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Using machine learning to explore core risk factors associated with the risk of eating disorders among Chinese young women: A decision-tree classification analysis

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INTRODUCTION

Eating disorders (EDs), a mental illness involving disturbances in eating behaviours, are prevalent globally and represent a threat to public health. Many previous studies investigated the risk factors associated with eating disorders (EDs). However, limited research had been conducted for investigating the factors in co-occurrence conditions and their interactions, especially in China where research in EDs is underrepresented. To address the concurrency and interactions among variables, machine learning has been used to explore the risk factors for mental disorders.

However, there is no research using machine learning that explored the risk factors of EDs among Chinese women. Thus, by using a machine learning approach, the present study aimed to fill the gap by including a range of well-established risk factors of EDs from the ER perspective to detect Chinese young women at-risk of EDs.

METHODS

Participants

The dataset used the current study was recruited from Hunan Agriculture University. A sample of 830 women was used in this current study, and their ages ranged from 18 to 23 years old with a mean of 18.91 (SD = 0.95).

Data Analytic Strategy

The procedure of developing a decision tree model with preprocessed data can be divided into two parts: model training and model testing (with a ration of 7:3). Training data was first balanced with SMOTE (Synthetic Minority Oversampling Technique) before model training. The partitions are then organized in a binary tree model. The procedure is repeated recursively until no further splitting can improve the accuracy of predictive outcomes.

RESULTS

Body image inflexibility, psychological distress, and body dissatisfaction were identified as important classifiers of identifying individuals at-risk of EDs (i.e., having the Eating Disorder Examination Questionnaire scores equal to or larger than 15). The feature importance for body image inflexibility, psychological distress, and body dissatisfaction was .81, .15, and .04, respectively.

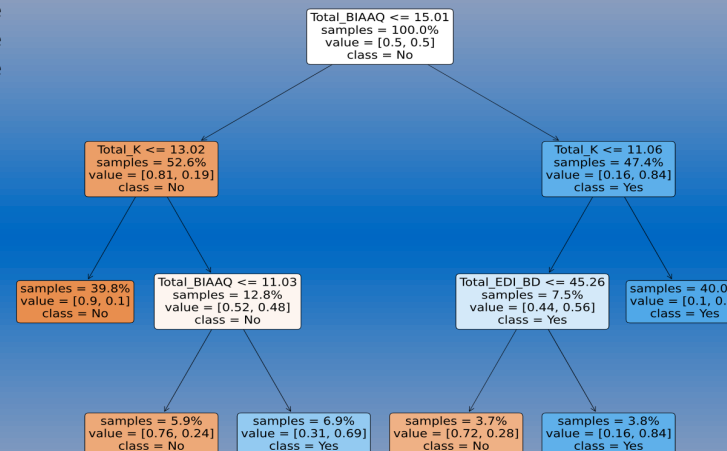


Figure 1

As shown in Figure 1, participants were first partitioned by body image inflexibility scores as measured by the BI-AAQ (body image inflexibility scale). Participants with higher body image inflexibility scores (>15.01) constituted 47.4% of the overall training samples, and 84% of these participants were classified as at-risk of EDs. Participants were further partitioned by psychological distress as measured by the K6 with different thresholds. On the right node, those with higher psychological distress scores (>11.06) were further classified as at-risk of EDs. And those with lower psychological distress scores (≤ 11.06) were further partitioned by body dissatisfaction as measured by the EDI-BD.

Model Evaluation

Our model in classifying at-risk of EDs in the test subsample (n = 249 of 830) has a sensitivity of .88 and a specificity of .85. By randomly selecting 30% data from the overall dataset for five times, the average sensitivity is .85 and the average specificity is .86, which fits the above evaluation results derived from one test subsample.

DISCUSSION

- Body image inflexibility was identified as the most significant classifier. This is consistent with prior studies proposing or demonstrating the key role of body image inflexibility in contributing to the development of EDs.
- When introducing psychological distress into the decision tree model, the effects and interactions between psychological distress and body image inflexibility were found distinctive. Elevated psychological distress could amplify the risks of EDs on individuals who have a high level of body image inflexibility. It is suggested that a lower level of body image inflexibility may improve the thresholds of psychological distress regarding the risk of EDs.

CONCLUSION

This is the first study to use a decision tree classification analysis in the Chinese context to explore the relations between diverse risk factors and their interactions for identifying Chinese young women at-risk of EDs. Several conclusions were drawn from a decision tree built upon data with three attributions: body image inflexibility, psychological distress, and body dissatisfaction.

References

- Hoek HW: Review of the worldwide epidemiology of eating disorders. *Curr Opin Psychiatry* 2016, 29(6):336-339. <https://doi.org/10.1097/YCO.0000000000000282>
- Stice E, Becker CB, Yokum S: Eating disorder prevention: current evidence-base and future directions. *Int J Eat Disord* 2013, 46(5):478-485. <https://doi.org/10.1002/eat.22105>

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