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Research Article

Are Bidding Behaviors of Jeopardy! Gameshow Contestants Influenced by Gender/Sex?

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Here we explored the potential sex/gender differences in risk-taking behaviors in Jeopardy!, a popular American television gameshow known for its unique blend of trivia knowledge and strategic wagering. Utilizing a retrospective analysis of publicly available Jeopardy! episodes spanning from 1984 to 2022, we investigated contestants' wagering behaviors during the game's Daily Double segments. These segments require contestants to make wagers before seeing the clue, introducing a calculated risk that varies with the contestants' confidence in the category. The dataset included episodes from different decades to assess whether bidding behaviors might have changed over time and whether these behaviors exhibited significant differences between contestants who were perceived women and men. Analysis did not reveal any statistically significant differences in the wagering patterns between men and women across all Daily Doubles or within specific rounds of play. Even when considering the temporal trends over approximately four decades, the interaction between contestant sex/gender and epoch did not significantly affect the percentage of amount wagered. The absence of significant differences between perceived women and men underscores the complexity of risk-taking behaviors and the potential influence of changing societal norms and cultural contexts on these behaviors. Our study contributes to the broader discourse on risk-taking by highlighting the importance of situational and temporal contexts in evaluating risk preferences. While focused on a specific and unique context, a gameshow, these findings invite further research into the complexities of human decision-making and risk-taking behaviors across different domains and environments.

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Introduction

Risk-taking behaviors have been extensively studied within the psychological, neurological, and socio-cultural frameworks, contributing to our understanding of individual and group differences [1][2][3][4][5][6]. However, a long-standing debate in the field of risk research pertains to the potential differences between the sexes in their leaning towards risk-taking. While some studies suggest significantly greater risk aversion in women than in men [7][8][9], others argue that these differences are context-dependent, diminished under certain conditions, or are altogether non-existent [10][11][12]. Consequently, the question of whether these differences exist remains unanswered, despite research in this area, with mixed findings presenting a complex narrative.

Jeopardy! is a long-running American television gameshow that combines trivia knowledge and strategic wagering. The show made its debut in 1964 and has since become a fixture of North American television. The game is played with three contestants competing against each other in a battle of knowledge across various categories. The show's host reads clues to the contestants, who respond with their answers in the form of a question. This answer-with-question format sets Jeopardy! apart from other quiz shows. The clues are valued at different monetary amounts, and higher-value clues are generally more challenging. The contestants select clues from a game board that displays the categories and clue values.

Each game of Jeopardy! consists of three segments: Jeopardy!, Double Jeopardy!, and Final Jeopardy!. In the Jeopardy! round, contestants take turns choosing clues and responding with their answers. If a contestant provides the correct response, they earn the clue's monetary value, and if they are incorrect, the money is deducted from their score. The Double Jeopardy! round follows a similar format but with higher clue values. In the Final Jeopardy! segment, contestants wager a portion of their winnings on a single clue. The contestant with the highest score at the end of Final Jeopardy! emerges as the game's winner.

One particularly exciting portion of the game is called the Daily Double. This portion of the game requires that contestants take a calculated risk with their wagering strategy, as they must wager before seeing the clue on the board, while knowing only the category. After placing their wager, the clue is revealed, and the contestant who made the wager gets a chance to answer. If they answer correctly, their wagered amount is added to their score. However, if they answer incorrectly, the wagered amount is deducted from their

score. There is one Daily Double clue during the Jeopardy! round and two Daily Double clues during the Double Jeopardy segment. The Daily Doubles present a risky decision for contestants. If they feel confident in a particular category or want to take a chance to catch up to their opponents, they may choose to wager a significant percent of the amount they currently have. Conversely, if they are unsure about the category or want to play it safe, they may wager a smaller amount. Consequently, the Daily Double adds an element of risk-taking to the game that serves as an ideal model to study risk-taking behaviors in a television gameshow. To this end, the current study determined whether sex/gender differences in risk-taking, as measured by contestants' wager, is evidenced in Jeopardy! game play.

Materials and Methods

Data Collection

Our data were collected from watching contestants in the gameshow Jeopardy! The study focused on potential sex/gender differences in their bidding behaviors during the Daily Double portion of the game. We collected data retrospectively by watching publicly available online recordings of the gameshow streaming on Pluto TV (www.pluto.tv) and telecasts from a local television station (KXAN) between September and December 2022. While our observations occurred during that 4-month period, the analyzed dataset included games recorded from 1984 to 2022. Additionally, not all episodes were publicly available during our observation period, consequently an a priori decision was made to analyze every episode from years containing fewer than 20 episodes and up to 20 randomly chosen episodes for years that contained more than 20 online episodes. We recognize that sexuality is not binary, however for purposes of our study we defined sex/gender as "perceived sex/gender" based on observable gender/sex-related characteristics. Therefore, hereinafter any reference to women or men should be understood as perceived women or men. The data were collected from observation of recordings and no interactions occurred between researchers and contestants. Finally, we did not conduct an analysis of inter-rater reliability.

Data Analyses

Analyses examined the percentage of each contestant's current amount that was bid on each of three Daily Doubles. We separately analyzed the bidding patterns for each round and then collectively for all Daily Doubles and compared these between men and women. The chronological year of the games was

also used as a variable in our study to account for potential temporal trends in bidding behavior. However, because some years included very few online episodes, we clustered episodes into four groups of years that included the following approximate decades: 1984-1994, 1995-2004, 2005-2014, 2015-2022. Note that the number of available online episodes impacted the size of each group, meaning the first group contained episodes for 11 years and the last group for 7 years, consequently these groups are labeled "approximate decades." Additionally, in instances where contestants placed bids exceeding 100%, such data were omitted. This scenario predominantly occurred during the first Daily Double, due to contestants having a score below the maximum permissible bid.

Statistics

We used independent t-tests to compare the bidding patterns of women and men for the three Daily Doubles separately and then for all combined. This approach was intended to identify any sex/gender differences in the average percentage of amount bid in each round and overall. To analyze the potential changes in these bidding patterns over the four decades covered by our data set, we performed a mixed-design analysis of variance (ANOVA). In this model, the sex/gender of the contestants was treated as the between-subjects factor, while the decade was the within-subjects factor. This allowed us to examine both the main effects of sex/gender and decade and their interaction on the average percentage bid across Daily Doubles.

These analyses were performed using Prism GraphPad statistical software (www.graphpad.com). The research was conducted ethically, using anonymized and publicly available data. The University of Texas at Austin Institutional Review Board determined that this study meets the criteria for exemption from IRB review under 45 CFR 46.104.

Results

The analysis of bidding patterns between male and female contestants revealed no significant differences. This was demonstrated through t-tests comparing the two groups across all daily doubles (Figure 1A, $t_{(503)} = 0.4865$, $p = 0.6268$), as well as specific comparisons for the first (Figure 1B, $t_{(149)} = 1.410$, $p = 0.1606$), second (Figure 1C, $t_{(173)} = 0.1440$, $p = 0.8857$), and third (Figure 1D, $t_{(177)} = 0.4404$, $p = 0.6602$) daily double.
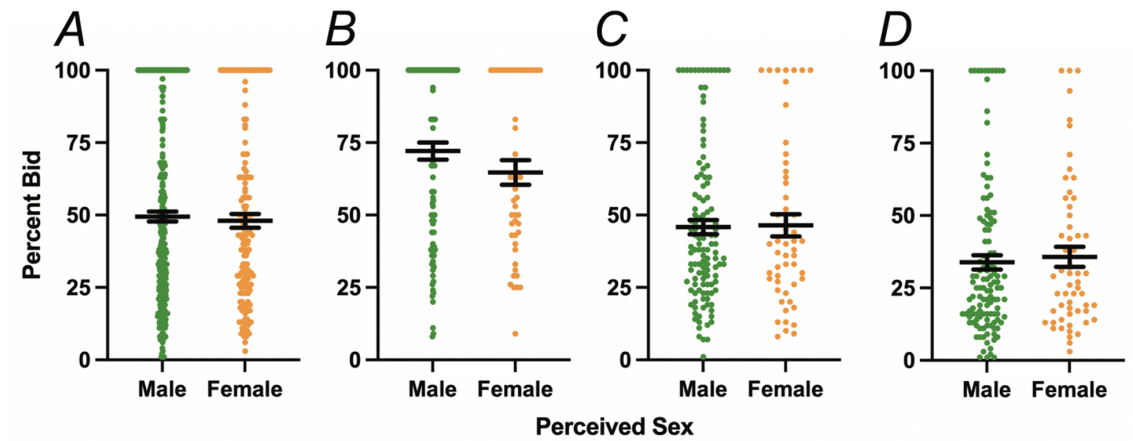
Figure 1. Bidding patterns between male and female contestants were not significantly different. Percent bids for males and females in all combined Daily Doubles (A), in addition to only the first (B), second (C), and third (D) Daily Double.

