UNIVERSITY of MARYLAND
SCHOOL OF SOCIAL WORK

WLA
WORLD LOTTERY ASSOCIATION

Patterns of lottery play among loyalty program participants: Associations with problem gambling

Paul Sacco, PhD MSW
Jihyeong Jeong, MA
Tural Mammadli, MSW

Background

- **Longstanding interest in behavioral health risk detection**
  - The SBIRT Project (2014-2017)
  - Consumer Credit Counseling Study
- **New ICRG grant on lottery gambling (2022)**
- **Mentor Connection** (Renee C. Williams)
- **Timetable**
  - Grant submission (Summer 2022)
  - Grant Award (Winter 2022)
  - Project Start (February 2023)
  - Data Collection (May 2023)
  - Analysis and Dissemination (2023-2025)

WLA
WORLD LOTTERY ASSOCIATION

UNIVERSITY of MARYLAND
SCHOOL OF SOCIAL WORK

Articles from this Study

Contents lists available at ScienceDirect

Addictive Behaviors

journal homepage: www.elsevier.com/locate/addictbeh

Assessing the risk of problem gambling among lottery loyalty program members: A machine learning approach

Paul Sacco *, Jihyeong Jeong

University of Maryland, 525 West Redwood Street, Baltimore, MD 21201, United States

Contents lists available at ScienceDirect

Addictive Behaviors Reports

journal homepage: www.elsevier.com/locate/abrep

Dimensionality and validity of the Gambling Motives Questionnaire – Financial among lottery loyalty program participants

Jihyeong Jeong *, Paul Sacco

School of Social Work, University of Maryland, Baltimore, United States

Main Findings

- 14% Problem Gamblers
- RF Analysis "Okay"
- Detected 91% of non-PGs
- Detected 50% of PGs
- Demographics & other gambling important

Main Findings

- Overall Motives = ↑Risk
- Coping Motives = ↑Risk
- Social Motives = ↓Risk
- Multiple sociodemographic risks: age, gender, race, income, marital status

The Current Study

- **Previous machine learning study**
  - Included non-lottery features (e.g., casino)
  - Supervised learning approach (Random Forests)
- **Move to unsupervised learning**
  - Identify subpopulations (or classes) of ticket upload patterns (“person-centered” approach)
  - Test whether being a given class of ticket upload pattern was associated with enhanced PG risk

WLA
WORLD LOTTERY ASSOCIATION

UNIVERSITY of MARYLAND
SCHOOL OF SOCIAL WORK

Lottery gambling and PG Risk

- Gambling disorders -> harm to individuals, families & communities.[1]
- Lottery = most popular form of gambling.[2, 3, 4]
- Harm r/t lottery may be from overall gambling.[3,5]
- Lottery loyalty prog's ↑ problem gamblers.[6, 7]
- Person-centered analyses have been used to classify based on gambling patterns,[8,9,10,11] but not in a sample of lottery loyalty participants

WLA
WORLD LOTTERY ASSOCIATION

UNIVERSITY of MARYLAND
SCHOOL OF SOCIAL WORK

Sample: Ticket and Surveys

- 136,260 survey invitations and a total of 6,847 lottery players responded (5%).
- Data on survey responses was merged with data on lottery ticket uploads
- The sample was limited to cases where individuals were loyalty members for at least 30 days (*n*=3,695).

