

From Neuroticism to Depression: Examining the Parallel Mediating Mechanisms of Loneliness and Stress Reactivity Through a Four-Wave Longitudinal Design

Chen-Tung Hua¹, Yiting Wang², Han-Yun Chang^{2*}

¹Department of Psychiatry, Buddhist Tzu Chi General Hospital, Taichung Branch, Taichung, Taiwan, R.O.C

²Clinical Psychological center, Asia University Hospital, No. 222, Fuxin Rd., Wufeng Dist., Taichung City 413505, Taiwan..

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

Objective

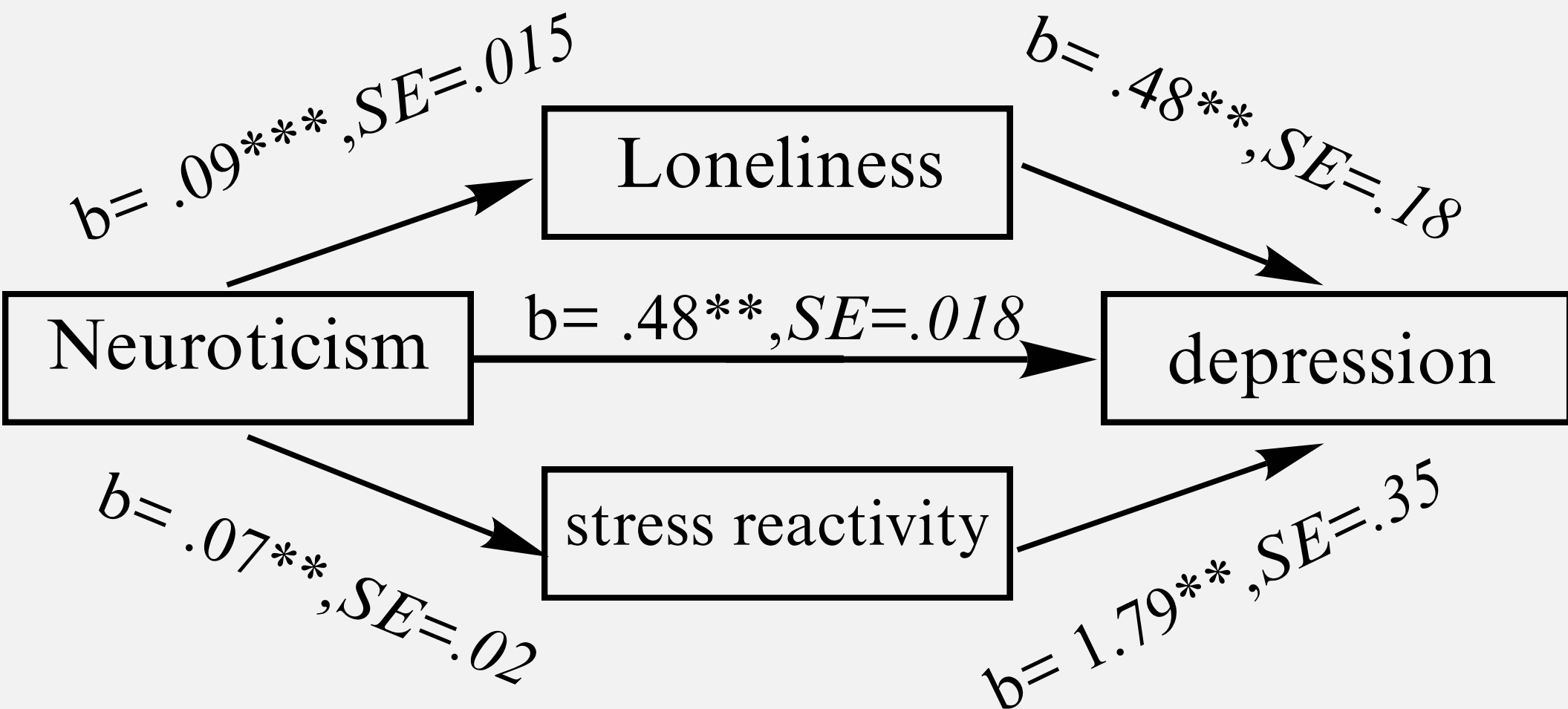
This study examines the predictive pathways from neuroticism to depression, focusing on parallel mediating effects of loneliness and stress reactivity. To address causal inference limitations of cross-sectional research, a four-wave longitudinal design was used to clarify whether neuroticism predicts depression through two independent paths: increased loneliness and heightened stress reactivity. Findings are expected to inform the timing and strategies of clinical interventions.

Methods

Participants were recruited from a fire service training center. Inclusion: age 18–40 and Chinese literacy; exclusion: severe suicidal ideation or cognitive/intellectual impairments. Assessment tools included the Big Five Inventory (BFI) (brief form), the UCLA Loneliness Scale, the Beck Depression Inventory (BDI), the Chinese Health Questionnaire (CHQ-12), the Daily Hassles Scale (DHS), and the Adult Life Stress Perception Scale. Data were collected across four waves at three-month intervals. T1 neuroticism was the independent variable, T1 loneliness and stress reactivity derived from T2 to T4 were parallel mediators, and T4 depression was the dependent variable. SPSS PROCESS Model 4 tested mediation effects.

Results

A total of 427 participants were included (90% male). T1 neuroticism significantly predicted T4 depression. With mediators, the direct effect remained significant (direct effect = .476, SE = .181, p = .0089, 95% CI [.120, .833]). Bootstrap results (5,000 iterations) showed a significant total indirect effect (SE = .084, 95% Boot CI [.076, .405]) through two paths: loneliness (SE = .049, 95% Boot CI [.010, .204]) and stress reactivity (SE = .056, 95% Boot CI [.034, .255]). Similar effect sizes and overlapping confidence intervals confirm both mediators play equally critical roles in the mechanism.



Results

Effects of loneliness and stress reactivity between neuroticism and depression

Total effect	.70
	(.349 ~ 1.051)
Direct effect	.476
	(.120 ~ .833)
Indirect effects	.224
	(.076 ~ .405)
Neuroticism→Loneliness →Depression	.043
	(.010 ~ .204)
Neuroticism→Stress Reactivity →Depression	.127
	(.035 ~ .255)

Note: The values in the table are b values, and the numbers in brackets are 95% confidence intervals

Discussion

A four-wave longitudinal tracking study confirms that neuroticism significantly predicts levels of depression nine months later, with the direct effect remaining robust (Effect = 0.476, p = .0089). This study elucidates a parallel mediation mechanism involving 'loneliness' and 'stress reactivity': high neuroticism escalates the risk of depression through the dual pathways of increasing loneliness (Effect = 0.099) and elevating stress reactivity (Effect = 0.127). These findings establish a temporal causal link within these psychological mechanisms, suggesting that clinical practice should adopt multi-point interventions targeting loneliness and stress reactivity in neurotic individuals to optimize depression prevention and prognosis.

References

- Yu, B., Liu, Y., Li, Y., & Wu, Q. (2025). Cross-sectional and prospective relationships between neuroticism and depressive symptoms among college students: The mediating role of loneliness. *Psychological Reports*, 128(4). <https://doi.org/10.1177/00332941231191065>
- Fu, C., Li, C., Zheng, X., et al. (2024). Relationship between personality and adolescent depression: the mediating role of loneliness and problematic internet use. *BMC Psychiatry*, 24, 683. <https://doi.org/10.1186/s12888-024-06131-1>



Disclosure of conflict of interest name of first author: Chen-Tung Hua
I have no COI with regard to the presentation