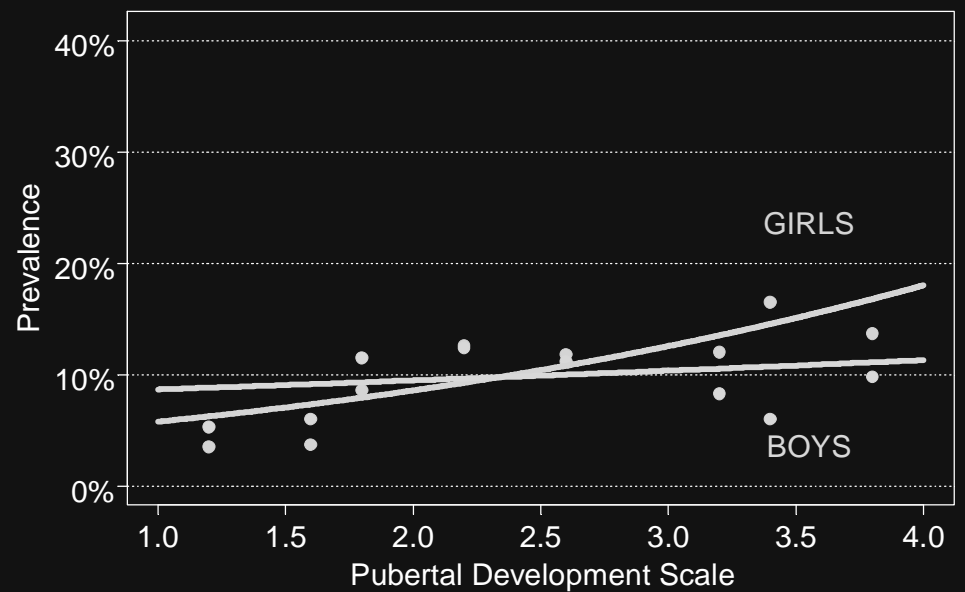


# Depressive and Somatic Symptoms by Pubertal Development

Depression ( $\geq 90^{\text{th}}$  percentile)



Somatization ( $\geq 90^{\text{th}}$  percentile)



# Research Opportunities

- **Further life-cycle studies (e.g., menopause)**
- **Relationship of gender-related factors (e.g., social role expectations, coping) to pain in non-Western cultures**
- **Common mechanisms underlying negative affective states (pain, depression, somatic symptoms) in women?**
- **Differential pain mechanisms by gender (even if pain outcomes the same)**

# Predictors of TMD Pain Onset in 11-14 year-olds Prospective Study, Multivariate Logistic Regression (n =1366)

<u>Baseline Variable</u>	<u>Odds Ratio (95% CI)</u>
Female gender	2.01 (1.2-3.3)***
Parent education $\leq$ HS (vs. grad/prof school)	0.33 (0.1-0.8)*
Somatic symptoms (~ depression)	1.80 (1.1.-2.8)*
Neutral or dissatisfied w/ life (vs. very satisfied)	4.12 (1.9-9.0)****
2-3 of 3 other pains (vs. 0)	3.22 (1.7-6.1)****

\* p< 0.05, \*\*\* p< 0.005, \*\*\*\* p< 0.0001

# Baseline Survey Females (11-17 y.o.): TMD Pain Prevalence by Time Since Menarche

Prevalence (%)

