RESEARCH SNAPSHOT

SUMMARIZE, MOBILIZE

greo. EVIDENCE INSIGHTS

Identifying patterns of high involvement in electronic gambling machines using unsupervised machine learning

What this research is about

Behavioural tracking data (BTD) can be used to help identify gambling behaviours that may be linked to a greater risk of harm. The purpose of this study was to identify different groups of people who are highly involved in electronic gambling machines (EGMs) using BTD. The researchers applied an unsupervised machine learning approach to identify the gambling patterns of different groups without predefined categories. They also compared these highly involved groups with people who gamble, but are not highly involved, to better understand which behavioural indicators may be linked to a greater risk of gambling-related harm.

What the researchers did

The researchers used anonymized data provided by a casino supply company that offers cloud-based services for data tracking. The transaction-level data included information such as withdrawals and deposits at the machine level. The account-level data included demographic (e.g., gender, age) and location information (i.e., site and machine number).

The researchers created indicators of gambling behaviour from the transaction data, including gambling frequency, amount wagered, and change in spending over time. Because the data were at the transaction level, they grouped transactions into gambling sessions, based on the time gap between transactions. They then summarized these sessions for each person in the dataset.

What you need to know

This study examined behavioural tracking data from 61,631 Polish adults who gambled on electronic gambling machines (EGMs). Using unsupervised machine learning, the researchers identified a group of 5,373 people in the top 3% in terms of gambling frequency, total amount debited, and net losses. Within this highly involved group, four subtypes were identified. Overall, the findings suggest that high gambling involvement is not characterized by one uniform pattern.

The dataset included 168,536 Polish adults who gambled on EGMs over a 15-month period between March 2023 and June 2024. Only data from people who made at least five deposits were used. The final sample consisted of 61,631 people, who were mostly male (91%) and under the age of 40 (60%).

The researchers analyzed gambling patterns and identified a group of people who were highly involved in gambling (i.e., those who gambled much more often or more intensely) and then subtypes within this group. They used unsupervised machine learning methods. This means that the algorithm was not told in advance the number of groups to look for; instead, it searched the data to group people based on similarities in gambling behaviour.

What the researchers found

Although most people did not gamble often or spend large amounts of money, 5,373 people were in

the top 3% in terms of gambling frequency (higher number of gambling sessions), volume (higher debited amount), and intensity (higher net losses). They also differed from the rest of the sample in other behavioural indicators, including gambling for longer sessions and making more transactions per session. This highly involved group tended to be older. Gender differences were small and not meaningful. The researchers identified four distinct subtypes among this highly involved group.

Cluster 0: High frequency but moderate stakes. This cluster included 3,317 people who tended to gamble frequently and regularly (average of 15 sessions per month). Their gambling behaviour was relatively stable (i.e., did not show extreme spikes in spending and maintained consistent engagement). They had moderate levels of spending per session compared with other clusters. Their gambling pattern suggested habitual or routine engagement.

Cluster 1: High stakes but moderate frequency. This cluster included 2,031 people who gambled less frequently than Cluster 1 but tended to place larger bets when they did. They had significantly larger win/loss amounts than other clusters. Their gambling pattern suggested VIPs or high rollers who bet larger amounts when they gambled.

Cluster 2: Infrequent but intense gambling. This cluster included 18 people who rarely gambled but bet large amounts when they did. Their gambling pattern varied greatly in frequency and wagered amounts, which might reflect occasional but high-risk gambling episodes. This cluster showed short time intervals between transactions, suggesting rapid and likely compulsive gambling.

Cluster -1: Erratic pattern with frequent nighttime gambling. This cluster consisted of 7 people whose gambling patterns were highly irregular and difficult to classify. They showed unpredictable behaviour and had large fluctuations in wagered amounts and gambling frequency. Their gambling pattern suggested impulsive and emotional gambling.

How you can use this research

This research can support the design of tailored harm reduction strategies that match different behavioural profiles.

About the researchers

Mana Azizsoltani and **Kasra Ghaharian** are affiliated with the International Gaming Institute at the University of Nevada, Las Vegas in Las Vegas, NV, USA. **Ismael Gomez-Talal** and **José Luis Rojo Alvarez** are affiliated with the Department of Signal Theory and Communications and Telematic Systems and Computation at Rey Juan Carlos University in Madrid, Spain. Ismael Gomez-Talal is also affiliated with the International Gaming Institute at the University of Nevada, Las Vegas in Las Vegas, NV, USA. For more information about this study, please contact Mana Azizsoltani at mana@diffgaming.com, or Ismael Gomez-Talal at ismael.gomez.talal@urjc.es.

Citation

Azizsoltani, M., Gomez-Talal, I., Rojo-Alvarez, J. L., & Ghaharian, K. (2026). Interpretable behavioral clusters of gamblers through unsupervised learning. *Acta Psychologica, 267*, 106947. https://doi.org/10.1016/j.actpsy.2026.106947

Study Funding

This study was funded by the Nevada Department of Health and Human Services and the Nevada Council on Problem Gambling. It was supported by the Cyber-Fold project, funded by the European Union through the NextGenerationEU Instrument (Recovery, Transformation, and Resilience Plan), and managed by the Instituto Nacional de Ciberseguridad de España, Spain. This study was also partially supported by the Autonomous Community of Madrid (ELLIS Madrid Node) and the Spanish Ministry of Science and Innovation.

About Greo Evidence Insights

Greo Evidence Insights is an independent, non-profit organization specializing in research, knowledge mobilization, and evaluation in the health and well-being sectors. Greo transforms research and insights into actionable strategies to prevent and reduce harm related to gambling, gaming, technology use, and substance use. To learn more about funding for Research Snapshots visit our website.