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Abstract:

This paper seeks to identify factors that motivate small and medium enterprises (SMEs) to establish business ties with banks in Oman. We collect data from 217 SMEs through questionnaire survey. We apply qualitative analytical technique in which various statements under each item was assigned the rating of pluses based on the degree of agreement among the respondents with the statements. In addition, t-test is performed to assess the differences in response. We find that SMEs place greater emphasis on electronic banking system, convenient location, behavior of bank staffs and favorable terms and conditions of financing. The results further show that SMEs choose Islamic banks because it fits their religious belief. This finding matches the Islamic culture and values practiced in Oman. Moreover, the responding SMEs perceive that Islamic banks are going to thrive in the future; hence, they intend to engage with Islamic banks although most entrepreneurs are not aware about the variety of Islamic banking products.

Keywords: Entrepreneurs, Islamic Finance, Small and Medium Enterprises, Oman

JEL Classification: G21, G28

Conflict of interest statement:

On behalf of all authors, the corresponding author states that there is no conflict of interest.

<p>Kuang-Chung Hsu (Main Author) <i>University of Central Oklahoma</i></p> <p>Nikki Diane Boyar (Additional Author) <i>University of Central Oklahoma</i></p> <p>Lexus Taylor Penn (Additional Author) <i>University of Central Oklahoma</i></p>	<p>Choking under Performance and Gender: A Revisit with Data from Collegiate Tennis Matches</p>
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Abstract:

This study employs data from college tennis to highlight the impact of pressure on the performance of tennis players, with a specific focus on gender differences. The results suggest that while female players show improvements in certain aspects of their serving performance under pressure, they tend to perform worse than their male counterparts in terms of using their serves to win points. These findings contribute to our understanding of the psychological factors that can influence player performance in tennis.

Keywords: competitive pressure, choking, college tennis, gender

1. Introduction

The phenomenon of choking has been extensively studied in various sports.¹ Existing literature has demonstrated a negative correlation between players' performance and the pressure they experience during their games. While these studies encompass both genders, there exists a significant disparity in monetary rewards between male and female players. Examining how male and female players handle choking can provide insights into the issue of gender inequality.

Most existing studies utilize data from professional sports to analyze the effect and determinants of choking. However, there is limited research that examines unprofessional sports such as college games. While many studies have found evidence supporting the choking effect in professional sports, using the same data to compare the choking effects between different genders can raise some concerns. The first concern is the disparity in rewards or salaries between male and female players. The significantly higher rewards in male sports compared to female sports may impact players' responses to pressure. Male players are likely to face greater consequences than female players if they choke in critical moments.²

¹ Choking phenomenon has been found in many other sports such as archery (Buccioli and Castagnetti; 2020), basketball (Cao, Price, & Stone; 2011), American football (Hsu, Liu, and Chang; 2019), golf (Wells, and Skowronski; 2012) and soccer (Dohmen; 2008).

² Toma (2017) compared the percentages of missing free-throw under pressure among players in National Basketball Association (NBA), Women's National Basketball Association (WNBA) and National Collegiate Athletic Association (NCAA). His data from ESPN.com show that players' free-throw percentages in NBA

Another potential issue, which is also linked to the income of professional players, is that choking can be mitigated through training. Players with sufficient resources can access better psychological or mental training, which helps them reduce the likelihood of choking under pressure. In fact, many lower-income professional players often face difficulties in maintaining a decent standard of living, not to mention affording expensive training costs.

This paper examines the phenomenon of choking by studying tennis matches among college players. Tennis matches are inherently filled with pressure and anxiety, and mental strength plays a crucial role in determining players' performance. Our focus is on understanding the different responses to pressure between male and female players. As highlighted by Paserman (2007) and Cohen-Zada et al. (2017), the play-by-play points in tennis offer varying levels of pressure, making it an ideal sport for our research topic. College matches do not involve monetary rewards but instead emphasize trophies and honors (such as high rankings). By using college data, we can avoid the influence of income effects on our topic. College tournaments also possess two unique features, namely the no-add and no-let (or play let) rules, which further intensify the pressure experienced in the games.

The no-add rule in tennis refers to a situation where, at deuce (score tied), the player who wins the next point also wins the game. This rule increases the pressure on both the server and the receiver, as a single point determines the entire game. It would be intriguing to observe how players handle a no-add point in the final set of a match. In tennis, a serve let occurs when the served ball touches the net and lands in the correct service box. Under the no-let rule, players must play any let, which contradicts the usual practice in tennis and amplifies the pressure on the receivers.

