

# The near-miss in online slot machine gambling: a pre-registered conceptual replication

Lucas Palmer, Mario Ferrari, Luke Clark

Centre for Gambling Research, Department of Psychology, University of British Columbia, Vancouver

## INTRODUCTION

There have been recent calls to confirm the replicability and robustness of key effects within gambling research, in part due to the influence this research can have on gambling policy.<sup>1,2</sup>

One of the more widely studied phenomena is the effect of near-miss outcomes on slot machines. As one popular theory posits: near-misses are experienced as primarily aversive, inducing feelings of regret for the missed win, which then increases a participant's motivation to continue playing the slot machine. Some studies indicate the aversion is driven primarily by near-misses that fall directly after the payline (such that the outcome was displayed and then withdrawn).<sup>3</sup>

Here we report the results of 2 experiments attempting to replicate these effects of near-misses, modelled on the designs of two prior studies.<sup>4,5</sup>

### Hypotheses:

- 1) Participants will report increased *motivation* to continue playing the slot machine after near-misses relative to full-misses.
- 2) Participants will report decreased ratings of positive valence (i.e. increased aversion) after near-misses relative to full-misses.
- 3) The valence ratings will be lower (i.e. increased aversion) following near misses after the payline, relative to both near-misses before the payline and full-misses.

## METHODS

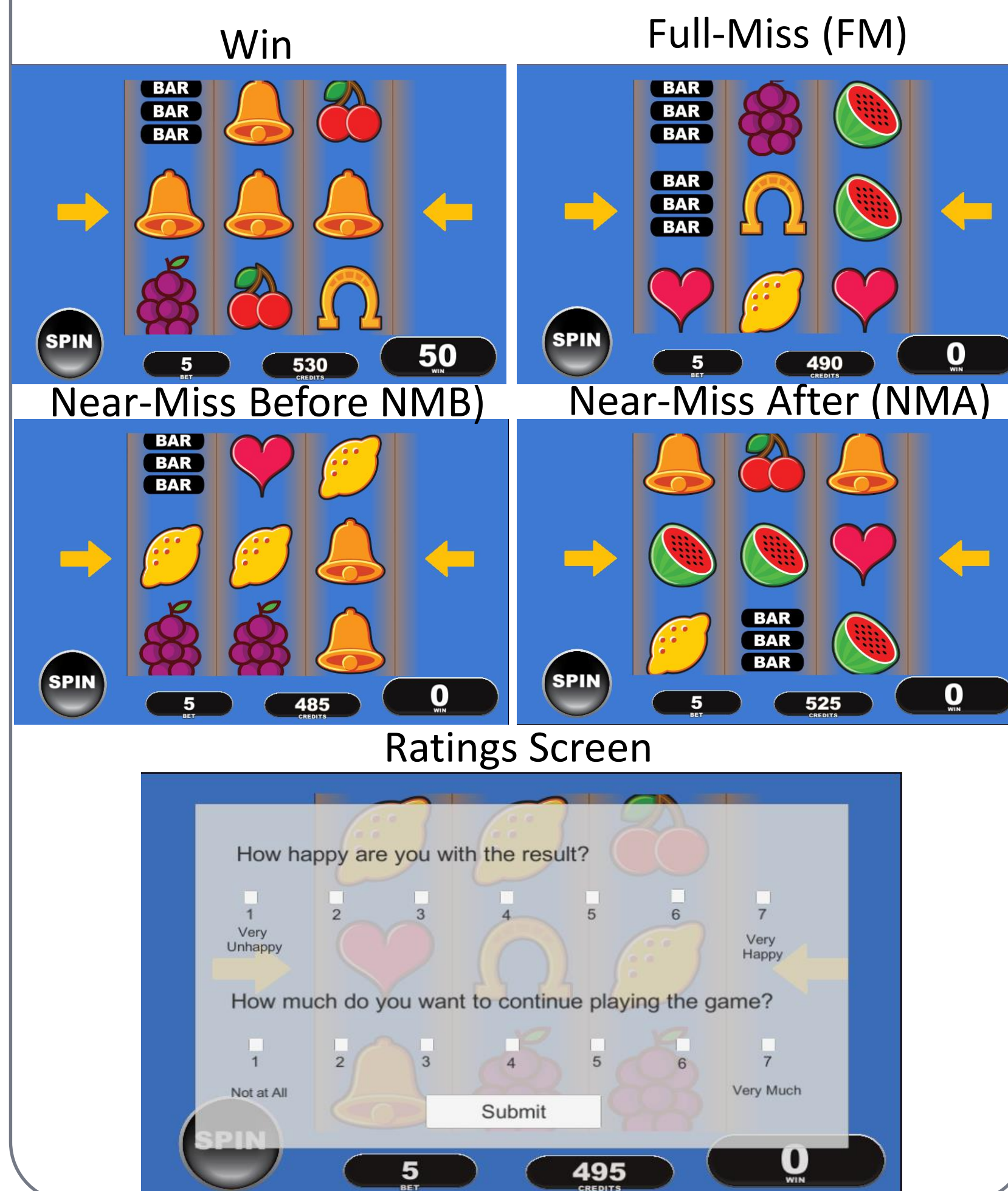
Exp 1: N = 169 (86 Female), Exp 2: N = 144 (67 Female) w/PGSI<7.

