

## Applying the Quad Model to Estimate the Implicit Self-Esteem of Patients with Depressive Disorders: Comparing the Psychometric Properties with the Implicit Association Test Effect

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**Abstract :** Researchers commonly assess implicit self-esteem with the Implicit Association Test (IAT). The IAT's measure, often referred to as the IAT effect, indicates the strengths of automatic preferences for the self relative to others, which is often considered an index of implicit self-esteem. However, based on the Dual-process theory, the IAT does not rely entirely on the automatic process; it is also influenced by a controlled process. The present study, therefore, analyzed the IAT data with the Quad model, separating four processes on the IAT performance: the likelihood that automatic association is activated by the stimulus in the trial (AC); that a correct response is discriminated in the trial (D); that the automatic bias is overcome in favor of a deliberate response (OB); and that when the association is not activated, and the individual fails to discriminate a correct answer, there is a guessing or response bias drives the response (G). The AC and G processes are automatic, while the D and OB processes are controlled. The AC parameter is considered as the strength of the association activated by the stimulus, which reflects what implicit measures of social cognition aim to assess. The stronger the automatic association between self and positive valence, the more likely it will be activated by a relevant stimulus. Therefore, the AC parameter was used as the index of implicit self-esteem in the present study. Meanwhile, the relationship between implicit self-esteem and depression is not fully investigated. In the cognitive theory of depression, it is assumed that the negative self-schema is crucial in depression. Based on this point of view, implicit self-esteem would be negatively associated with depression. However, the results among empirical studies are inconsistent. The aims of the present study were to examine the psychometric properties of the AC (i.e., test-retest reliability and its correlations with explicit self-esteem and depression) and compare it with that of the IAT effect. The present study had 105 patients with depressive disorders completing the Rosenberg Self-Esteem Scale, Beck Depression Inventory-II and the IAT on the pretest. After at least 3 weeks, the participants completed the second IAT. The data were analyzed by the latent-trait multinomial processing tree model (latent-trait MPT) with the TreeBUGS package in R. The result showed that the latent-trait MPT had a satisfactory model fit. The effect size of test-retest reliability of the AC and the IAT effect were medium ( $r = .43, p < .0001$ ) and small ( $r = .29, p < .01$ ) respectively. Only the AC showed a significant correlation with explicit self-esteem ( $r = .19, p < .05$ ). Neither of the two indexes was correlated with depression. Collectively, the AC parameter was a satisfactory index of implicit self-esteem compared with the IAT effect. Also, the present study supported the results that implicit self-esteem was not correlated with depression.

**Keywords :** cognitive modeling, implicit association test, implicit self-esteem, quad model

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