The remaining sections of the paper are organized as follows: Section 2 provides a literature review, with a specific focus on gender differences in performance in sports. Section 3 introduces our data and empirical model. Section 4 presents our empirical results, and Section 5 concludes our discussion.

2. Literature Reviews

In many sports worldwide, there exists a performance gap between men and women due to their biological differences. Despite advancements in gender equality, there is an expectation that this gap will narrow or even disappear. However, Thibault et al. (2010) found that since 1983, the gender gaps in the best performance and world records in swimming, long jump, speed skating, and track cycling have not diminished. Capranica et al. (2013) also discuss the trend in gender gaps in sports performance and the underlying issues related to gender differences. Their analysis, using data from the 2012 London Olympic Games, shows that while the gap is closing, it still persists. Globally, cultural and sociopolitical factors continue to influence female performance in sports. Consequently, the gender gap in physical strength persists and has been cited to explain certain salary disparities in occupations that heavily rely on physical power.

and WNBA declined more in the final 30 seconds in a tie game than players did in NCAA. Although he can't find any statistical evidence to prove the difference in decline in free-throw performance between professional players and college players, the results indicate that male college players who will play at the professional level choke far more than do those who do not go pro. It's very possible that the reward and expectation play an important role in a player's chance of choking under pressure.

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In addition to physical differences between males and females, there are sports that do not directly require greater physical strength. For example, Dilmaghani (2020) examines data from the World Chess Federation's tournaments between 2012 and 2019 to investigate gender differences in the effects of time constraints on performance. Her findings indicate that male chess players outperform their female counterparts in fast chess games. The performance gap between genders widens as pressure increases (due to tightened time constraints). Similar results are observed in esports. Nolla et al. (2023) discovered that women participating in mixed-gender tournaments had poorer outcomes compared to women competing in women-only tournaments. Irrespective of other factors such as gaming experience and time spent studying games, women underperformed in matches against men. Furthermore, the research conducted by Buccioli and Castagnetti (2020) demonstrates that the negative impact of choking under pressure is particularly evident among archery players, especially female players, during tiebreaks.

Winning a tennis match involves facing both physical and psychological challenges. Paserman (2007) conducted a study using data from nine Grand Slam tournaments held between 2005 and 2007 to examine how choking affects the performance of men and women differently. His analysis at the set level indicated that both genders experienced a decline in performance due to choking in the final set and decisive set. However, there was no statistical evidence to suggest that women declined more than men. In his point-by-point analyses, Paserman observed that women tended to adopt a more conservative and less aggressive playing style when the points became more crucial.

On the other hand, Cohen-Zada et al. (2017) questioned the game-theoretical framework used in Paserman's study and proposed a direct assessment of the effect of competitive pressure on the likelihood of winning a match. Their game-by-game analyses revealed that only male players significantly choked under competitive pressure, while women exhibited a smaller decline in performance compared to men in decisive moments.

In summary, the majority of studies examining gender differences in response to pressure suggest that men tend to perform better than women. However, in the context of tennis, while players may experience choking under pressure, female players are not necessarily worse than male players and sometimes even handle pressure better. Nevertheless, there is a need for further evidence in tennis to investigate the gender gap in performance under pressure.

3. Model and Data

3.1 Model

The setup of our model follows Paserman (2007) and Cohen-Zada et al. (2017). We employ point-by-point analyses but specifically focus on players' performance in serving. As argued by Cohen-Zada et al. (2017), serving plays a dominant role in modern tennis games. In comparison to the receiver, the server holds an advantage as they can choose the direction (angle), spin, speed, and height of the server. An ace refers to winning a point solely by serving the ball. Even without an ace, a server can still utilize the serve to put the opponent in an unbalanced position or elicit a weak return. Therefore, holding one's own service games is key to winning a tennis match. The objective of our model is to examine how pressure affects players' serving

performance and how men and women respond to pressure in tennis matches. Our empirical regression model is as follows:

$$(1) \quad Performance_{pgs} = \beta_0 + \beta_1 Pressure_{pgs} + \beta_2 W_m * Pressure_{pgs} + \beta_3 UTRD$$

Where *performance* is a dummy variable that measures a player's serving performance on a specific point (p), in a game (g), and in a set (s). In this study, Performance is set to 1 if a player commits a double fault, makes a successful first serve, wins on their first serve, wins on their second serve, or wins on their serve. