

Differential Risk Factors for Suicide Attempts in Depressed Adolescents with and Without Childhood Sexual Abuse: A Machine Learning and Moderated Modeling Approach

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Abstract

Background: Childhood sexual abuse (CSA) is a major risk factor for suicide attempts (SA) in depressive disorders. However, few studies have thoroughly investigated the differences in risk factors and psychopathological mechanisms in SA between depressed adolescents with and without CSA. The goal of this work was to combine traditional regression models and machine learning (ML) methods to uncover distinct predictors of SA in these two subgroups, and to investigate the moderating effect of rumination on the relationship between CSA and SA. **Methods:** A total of 796 adolescents with depressive disorders were stratified into two subgroups based on CSA history. Logistic regression was used to identify predictive factors for SA in each subgroup. The SHapley Additive exPlanations (SHAP) method was employed to quantify feature importance and enhance model interpretability. Additionally, a moderation analysis was performed within the CSA subgroup to investigate the moderating effect of rumination on the relationship between CSA and SA. **Results:** SHAP feature importance analysis identified rumination, age, and CSA as the top predictors in the CSA subgroup. Whereas depressive symptoms and age were the primary predictors in the non-CSA subgroup. Notably, a subsequent moderation analysis demonstrated that rumination exerted a significant moderating effect on the association between CSA and SA within the CSA subgroup. **Conclusions:** Individualized suicide prevention strategies, such as rumination-focused interventions for the CSA subtype and evidence-based depression treatment for non-CSA subtype, may be beneficial for depressed adolescents.

Keywords

Depressive Disorders, Suicide Attempts, Childhood Sexual Abuse, Rumination, SHAP

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