WLA
WORLD LOTTERY ASSOCIATION

UNIVERSITY of MARYLAND
SCHOOL OF SOCIAL WORK

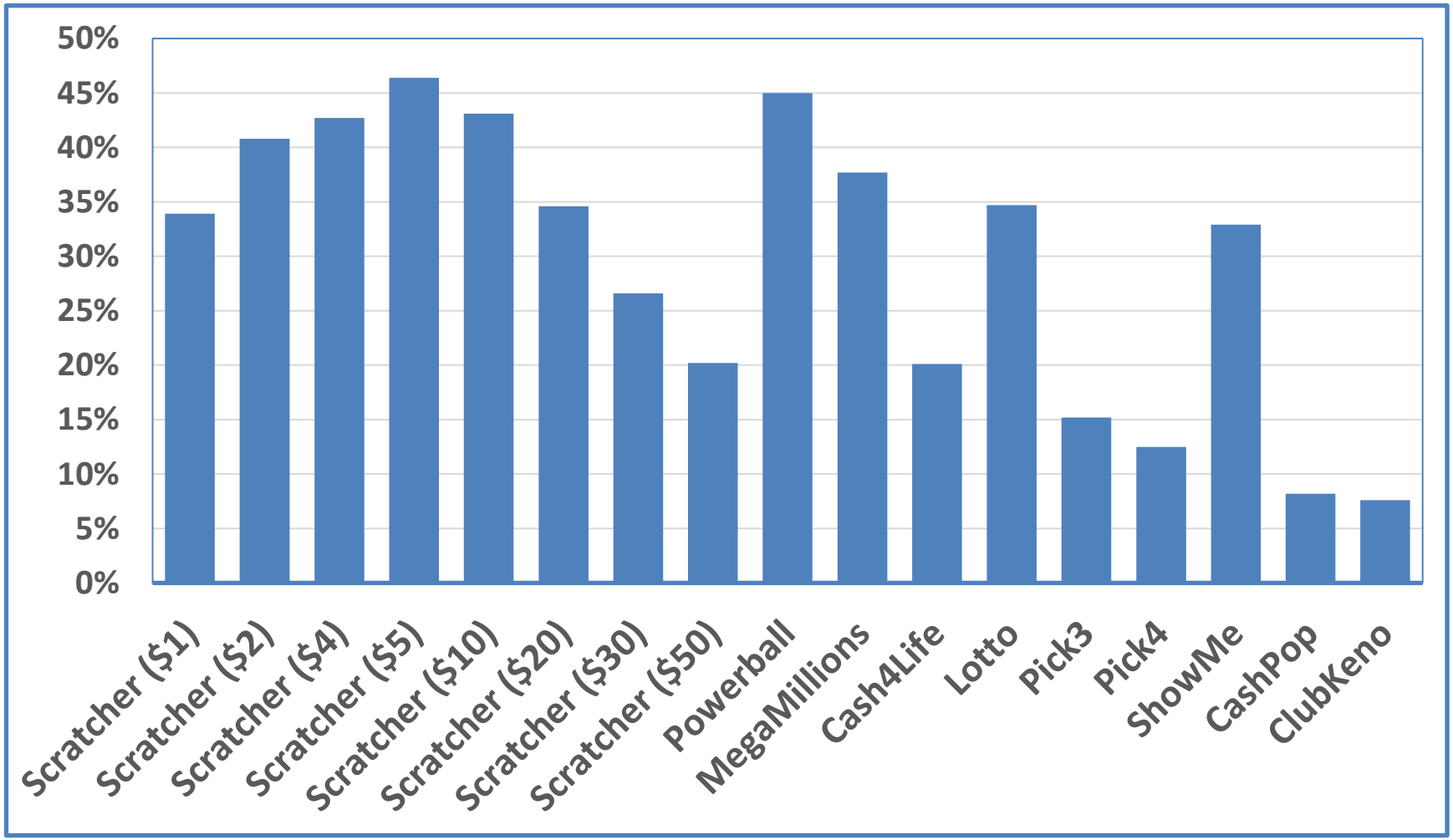
Sample Characteristics

- 14% PGSI (5+), higher than epidemiologic estimates.[12]
- Mean coping score 5.67 (SD=5.7; range 4-16).
- mean age 54.5 years old (SD=12.4).
- Men 40% of the sample.
- 11.7% African American & 1.3% as Latinx.
- Education: 34.2% high school degree or less; 36.7% some college education; 22.4% college degree & 6.7% advanced degree.

