



Moderating Effects of Smoking Status on the Relationships between Exercise, Mental Distress and Sleep Quality

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Background



- Harmful effects of smoking on sleep quality have been well documented.
- It is well known that exercise and psychological health are associated with sleep quality.
- However, the moderating effect of smoking status on the relationships between these factors have not been fully understood.



Objectives

1. To investigate whether the association between physical activity and sleep quality varies by smoking status
2. To examine whether the association between mental distress and sleep quality varies by smoking status



Methods

DATA: Behavioral Risk Factor Surveillance System (BRFSS)

- Nationwide population health surveys
- Aged 18 and above
- Annually administered since 1984 by telephone
- 50 states, District of Columbia + other territories
- “Gold standard” of behavioral surveillance of the U.S.
- Secondary analysis



2015 BRFSS Variables Used (N=16,253)

- Sex (Female: 50.7%)
- Age (6 categories, mean age category: 35-44)
- Race/Ethnicity (White: 76.9%)
- Education (Some college or more: 53%)
- Income (5-level; mean income category: \$25k-35k)
- Exercise in past 30 days (Yes: 68.2%)
- Days of mental health not good (0-30 days)
- Smoking status (Intermittent or everyday smokers: 22.8%)
- Days of poor sleep (0-14 days; mean: 3.77)



Question for days of mental health not good

- Now thinking about your mental health, which includes stress, depression, and problems with emotions, for how many days during the past 30 days was your mental health not good?

Question for days of poor sleep

- Over the last 2 weeks, how many days have you had trouble falling asleep or staying asleep or sleeping too much?

Question for exercise

- During the past month, other than your regular job, did you participate in any physical activities or exercises such as running, calisthenics, golf, gardening, or walking for exercise?

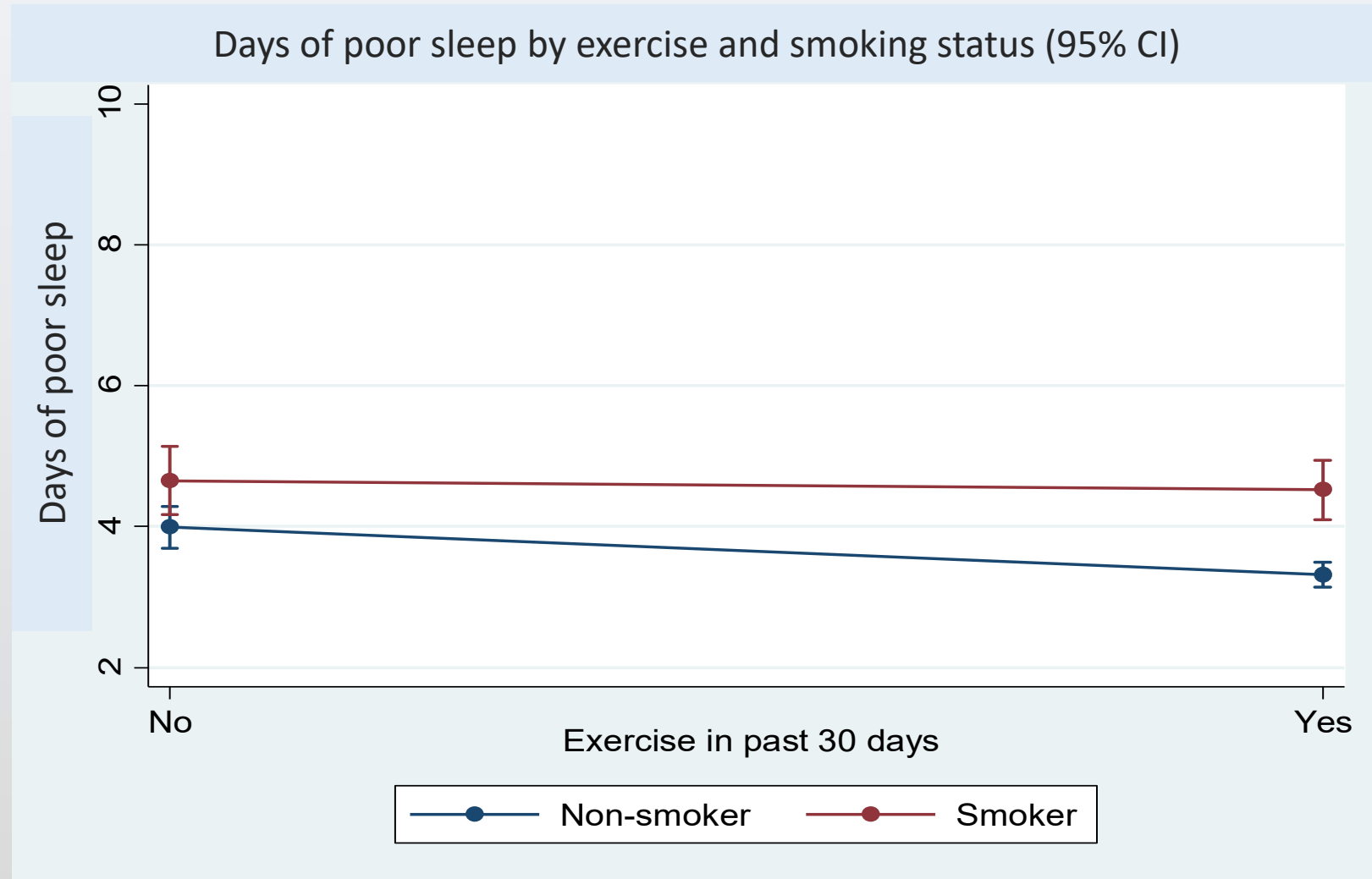
Analytic Approaches

- Linear regression equations
- Two-way interaction models
- Models accounted for survey sampling design (clusters, strata, and weights)
- Models were estimated with STATA 14



