



Protective Effects of Cognitive Reappraisal on the Mental Health of Firefighter Trainees: A Dynamic Longitudinal Examination of Sleep, Depression, and Subjective Well-Being

Pin-no Wang¹, Cheng-Chieh Li¹, Han-Yun Chang^{1 2*}

¹Department of Psychology, Asia University, Taichung, Taiwan

² Asia University Hospital, Clinical Psychology Center, Taichung, Taiwan

*Corresponding author: Han-Yun Chang(Ta8001017@asia.edu.tw)

OBJECTIVE

Firefighter trainees are exposed to intensive physical training, irregular routines, and high-risk occupational preparation, making sleep quality a critical factor in later psychological adjustment. Poor sleep has been associated with depressive symptoms and reduced well-being, and recent evidence suggests that sleep loss may impair emotional functioning.

However, not all individuals with poor sleep experience the same level of psychological distress.

This study aimed to examine whether depressive symptoms mediate the longitudinal association between sleep quality and later well-being, and whether cognitive reappraisal serves as a protective factor by buffering the effect of poor sleep quality on subsequent depression.

METHODS

This study used a three-wave longitudinal design with three-month intervals.

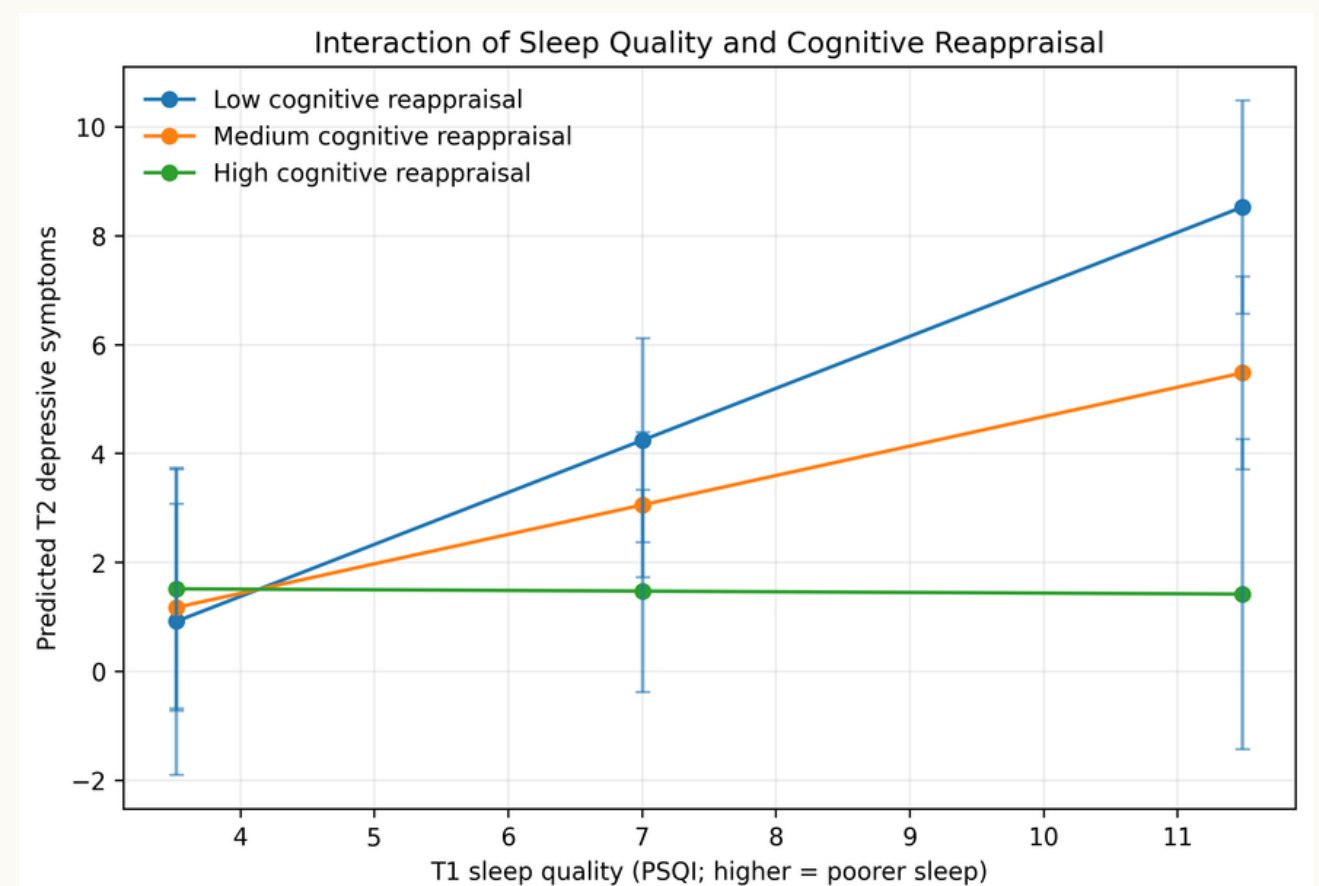
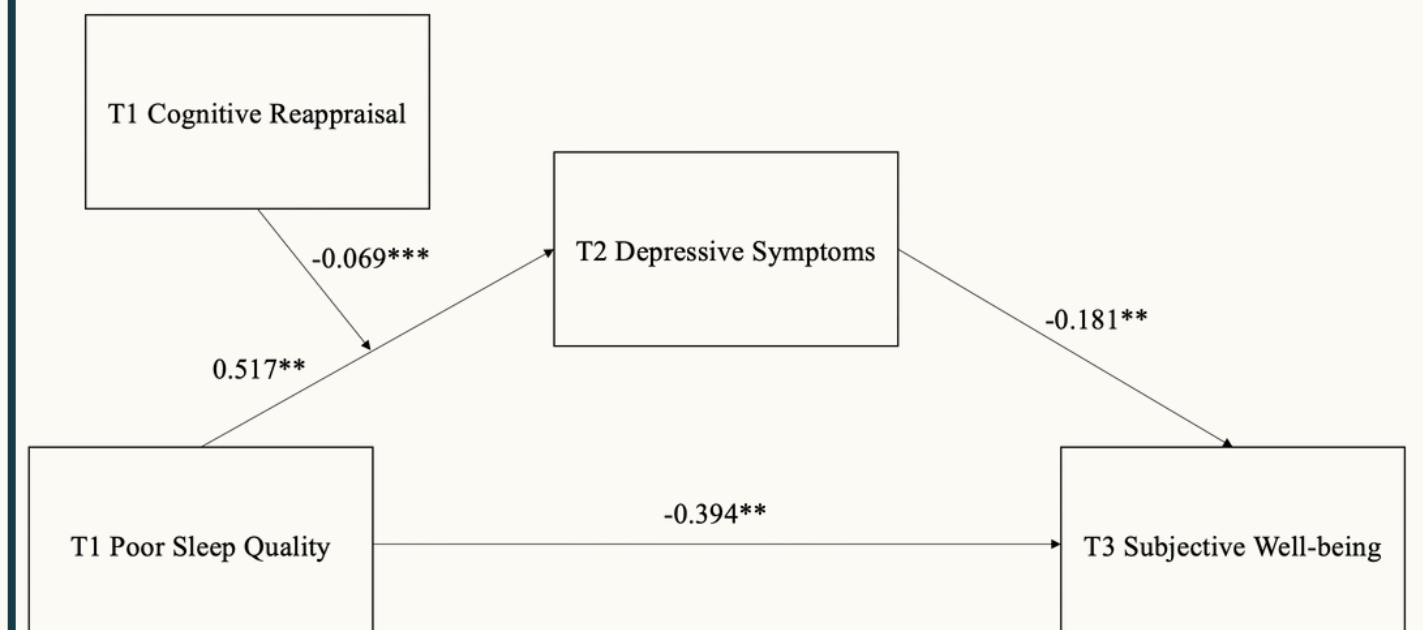
Of the 182 Taiwanese firefighter trainees initially recruited, 171 completed all three waves and were included in the final analyses; 86.5% were male. Measures included the PSQI, ERQ cognitive reappraisal subscale, BDI-II, and a Subjective Well-Being Scale.