WLA
WORLD LOTTERY ASSOCIATION

UNIVERSITY of MARYLAND
SCHOOL OF SOCIAL WORK

Percentage by Ticket Type



WLA
WORLD LOTTERY ASSOCIATION

UNIVERSITY of MARYLAND
SCHOOL OF SOCIAL WORK

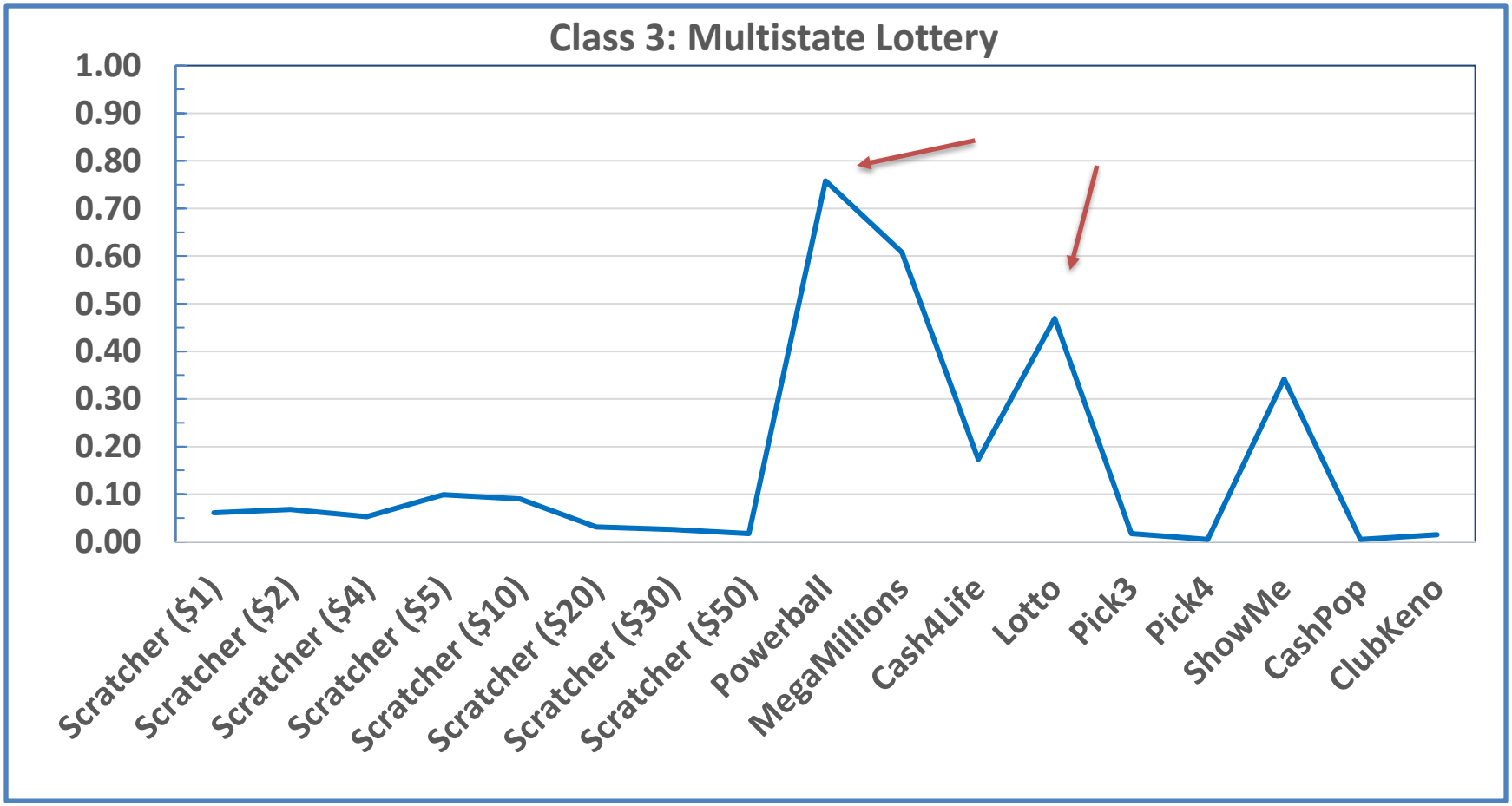
Latent Class Analysis[13]

- **Classification Model**
  - Series of nested models, 1-class, 2-class…
  - Compare models using AIC, BIC, entropy, etc.
  - Key ideas:
    - Classification based on binary 0/1 items
    - Not deterministic, but probabilities for each class
- **Prediction model**
  - Dependent variable – Latent class
  - Independent variables – PGSI(5+), Age, Male gender, Black race, Latino Ethnicity, Education, Unemployed, Coping Gambling