Results

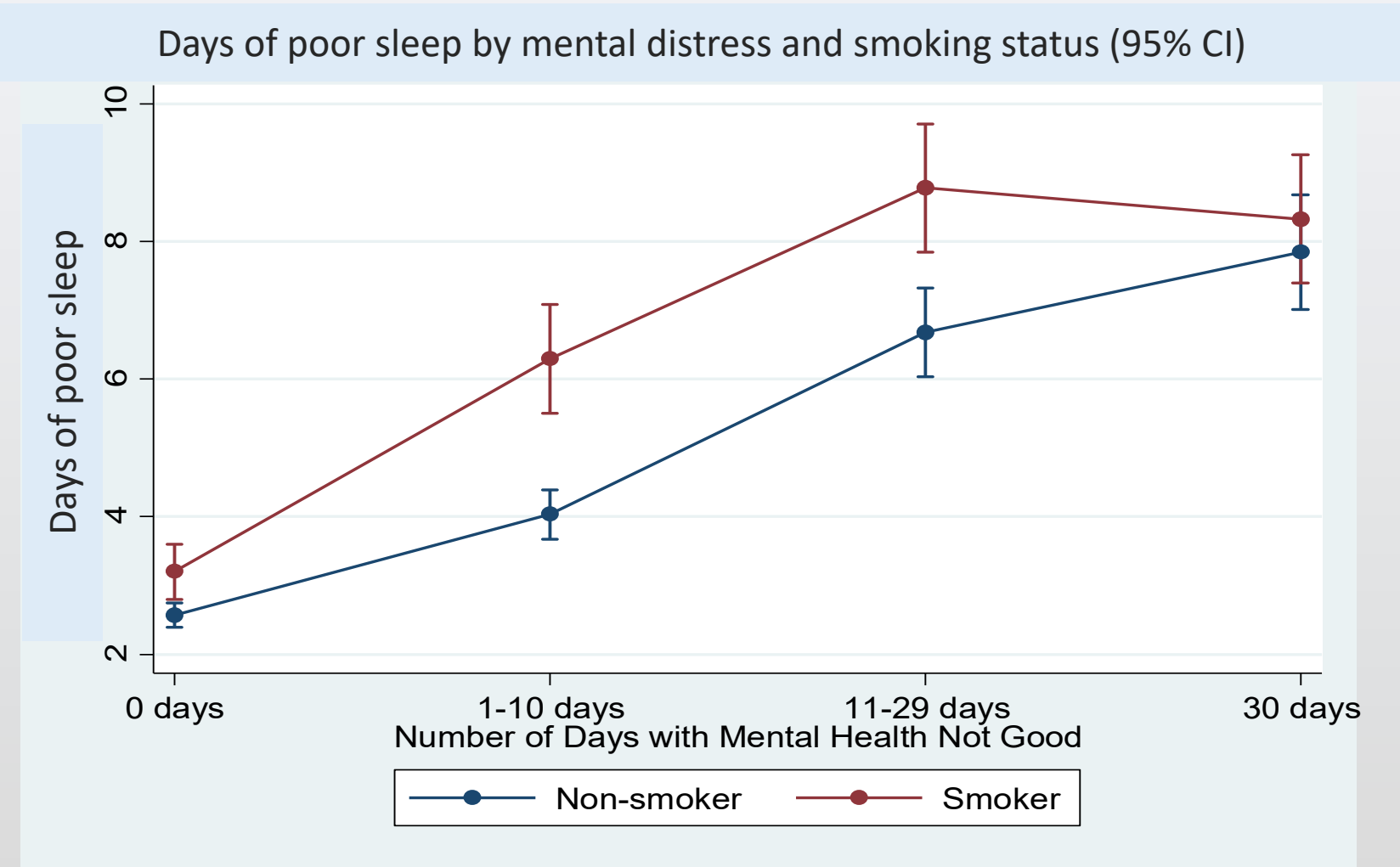
Figure 1. Association between exercise and sleep quality by smoking status



Results (Figure 1)

- Higher number of days of poor sleep was reported by smokers compared to nonsmokers.
 - This difference (between smokers and nonsmokers) was significant among those who reported exercise in the past 30 days.
- Generally, exercise and sleep quality was positively correlated. However,
 - Exercise did not seem to improve sleep quality among smokers.
 - Exercise seemed to matter slightly more for nonsmokers than smokers, but the smoking status difference in the size of the impact of the exercise on sleep quality was not significant. (i.e., these two slopes were nearly the same)