Participants play 30 spins on one of 2 fixed sequences on an online three reel slot machine.

2 ratings after each trial:

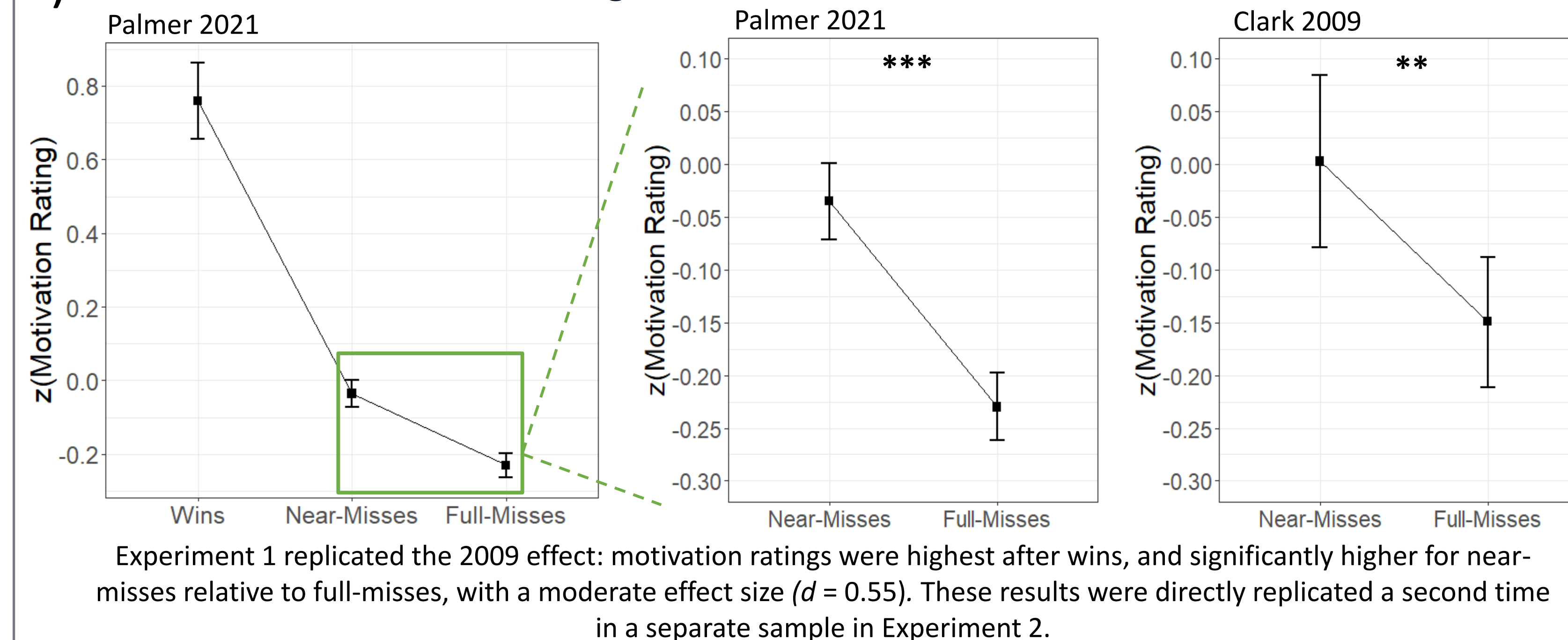
- How happy are you with the result? (Valence)
- How much do you want to continue playing? (Motivation)