Although the average bidding rates (Figure 2) might suggest initial trends, such as males bidding higher percentages than females in earlier epochs (1984 –1994 and 1995 – 2004) and females outbidding males in the most recent epoch (2015 – 2022), these observations are not supported by more rigorous statistical tests. Specifically, a mixed-effect analysis of variance (ANOVA) demonstrated that the interactions between perceived sex/gender and epochs in bidding rates are not statistically significant ($F_{(3, 154)}$ = 2.008, p = 0.1152).
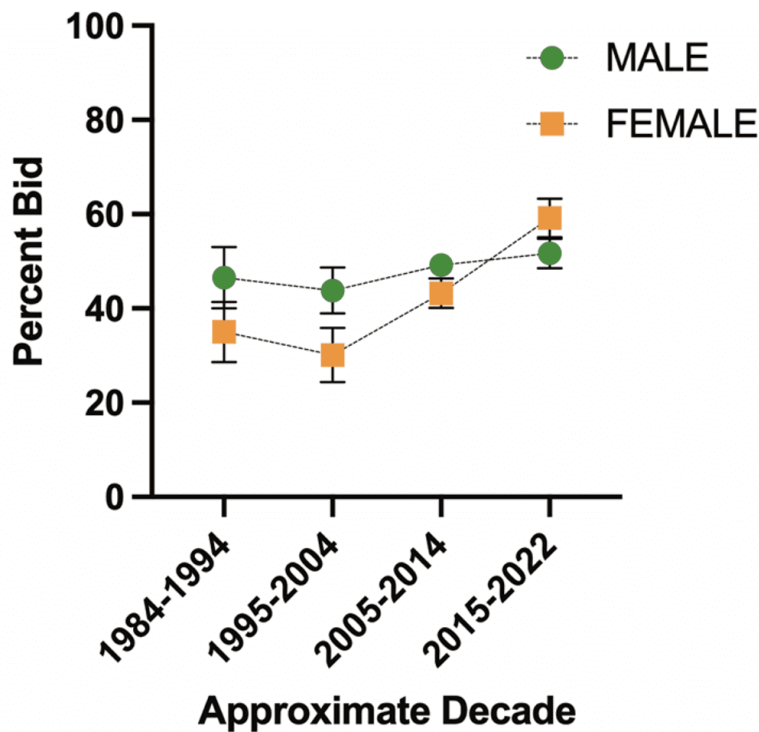
Figure 2. Epoch did not impact sex/gender differences in wager. Average bidding rates were not statistically different between male and female contestants across four-approximate decades.

Discussion

Earlier research, primarily rooted in evolutionary psychology, suggests that on average males are more inclined towards risk-taking behaviors than are females. This assertion based, in part, on the theory of sexual selection, suggests that men have historically faced higher pressures to compete for resources and mates, which in turn might have necessitated greater propensity for risk [13][14].

While the evolutionary perspective provided an initial basis, the socio-cultural perspective brought in another layer of complexity, attributing sex/gender differences in risk-taking to socialization processes and cultural norms. Over the years, evidence has shown a range of results, with some studies supporting sex/gender differences [7][8][9], whereas others indicate that these differences depend on content or are altogether absent [10][11][12]. Further layers of complexities are added by our emerging recognition of sex and gender as spectrums rather than binaries, which challenges the traditional male-female dichotomy

in risk research. The intersection of biological, psychological, and socio-cultural factors that potentially mediate sex/gender differences in risk-taking behaviors necessitates a more nuanced exploration of this area.

Given these complexities, the present study investigated sex/gender differences in risk-taking behavior as exhibited in the wagering strategies of contestants on the gameshow Jeopardy! across different epochs. Contrary to some prevailing conventions in the risk behavior literature, our findings did not support the hypothesis of significant sex/gender-based differences in risk-taking, as measured by the percentage of wagers during the Daily Double segments of the game.

Our analysis of data, spanning from 1984 to 2022, suggests that the risk-taking behaviors in the context of Jeopardy! are not significantly influenced by the sex/gender of the contestants. This finding is aligned with the idea that sex/gender differences in risk-taking may be context-dependent and not as universally pronounced as previously thought. For instance, Filippin and Crosetto [10] and Nelson [11] have suggested that risk preferences can vary significantly depending on the specific scenario or environment, potentially explaining the lack of pronounced differences observed in our study.

Secondly, the absence of significant differences in bidding behavior between male and female contestants across epochs might challenge some traditional views on risk aversion. While it was observed that men tended to bid slightly higher in earlier epochs and women in more recent epochs, these differences were not statistically significant. While not statistically significant, these trends still underscore the complexity of risk-taking behaviors and suggest that differences in risk aversion may not always be straightforward and might be influenced by a multitude of factors, including societal changes and evolving cultural norms.

Lastly, our findings have implications for understanding risk-taking behaviors in game theory and real-life scenarios. Jeopardy!, with its blend of knowledge, strategy, and risk, offers a unique microcosm for studying human decision-making. The fact that contestants' risk-taking behaviors did not significantly differ by sex/gender over some decades suggests a potential paradigm shift in how we perceive and analyze risk-taking in competitive environments.

