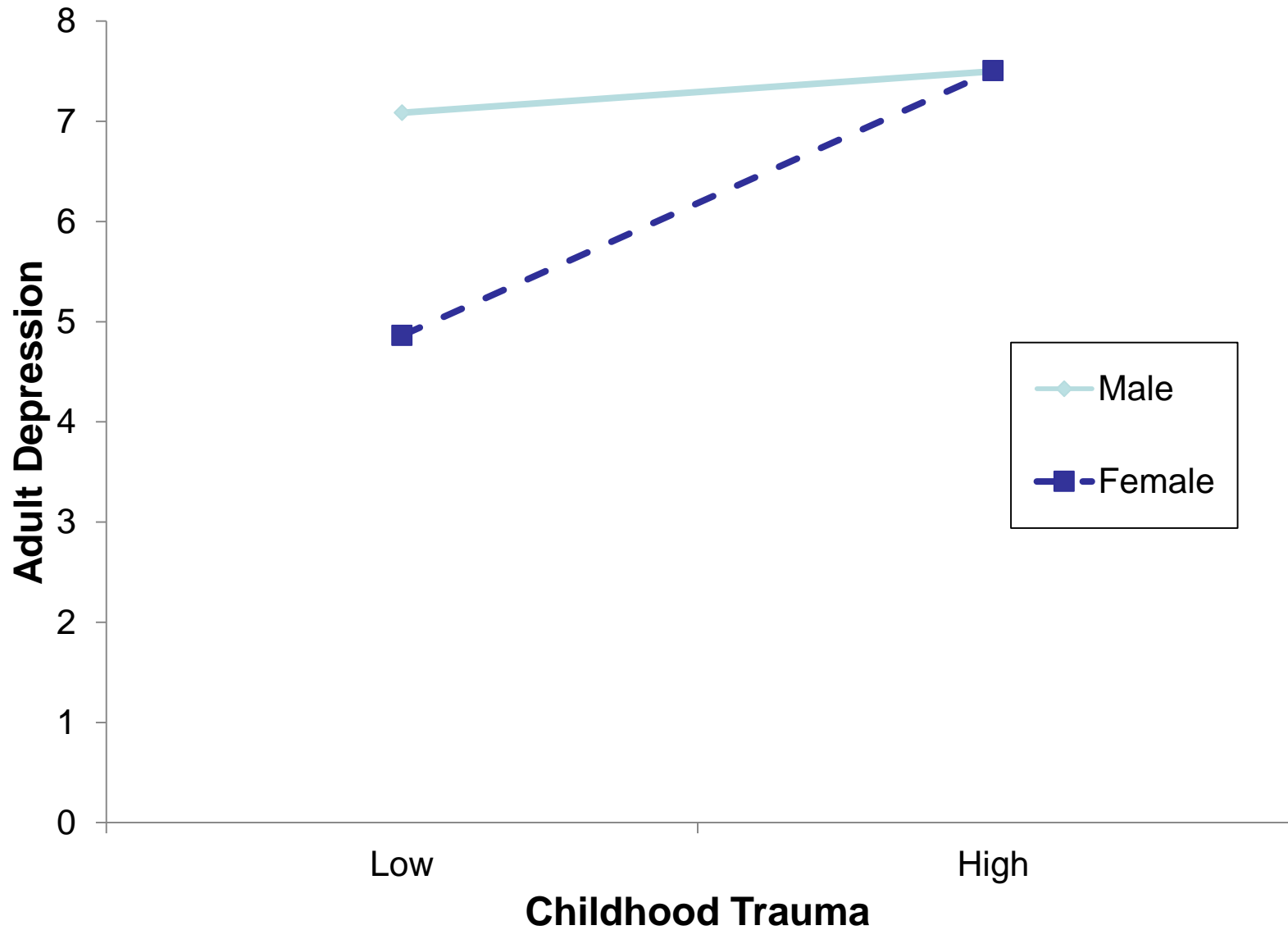# Moderation

What Is Moderation?

- The causal relationship between two variables (X $\rightarrow$ Y) changes as a function of a third variable (M).
  - X and M interact to cause Y.
- E.g., the relationship between childhood trauma (X) and adult depression (Y) changes as a function of gender (M)
- Gender moderates the causal effect of childhood trauma on adult depression
  - E.g., a weaker relationship for men than women

The Effects of Childhood Trauma on Adult Depression Moderated by Gender

Moderation and Causation

- Need to know causal direction.

- If X is a manipulated variable, there should be no relationship between X and M.

- Unlike mediation, there is no reason why necessarily X and M should be correlated.

Estimation of Moderation

- Typically estimated as the interaction between X and M
- Y = aX + bM +cXM + E
    - a = main effect of X
    - b = main effect of M
    - c = interaction between X and M
- Using an product term implies a linear relationship between M and X to Y relationship
    - The effect of X on Y changes by a constant amount as M increases or decreases
    - E.g., the effect of X on Y changes by the same amount for every year married.

Centering

$$Y = aX + bM + cXM + E$$

a = effect of X when M is zero
b = effect of M when X is zero

The meaning of a main effects depends on the meaningfulness of zero of the other variable.

To make zero meaningful

make sure it is meaningful in the raw units

center: subtract off the mean and so zero refers to the average person

Dichotomous Within-Dyads Moderator

- The distinguishing variable is a moderator.
- The two partners each have a score but across dyads the scores are the same (e.g., gender in heterosexual couples)
- If dyad members are distinguishable, **two** moderation effects
  - Moderates the actor effect
  - Moderates the partner effect

Between-Dyads Moderator

- One moderation variable per dyad
- Examples
  - Years married
  - Couple level treatment
  - Gay vs. lesbian couples
  - Twins: separated at birth vs. raised together

Number of Effects

- One moderation variable
- Indistinguishable: Two moderation effects
  - Moderates the actor effect
  - Moderates the partner effect
- Distinguishable: Four moderation effects
  - Moderates the actor effect for each member
  - Moderates the partner effect for each member

Mixed Moderator

- The two partners each have a score, and the average score varies across dyads
- Indistinguishable: Four moderation effects
  - actor effect moderated by each member's closeness
  - partner effect moderated by each member's closeness
- Distinguishable: Eight moderation effects
  - Each of the above also moderated by member type (e.g., husband and wife)

Simplifying Mixed Moderators

- Actor-only moderator
- Partner-only moderator
- Sum (or average) of actor and partner moderator variables (couple moderator)
- Difference between actor and partner moderator variables (contrast moderator)
- k weighted