



# Sleep Quality: A Mediator in the Pathway of Stress and Cold Symptom Severity

Muskan Bansal <sup>2</sup>, Sarah M. Ghose, M.A. <sup>1</sup> & Natalie D. Dautovich, Ph.D. <sup>1</sup>

<sup>1</sup>Psychology Department, Virginia Commonwealth University, Richmond, VA

<sup>2</sup>Center for the Study of Biological Complexity, Virginia Commonwealth University, Richmond, VA



## Background

- Stress is a known contributor to immune system suppression associated with higher illness susceptibility, including acute infectious respiratory illness, or the common cold (Cohen, et al., 1991).
- Sleep is a further known factor which contributes to illness susceptibility, severity, and recovery (Altevogt, et al, 2006).
- Specifically, poor sleep is associated with greater risk of viral infection following exposure (Cohen, et al., 2009, 2020).

**Study Aim:** The present study investigated (1) the association between stress and cold symptom severity and (2) the mediating role of sleep quality.

## Hypotheses

- H1:** Increased perceived stress during quarantine will be associated with decreased change in cold symptom severity.
- H2:** Sleep quality will predict cold symptom severity above perceived stress alone, whereby worse sleep will be associated with decreased change in cold symptom severity, and better sleep will predict increased change in cold symptom severity.

## Methods

### Sample Characteristics

- The current study utilized archival data from the Pittsburgh Cold Study 3 (PCS3)
- Participants were 213 adults (Mean Age=30.1 yrs., SD=10.9 yrs., 42.3% female)

### Measures

**Perceived Stress:** Cohen's (Cohen, 1994) Perceived Stress Scale (PSS) was utilized as an index of perceived stress in the present study. Responses were made using a Likert type scale. Higher scores indicate higher levels of perceived stress.

**Sleep Quality:** The Pittsburgh Sleep Quality Index (PSQI) global sleep quality item was utilized as an index of subjective sleep quality. Higher scores indicate worse sleep quality.

**Cold Symptom Severity:** The Jackson Symptom Score is a measure used to assess common cold severity. Responses to items asking about the severity of 8 common cold symptoms are made using a 4-point Likert type scale. Responses are totalled to arrive at a summative severity score. Higher scores indicate higher cold severity.

**Table 1.** Descriptive statistics and bivariate correlations of study variables

Variables	M(SD)	1.	2.	3.	4.	5.
1. Age	30.1 (10.9)	--				
2. Sex	--	.03	--			
3. Stress	12.05(5.65)	-.10	-.05	--		
4. PSQI	3.62(2.42)	.01	.01	.35**	--	
5. ΔJackson	1.64 (3.56)	.01	.12	.03	-.14*	--

Note. \* $p < .05$ ; \*\* $p < .01$

## Methods

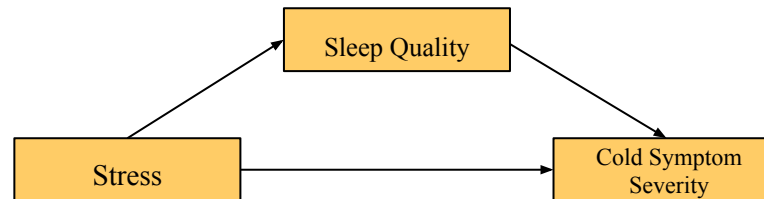


Figure 1. Conceptual model of the association between stress and cold symptom severity mediated by sleep quality.

Note: Age and Sex served as covariates.

## Results

- Perceived stress was significantly associated with sleep quality ( $B = -.15$ ; 95% CI [.10, .21]), whereby an increase perception of stress was associated with worse sleep quality.
- Global sleep quality fully mediated the association between stress and changes in cold severity.
- Specifically, better sleep quality predicted larger changes in cold severity, which further predicted a decrease in stress ( $B = -.23$ ; 95% CI [-.43, -.04]).
- Zero-order correlation analyses revealed a trend level ( $r = .04$ ,  $p = .06$ ) association between sleep quality and aggregate cold severity, suggesting that as sleep improves, symptoms decrease.

## Conclusions & Future Directions

- Notable limitations of the present study include cross-sectional mediation analysis, constrained measurement of cold symptomatology (Jackson Score), and lack of objective indices of sleep quality
- Higher perceived stress were associated with slower change in cold symptomatology in the present sample.
- Sleep quality served as an indirect pathway linking perceived stress and cold symptom severity.
- As such, future research should consider further mechanisms underlying the associations between stress, cold symptom severity, and sleep quality to inform (1) more holistic research and (2) modifiable targets for meaningful health behavior change.

## References

Altevogt, B. M., & Colten, H. R. (Eds.). (2006). Sleep disorders and sleep deprivation: an unmet public health problem. Cohen, S. (2021). Psychosocial vulnerabilities to upper respiratory infectious illness: Implications for susceptibility to coronavirus disease 2019 (COVID-19). *Perspectives on Psychological Science*, 16(1), 161.  
 Cohen, S., Doyle, W. J., Alper, C. M., Janicki-Deverts, D., & Turner, R. B. (2009). Sleep habits and susceptibility to the common cold. *Archives of Internal Medicine*, 169, 62-67. PMID: PMC2629403  
 Cohen, S., Tyrrell, D. A. J., & Smith, A. P. (1991). Psychological stress and susceptibility to the common cold. *New England Journal of Medicine*, 325, 606-612.

### Acknowledgements:

The data was collected by the Laboratory for the Study of Stress, Immunity and Disease at Carnegie Mellon University under the directorship of Sheldon Cohen, PhD; and were accessed via the Common Cold Project website ([www.commoncoldproject.com](http://www.commoncoldproject.com)).

The Pittsburgh Cold Study project was supported by grant (NCCIH AT006694). The Pittsburgh Cold Study 3 was supported by a grant from the National Institute of Allergies and Infectious Diseases (NIAID) (R01 AI066367), the Pennsylvania Department of Health (08-01-02) and the National Center for Complementary and Integrative Health (RCIAT005799) The Pittsburgh Cold Study 3 was supported by the John D. and Catherine T. MacArthur Foundation Research Network and grants from the National Institutes of Health (UL1RR024153 and UC1TR000005) for supplemental and secondary research respectively.

Please address all correspondence to Sarah Ghose: ghosem@vcu.edu.