Eight Class Model

- **Class 1:** High Volume (11%)
- **Class 2:** High value Instant Win (7%)
- **Class 3:** Multistate Lottery (22%)
- **Class 4:** Daily Draws (4%)
- **Class 5:** High Instant Win (9%)
- **Class 6:** Low Value Instant and Interstate Lottery (8%)
- **Class 7:** Low Price Instant Win (26%)
- **Class 8:** Low Participation Instant win (13%)

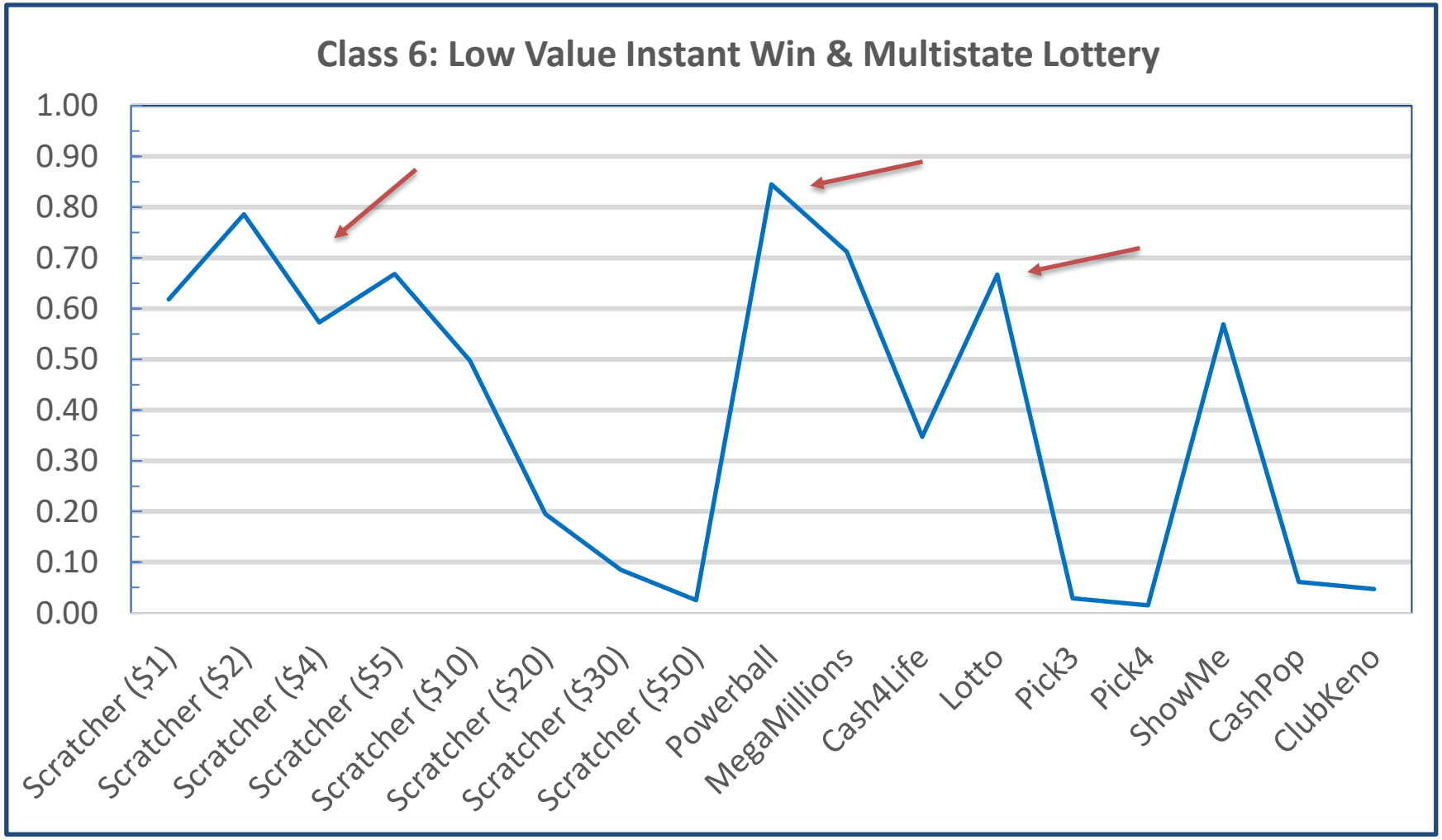
Lowest Risk Class (ref.)