It is, however, important to recognize three significant limitations inherent in our study. Firstly, the data were collected from publicly available pre-recorded telecasts of the gameshow. The selection of these episodes was determined by the availability on the streaming service or television station, and not through random sampling by the researchers. This method of episode selection may have introduced a

selection bias since it does not necessarily represent a comprehensive cross-section of all Jeopardy! episodes. Secondly, subjects in our study were not drawn from a random sample of the general population but were instead a select group of contestants on a gameshow known for its rigorous contestant selection process. This process typically chooses highly knowledgeable individuals, potentially skewing the sample towards those with higher levels of preparation and trivia knowledge. Consequently, the contestants' advanced skill level and preparedness might have masked any potential sex/gender differences in risk-taking behaviors that could be more apparent in a general population. Another notable limitation of our study is the lack of data regarding the contestants' sexual orientation or identity. Our methodology did not involve directly interacting with the contestants, nor did it include ways to ascertain their sexual identity or biological sex beyond observable characteristics. This limitation is significant as it restricts our ability to make definitive comparisons based on sexual orientation or identity.

In conclusion, while our study focused on a specific context, it contributes to the broader discourse on risk-taking behaviors. It highlights the importance of considering the situational and temporal contexts when evaluating risk preferences and behaviors. Future research might explore how these findings translate to other domains of risk-taking, potentially offering more nuanced insights into the complexities of human decision-making processes.

Statements and Declarations

References

1. ^de-Juan-Ripoll C, Giglioli IAC, Llanes-Jurado J, Marin-Morales J, Alcaniz M (2021). "Why Do We Take Risks? Perception of the Situation and Risk Proneness Predict Domain-Specific Risk Taking." Front Psychol. 12. doi:

10.3389/fpsyg.2021.562381.

2. ^*Dohmen T, Falk A, Huffman D, Sunde U, Schupp J, Wagner GG (2011). "Individual Risk Attitudes: Measurement, Determinants, and Behavioral Consequences." J Eur Econ Assoc. 9(3):522–550. doi:10.1111/j.1542-4774.2011.01015.x.*

3. ^*Kusev P, Purser H, Heilman R, Cooke AJ, Van Schaik P, Baranova V, et al. (2017). "Understanding Risky Behavior: The Influence of Cognitive, Emotional and Hormonal Factors on Decision-Making under Risk." Front Psychol. 8. doi:10.3389/fpsyg.2017.00102.*

4. ^*Levin IP, Xue G, Weller JA, Reimann M, Lauriola M, Bechara A (2012). "A Neuropsychological Approach to Understanding Risk-Taking for Potential Gains and Losses." Front Neurosci-Switz. 6. doi:10.3389/fnins.2012.00015.*

5. ^*Salas-Rodriguez J, Gomez-Jacinto L, Hombrados-Mendieta I, del Pino-Brunet N (2022). "Applying an Evolutionary Approach of Risk-Taking Behaviors in Adolescents." Front Psychol. 12. doi:10.3389/fpsyg.2021.694134.*

6. ^*Byrnes JP, Miller DC, Schafer WD (1999). "Gender Differences in Risk Taking: A Meta-Analysis." Psychol Bull. 125(3):367–383. doi:10.1037/0033-2909.125.3.367.*

7. a, b*Charness G, Gneezy U (2012). "Strong Evidence for Gender Differences in Risk Taking." J Econ Behav Organ. 83(1):50–58. doi:10.1016/j.jebo.2011.06.007.*

8. a, b*Powell M, Ansic D (1997). "Gender Differences in Risk Behaviour in Financial Decision-Making: An Experimental Analysis." J Econ Psychol. 18(6):605–628. doi:10.1016/S0167-4870(97)00026-3.*

9. a, b*Xie ZX, Page L, Hardy B (2017). "Investigating Gender Differences under Time Pressure in Financial Risk Taking." Front Behav Neurosci. 11. doi:10.3389/fnbeh.2017.00246.*

10. a, b, c*Filippin A, Crosetto P (2016). "A Reconsideration of Gender Differences in Risk Attitudes." Manage Sci. 62(11):3138–3160. doi:10.1287/mnsc.2015.2294.*

11. a, b, c*Nelson JA (2015). "Are Women Really More Risk-Averse Than Men? A Re-Analysis of the Literature Using Expanded Methods." J Econ Surv. 29(3):566–585. doi:10.1111/joes.12069.*

12. a, b*Schubert R, Brown M, Gysler M, Brachinger HW (1999). "Financial Decision-Making: Are Women Really More Risk-Averse?" Am Econ Rev. 89(2):381–385. doi:10.1257/aer.89.2.381.*

13. ^*Petrie M (2021). "Evolution by Sexual Selection." Front Ecol Evol. 9:786868.*

14. ^*Ryan MJ (2021). "Darwin, Sexual Selection, and the Brain." P Natl Acad Sci USA. 118(8). doi:10.1073/pnas.2008194118.*

Declarations

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