A preliminary mediation model was tested first, followed by a moderated mediation analysis using PROCESS Macro Model 7 with 5,000 bootstrap resamples to estimate 95% confidence intervals.

RESULTS

A total of 171 valid longitudinal cases were analyzed. As shown in Figure 1, T1 cognitive reappraisal significantly moderated the association between T1 sleep quality and T2 depressive symptoms, $B = -0.069$, $p < .001$. Simple slope analyses further showed that poorer sleep quality predicted higher depressive symptoms among trainees with low cognitive reappraisal, $B = 0.956$, $p < .001$, but not among those with high cognitive reappraisal, $B = -0.012$, $p = .955$ (Figure 2). T2 depressive symptoms significantly predicted lower T3 subjective well-being, $B = -0.181$, $p = .003$. The conditional indirect effect was significant only at low cognitive reappraisal, Effect = -0.173 , 95% CI $[-0.303, -0.067]$, and the index of moderated mediation was significant, Index = 0.013 , 95% CI $[0.003, 0.022]$.

RESULTS



DISCUSSION

These findings suggest that cognitive reappraisal may serve as a protective psychological resource for firefighter trainees. Poorer sleep quality predicted higher depressive symptoms, which in turn contributed to lower subjective well-being; however, this indirect pathway was significant only among trainees with low cognitive reappraisal. Higher cognitive reappraisal appeared to buffer the emotional impact of poor sleep, reducing the likelihood that sleep difficulties would develop into depressive symptoms. These results highlight the value of integrating cognitive reappraisal training into firefighter education to support resilience and long-term well-being under high-stress and sleep-disrupted conditions.

REFERENCES

- Liu, Y., Li, Z., Xiang, Q., Zhang, X., Bai, R., Sun, C., & Liu, J. (2025). Depression and daytime dysfunction centralize the fatigue-sleep cascade in island firefighters: A symptom network and Bayesian DAG study. *Frontiers in Psychiatry*, 16, Article 1663957. <https://doi.org/10.3389/fpsy.2025.1663957>
- Palmer, C. A., Bower, J. L., Cho, K. W., Clementi, M. A., Lau, S., Oosterhoff, B., & Alfano, C. A. (2024). Sleep loss and emotion: A systematic review and meta-analysis of over 50 years of experimental research. *Psychological Bulletin*, 150(4), 440–463. <https://doi.org/10.1037/bul0000410>
- Stover, A. D., Shulkin, J., Lac, A., & Rapp, T. (2024). A meta-analysis of cognitive reappraisal and personal resilience. *Clinical Psychology Review*, 110, Article 102428. <https://doi.org/10.1016/j.cpr.2024.102428>

Disclosure of conflict of interest

first author: Pin-no Wang

I have no COI with regard to the presentation