# The impact of depression and insomnia on individual risk decision-making and subjective executive function

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## Background

Insomnia is common in modern society, impacting health and socio-economic conditions. Its effects on risk decision-making remain unclear, with studies yielding mixed results. Insomnia often coexists with depressive symptoms, which may influence decision-making. Subjective executive function assessments, due to their real-life relevance, are crucial. This study explores how depressive symptoms moderate the relationship between insomnia, risk decision-making, and executive functions, aiming to clarify their interplay.

## Methods

This study recruited 141 participants (98 females, 69.5 %) aged 18–65. Based on the Pittsburgh Sleep Quality Index (PSQI) and the Beck Depression Inventory-II (BDI-II) scores, they were categorized into three groups (47 each): Insomnia with Depression (ID; PSQI≧5, BDI≧ 14), Insomnia only (IS; PSQI ≧ 5, BDI < 14), and Healthy Control (HC; PSQI < 5, BDI < 14). Age and gender were matched. The study used the Daily Executive Behaviors Scale to assess executive functions and the Iowa Gambling Task 2 (IGT2) to evaluate risk decision-making.

## Results

Results showed the ID group had lower IGT net scores than IS and HC, indicating impaired risk decision-making in those with comorbid depression and insomnia. No difference was found between IS and HC. In executive function, the ID group had greater deficits in planning and emotional monitoring than IS and HC. The ID group also showed greater deficits in motivation control and environmental interaction monitoring than IS, while IS showed more deficits than HC. For social inhibition, the ID group had higher impairment than IS, but IS and HC did not differ.

## Table 1

Analysis of the IGT net scores and Subjective executive function assessments of the three groups.

| | *Mean(SD)* | | | |
|---|---|---|---|---|
| | ID (*N*=47) | IS (*N*=47) | HC (*N*=47) | *F* |
| IGT net score | 40.51 (6.84) | 45.47 (8.24) | 45.64 (9.77) | 5.69* |
| planning Deficit | 9.68 (2.47) | 7.28 (2.16) | 6.40 (1.86) | 28.52*** |
| emotional monitoring Deficit | 8.19 (2.31) | 6.45 (2.14) | 6.17 (1.80) | 12.91*** |
| motivation control Deficit | 12.28 (2.31) | 9.00 (2.39) | 7.06 (2.59) | 55.17*** |
| environmental interaction monitoring Deficit | 13.45 (2.66) | 11.00 (2.25) | 9.21 (2.23) | 37.31* |
| social inhibition Deficit | 11.66 (3.21) | 10.23 (2.14) | 10.38 (2.44) | 4.17* |

* $p < .05$,** $p < .01$,*** $p < .001$
ID = Insomnia with Depression
IS = Insomnia only
HC = Healthy Control

## Discussion

Findings suggest depressive mood is key in the link between insomnia and risk decision-making. Comorbid depression and insomnia impair decision-making, while insomnia alone shows no difference from controls. This may explain past inconsistencies, as depression was often overlooked. Executive function deficits are more severe with comorbid depression, especially in planning, emotional regulation, and motivation control. Clinical assessments focusing only on sleep may be insufficient; emotional states should also be considered for a fuller evaluation of cognitive changes and more effective interventions.

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**Name of first author: Han Chiu**
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