WLA
WORLD LOTTERY ASSOCIATION

UNIVERSITY of MARYLAND
SCHOOL OF SOCIAL WORK

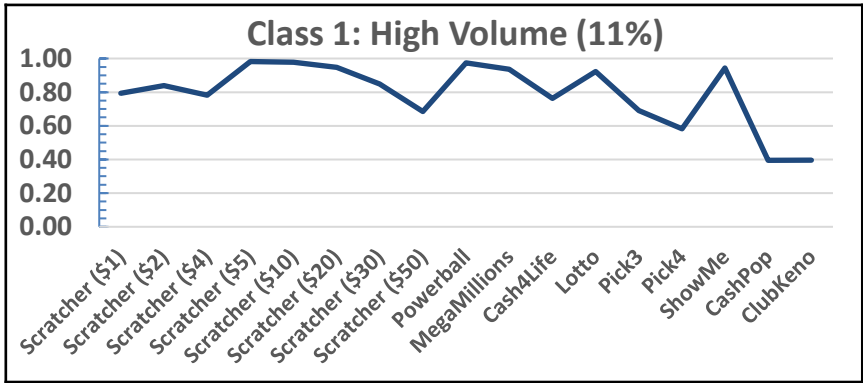
Low Risk: Class 6

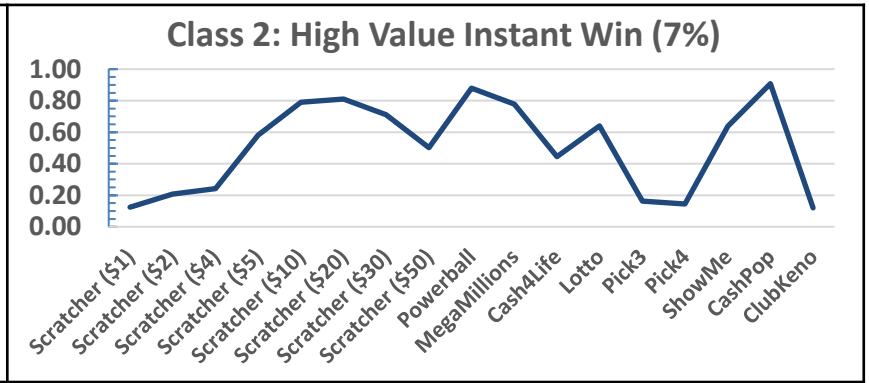


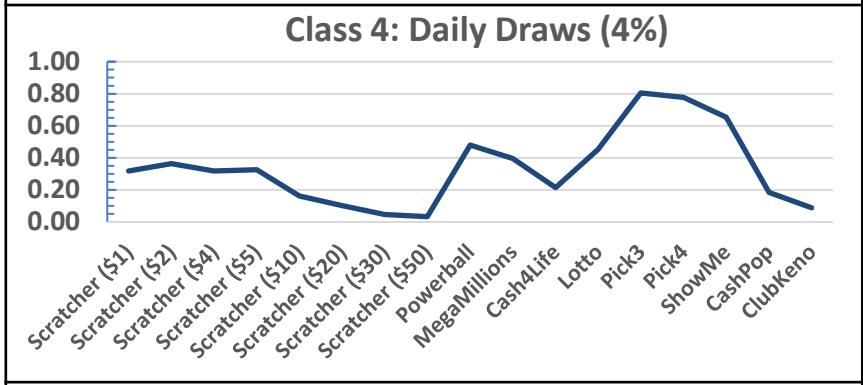
WLA
WORLD LOTTERY ASSOCIATION

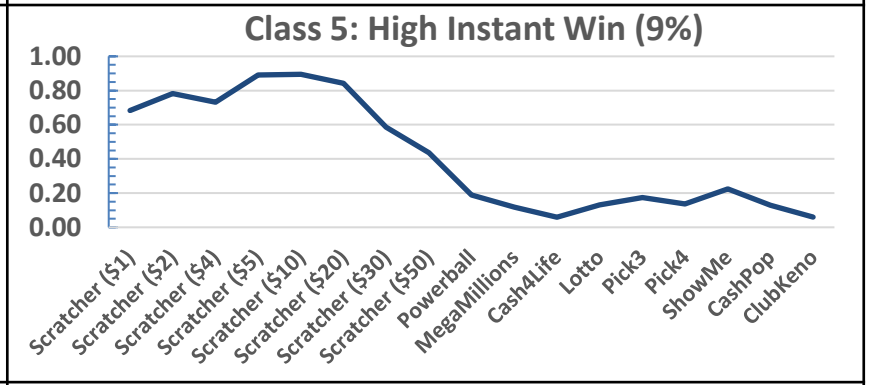
UNIVERSITY of MARYLAND
SCHOOL OF SOCIAL WORK

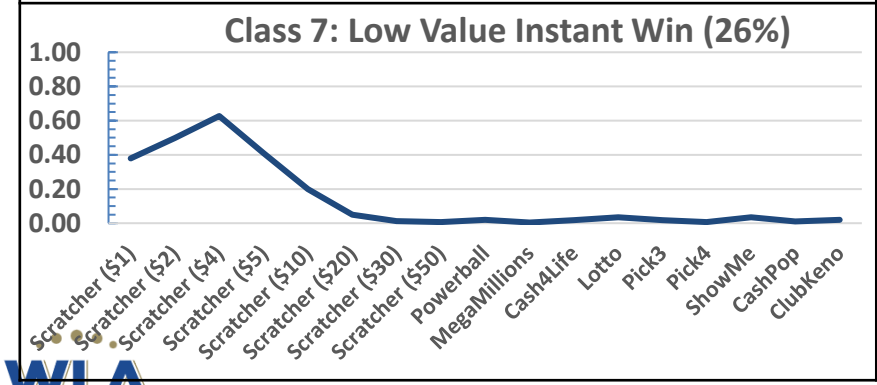
High Risk Classes

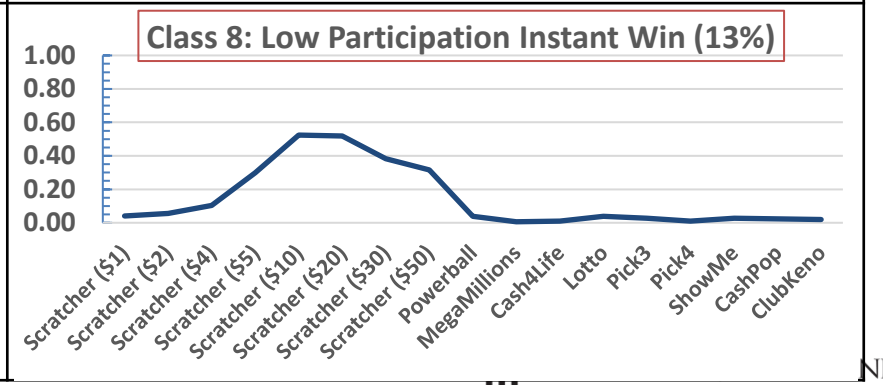












Correlates of Latent Class

Reference class (C3: Multistate 22%)	C1: High Volume (11%)	C2: High value instant win (7%)	C4: Daily Draws (4%)	C5: High Scratchers (9%)	C6: Low Value Instant & Multi-state (8%)	C7: Low Price Instant Win (26%)	C8: Low Part Instant win (13%)
PGSI	**6.58*** **	**5.88*** **	**9.05*** **	**9.14*** **	1.72	**5.67*** **	**8.42*** **
Age (in years)	1.02	1.01	1.00	**0.98** **	1.01	**0.95*** **	0.99
Male gender	0.83	1.39	0.94	**0.69***	**0.41*** **	**0.36*** **	0.84
AA/Black race	**1.71***	0.870	**10.49*** **	1.43	0.92	0.92	1.089
Latino Ethnicity	0.28	1.06	0.61	0.66	0.99	0.68	1.10
Education Level	**0.64*** **	**0.80***	**0.60*** **	**0.62*** **	0.842	**0.59*** **	**0.79** **
Unemployed	1.89	2.11	1.91	1.73	1.10	2.64	0.97
Coping Gambling	**1.16*** **	**1.11***	**1.11***	**1.14*** **	**1.12***	**1.14*** **	**1.11** **