4 outcome types (1/6 = wins, 1/6 = NMA, 1/6 = NMB, 3/6 = FM)

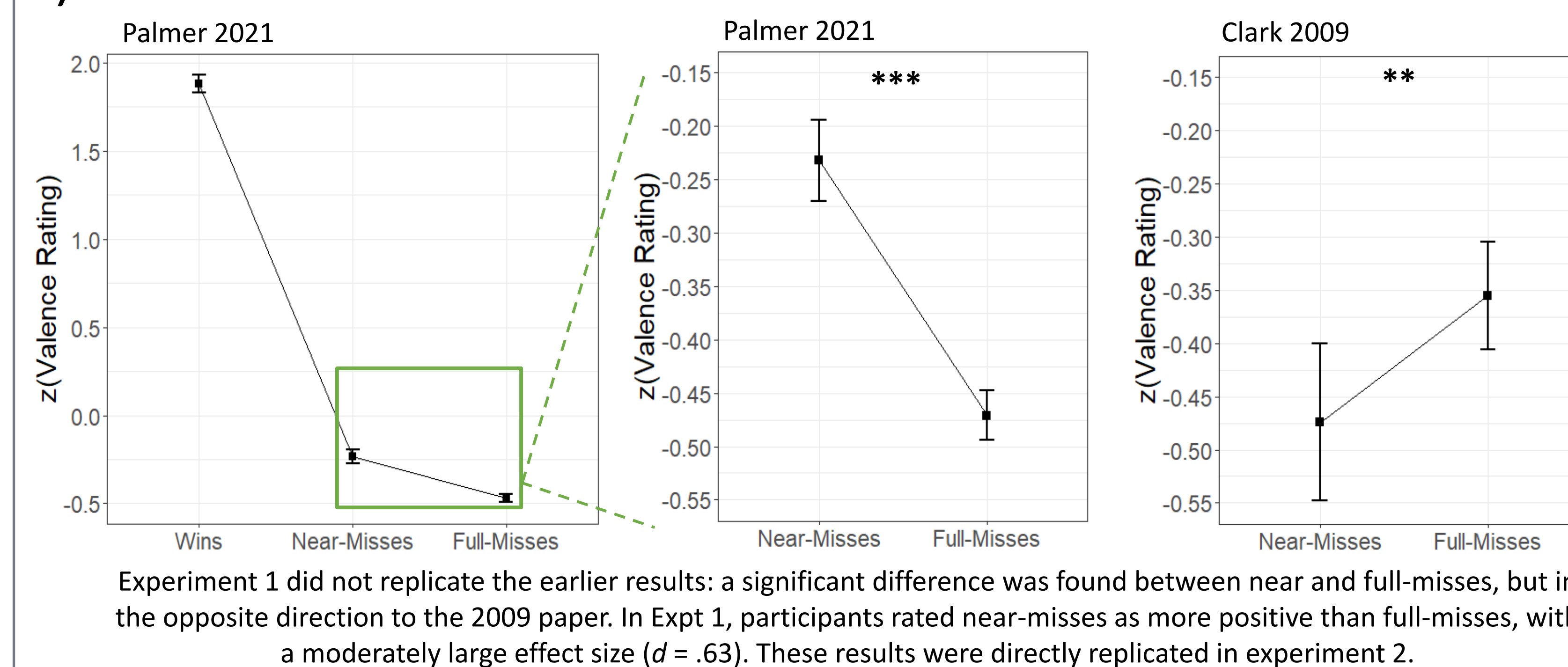


## RESULTS

### 1) Are near-misses more motivating than full-misses?

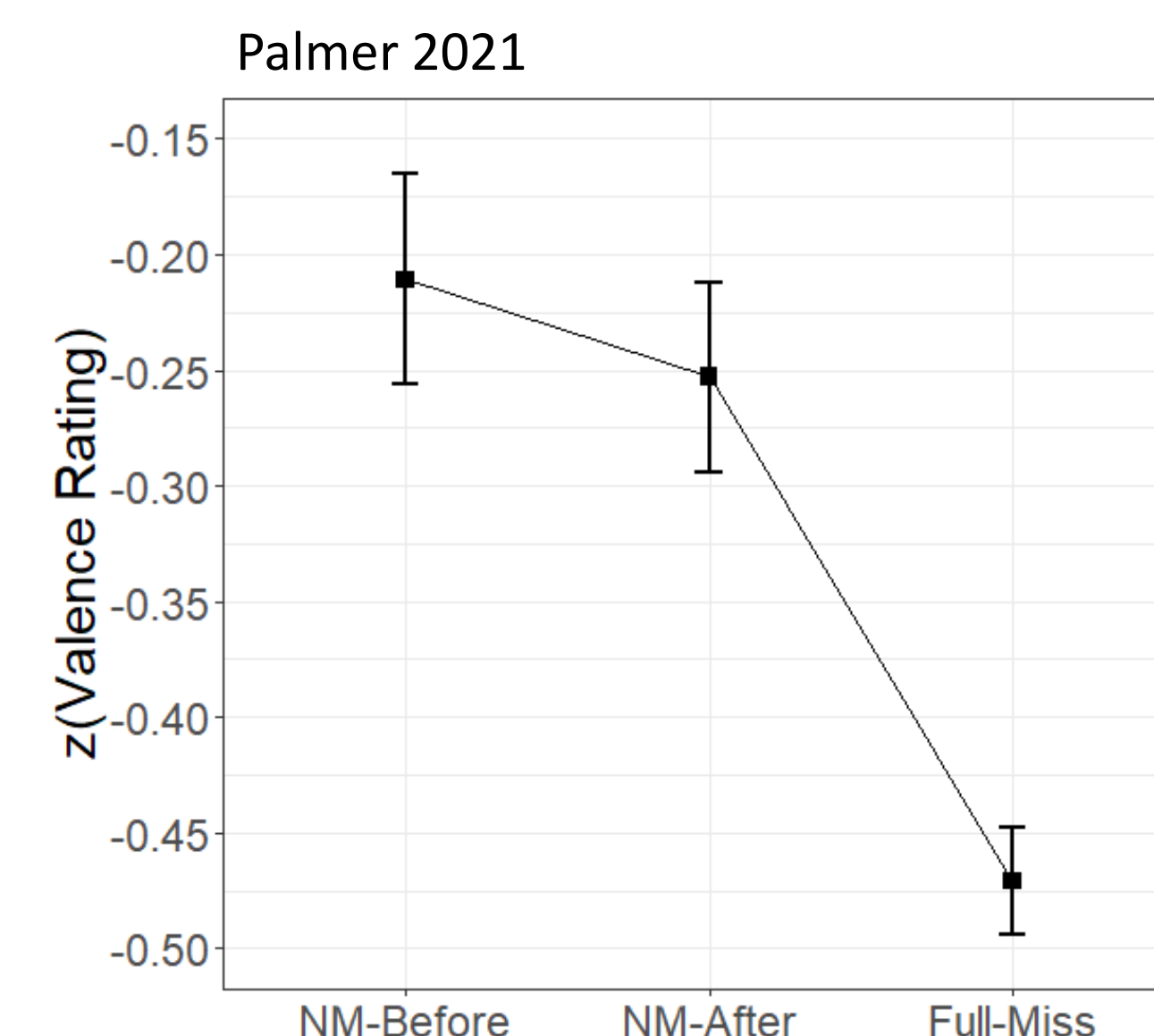


### 2) Are near-misses more aversive than full-misses?



### 3) Near misses either side of the payline

Contrary to hypothesis 3, in experiment 1 both subtypes of near-miss were rated as significantly more positive than full-misses. In Expt 1, there was also a small difference between NMB > NMA, but this effect did not reach significance in Experiment 2.



## CONCLUSION

Across both replication studies, near-misses increased motivation to continue the game relative to full-misses, replicating the earlier papers. While these findings are based on subjective ratings rather than behavioural persistence, they support near-misses as a key structural characteristic that can be engineered within modern gambling products. By contrast, the effects on the valence ratings did not replicate the earlier research: near-misses were experienced as more positive than full-misses, and near-misses either side of the payline (NMA and NMB) had broadly similar effects. Past research has reported that near-misses were experienced as a particularly aversive outcome, with some evidence that this aversiveness