Figure 2. Association between sleep quality and mental distress by smoking status

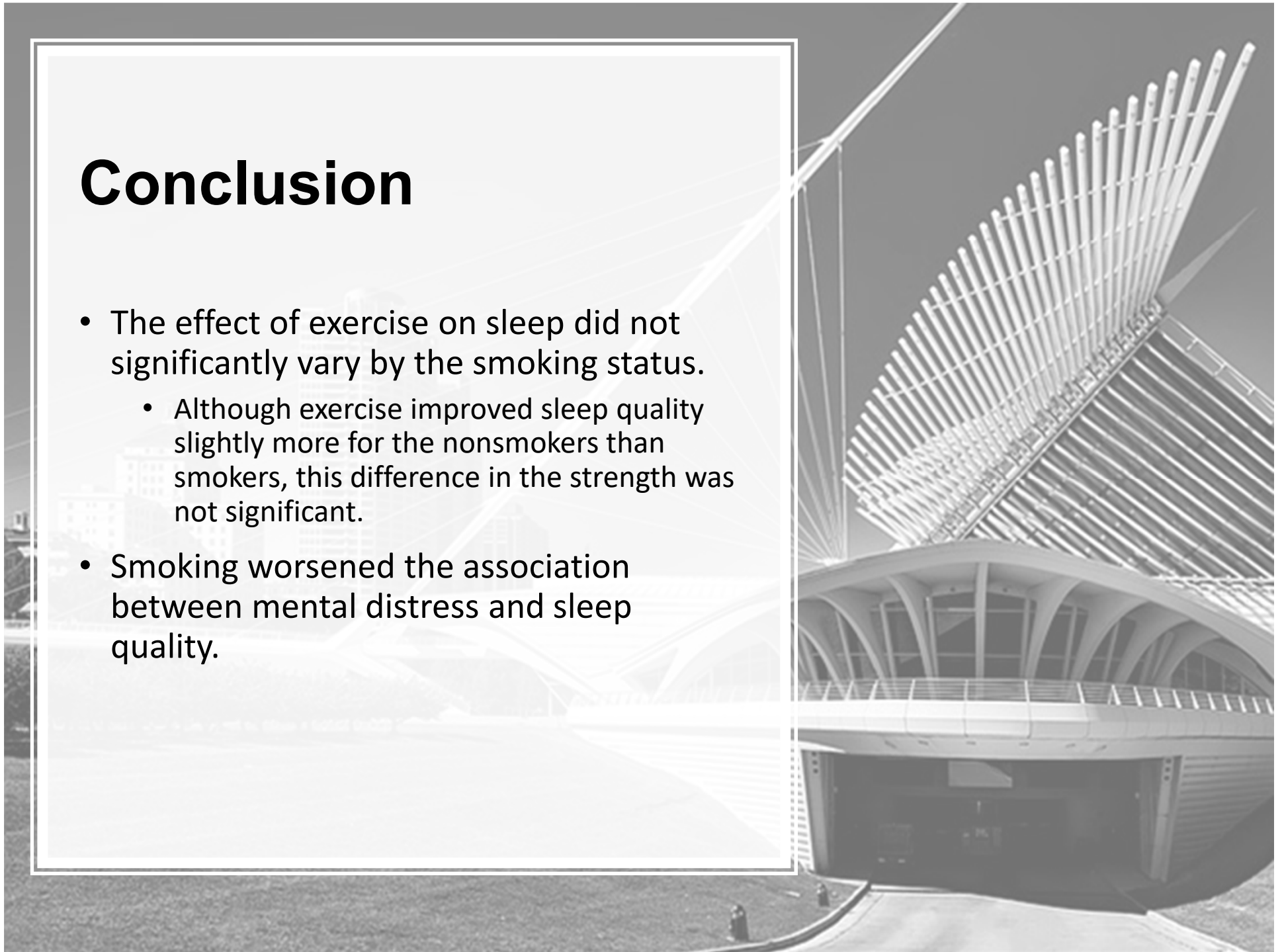


Results (Figure 2)

- Overall, mental health and sleep quality are highly correlated.
- The association b/w mental distress and poor sleep was significantly higher among smokers compared to nonsmokers.
- Differences in the association were much more higher in those with moderate mental distress than without and with severe mental distress.
- The association b/w mental distress and poor sleep may be non-linear (i.e. polygonal slope).

Conclusion

- The effect of exercise on sleep did not significantly vary by the smoking status.
 - Although exercise improved sleep quality slightly more for the nonsmokers than smokers, this difference in the strength was not significant.
- Smoking worsened the association between mental distress and sleep quality.



Conclusion

- Smoking may be related to poor sleep and/or mental distress.
- Future research on the mechanisms of how smoking affects the relationships between mental distress and poor sleep is needed.

Limitations

- Self-reported surveys
- Cross-sectional
- More detailed information about exercise, mental distress, and poor sleep not considered
- E-cigarettes not considered



Questions