WLA
WORLD LOTTERY ASSOCIATION

UNIVERSITY of MARYLAND
SCHOOL OF SOCIAL WORK

Main Findings

- **Patterns of uploads that are lower risk?**
  - Multistate lotteries
  - Instant win tickets with lower face values

- **Multiple high-risk patterns involving…**
  - Higher value instant win tickets
  - Daily Draw tickets

- **Consistent sociodemographic correlates**
  - Education, Coping gambling, Gender
  - Class 5: Racial disparities & risk re: daily draws

WLA
WORLD LOTTERY ASSOCIATION

UNIVERSITY of MARYLAND
SCHOOL OF SOCIAL WORK

Limitations

- **Low response rate**
  - PGSI is a reliable measure
  - But survey response is an issue
- **Limits of LCA**
  - Are the classes just outliers?
  - Nominal fallacy
- **Purchases not uploaded?**
  - Some players may be at high risk but don't upload tickets
- **Unexplored: Role of other gambling**

WLA
WORLD LOTTERY ASSOCIATION

UNIVERSITY of MARYLAND
SCHOOL OF SOCIAL WORK

What it might mean

- **Some tickets may be more attractive to at-risk gamblers**
  - Scratch tickets[14, 15, 16, 17, 18]
  - Higher payout
  - Lower cost
- **Draw tickets & African American purchasers**
  - May confer greater risk
  - Cultural history of numbers playing?[19]

Acknowledgments

INTERNATIONAL CENTER FOR RESPONSIBLE GAMING

Lottery Authority that shared their data for this project.

This research was funded in whole by a grant from the International Center for Responsible Gaming supported by The Hoosier Lottery Problem Gambling Research Fund, a fund of Central Indiana Community Foundation. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the International Center for Responsible Gaming.