was attributable to those outcomes that pass through the payline (such that the win is withdrawn, i.e. NMA). By that account, the aversion may be driven by feelings of regret for a potentially missed win, which could further trigger the motivation to continue playing in order to overcome these negative emotions. Given the current research investigates these effects in two of the most highly powered samples to date, it is worth reconsidering this classical account of near-misses. By an alternative account, near-misses may be processed as a type of 'mini-win', based on reward/goal generalization. Our data are more consistent with this mini-win theory.

This is first in a line of experiments where we are planning to test the robustness of the near-miss with respect to several dependent variables. Future studies will examine effects on speed of play, risk-taking, and a behavioural measure of gambling persistence.

## REFERENCES

1. Michael J. A. Wohl, Nassim Tabri & John M. Zelenski (2019): The need for open science practices and well-conducted replications in the field of gambling studies, *International Gambling Studies*, <https://doi.org/10.1080/14459795.2019.1672769>
2. Robert M. Heirene (2021) A call for replications of addiction research: which studies should we replicate and what constitutes a 'successful' replication?, *Addiction Research & Theory*, 29:2, 89-97, <https://doi.org/10.1080/16066359.2020.1751130>
3. Wu, Y., van Dijk, E., Li, H., Aitken, M., & Clark, L. (2017). On the Counterfactual Nature of Gambling Near-misses: An Experimental Study. *Journal of behavioral decision making*, 30(4), 855-868. <https://doi.org/10.1002/bdm.2010>
4. Clark, L., Lawrence, A. J., Astley-Jones, F., & Gray, N. (2009). Gambling near-misses enhance motivation to gamble and recruit win-related brain circuitry. *Neuron*, 61(3), 481-490. <https://doi.org/10.1016/j.neuron.2008.12.031>
5. Clark, L., Liu, R., McKavanagh, R., Garrett, A., Dunn, B. D., & Aitken, M. R. F. (2013). Learning and affect following near-miss outcomes in simulated gambling. *Journal of Behavioral Decision Making*, 26(5), 442-450. <https://doi.org/10.1002/bdm.1774>

## Disclosures

This study was supported by the core funding of the Centre for Gambling Research at UBC, which is supported by the Province of British Columbia government and the British Columbia Lottery Corporation (BCLC; a Canadian Crown Corporation). LC also holds a Discovery Award from the Natural Sciences and Engineering Research Council of Canada (RGPIN-2017-04069). LP holds a graduate fellowship from the UBC Department of Psychology, and MF holds an NSERC Graduate Fellowship.