Jihyeong Jeong, MA

Tural Mammadli, MSW

WLA
WORLD LOTTERY ASSOCIATION

UNIVERSITY of MARYLAND
SCHOOL OF SOCIAL WORK

References

1. Langham, E., Thorne, H., Browne, M., Donaldson, P., Rose, J., & Rockloff, M. (2015). Understanding gambling related harm: A proposed definition, conceptual framework, and taxonomy of harms. *BMC Public Health, 16*(1), 80. https://doi.org/10.1186/s12889-016-2747-0
2. Cunningham-Williams, R. M., Grucza, R. A., Cottler, L. B., Womack, S. B., Books, S. J., Przybeck, T. R., Spitznagel, E. L., & Cloninger, C. R. (2005). Prevalence and predictors of pathological gambling: results from the St. Louis personality, health and lifestyle (SLPHL) study. *Journal of Psychiatric Research*, *39*(4), 377-390. https://doi.org/10.1016/j.jpsychires.2004.09.002
3. LaPlante, D. A., Nelson, S. E., LaBrie, R. A., & Shaffer, H. J. (2011). Disordered gambling, type of gambling and gambling involvement in the British Gambling Prevalence Survey 2007. *European Journal of Public Health, 21*(4), 532-537. https://doi.org/10.1093/eurpub/ckp177
4. Sproston, K., Erens, B., & Orford, J. (2000). *Gambling behaviour in Britain: Results from the British gambling prevalence survey*. National Centre for Social Research, London.
5. Welte, J. W., Barnes, G. M., Wieczorek, W. F., Tidwell, M.-C. O., & Hoffman, J. H. (2007). Type of gambling and availability as risk factors for problem gambling: A Tobit regression analysis by age and gender. *International Gambling Studies, 7*(2), 183-198. https://doi.org/10.1080/14459790701387543
6. Delfabbro, P., & King, D. L. (2020). The prevalence of loyalty program use and its association with higher risk gambling in Australia. *Journal of Behavioral Addictions, 9*(4), 1093-1097. https://doi.org/10.1556/2006.2020.00082
7. LaPlante, D. A., Gray, H. M., Bosworth, L., & Shaffer, H. J. (2010). Thirty years of lottery public health research: Methodological strategies and trends. *Journal of Gambling Studies, 26*(2), 301-329. https://doi.org/10.1007/s10899-010-9185-1
8. Challet-Bouju, G., Hardouin, J.-B., Thiabaud, E., Saillard, A., Donnio, Y., Grall-Bronnec, M., & Perrot, B. (2020). Modeling early gambling behavior using indicators from online lottery gambling tracking data: Longitudinal analysis. *Journal of Medical Internet Research, 22*(8), e17675. https://doi.org/10.2196/17675
9. Lloyd, J., Doll, H., Hawton, K., Dutton, W. H., Geddes, J. R., Goodwin, G. M., & Rogers, R. D. (2010). Internet gamblers: A latent class analysis of their behaviours and health experiences. *Journal of Gambling Studies, 26*(3), 387–399. https://doi.org/10.1007/s10899-010-9188-y
10. Boldero, J. M., Bell, R. C., & Moore, S. M. (2010). Do gambling activity patterns predict gambling problems? A latent class analysis of gambling forms among Australian youth. *International Gambling Studies, 10*(2), 151–163. https://doi.org/10.1080/14459795.2010.501808
11. Lloyd, J., Doll, H., Hawton, K., Dutton, W. H., Geddes, J. R., Goodwin, G. M., & Rogers, R. D. (2010). Internet gamblers: A latent class analysis of their behaviours and health experiences. *Journal of Gambling Studies, 26*(3), 387-399. https://doi.org/10.1007/s10899-022-10180-0
12. Delfabbro, P., & King, D. L. (2022). Is there a continuum of behavioural dependence in problem gambling? Evidence from 15 years of Australian prevalence research. *International Journal of Mental Health and Addiction, 20(4), 2208–2220. https://doi.org/10.1007/s11469-021-00509-y*
13. Sinha, P., Calfee, C. S., & Delucchi, K. L. (2021). Practitioner's Guide to Latent Class Analysis: Methodological Considerations and Common Pitfalls. *Critical Care Medicine, 49(1), e63–e79. https://doi.org/10.1097/ccm.0000000000004710*
14. Delfabbro, P., & Parke, J. (2021). Empirical Evidence Relating to the Relative Riskiness of Scratch-Card Gambling. *Journal of Gambling Studies, 37(3), 1007–1024. https://doi.org/10.1007/s10899-021-10033-2*
15. Short, M., Penney, A., Mazmanian, D., & Jamieson, J. (2015). Lottery ticket and instant win ticket gambling: Exploring the distinctions. *Journal of Gambling Issues(30), 6–21. https://doi.org/http://dx.doi.org/10.4309/jgi.2015.30.4*
16. Booth, L., Thomas, S., Moodie, R., Peeters, A., White, V., Pierce, H., Anderson, A. S., & Pettigrew, S. (2020). Gambling-related harms attributable to lotteries products. *Addictive Behaviors, 109, 106472. https://doi.org/10.1016/j.addbeh.2020.106472*
17. Stange, M. (2021). *Examining the Influence of Scratch Card Structural Characteristics on Psychophysiology, Motivation, and Gambling Behaviour University of Waterloo]. Waterloo, Ontario, Canada.*
18. Raposo-Lima, C., Castro, L., Sousa, N., & Morgado, P. (2015). SCRATCH THAT! — Two case reports of scratch-card gambling disorder. *Addictive Behaviors, 45, 30–33. https://doi.org/10.1016/j.addbeh.2015.01.018*
19. Harris, L. (2024). Histories of America's Lottery System. *Reviews in American History 52*(4), 334-339. https://dx.doi.org/10.1353/rah.2024.a948358.

WLA
WORLD LOTTERY ASSOCIATION

UNIVERSITY of MARYLAND
SCHOOL OF SOCIAL WORK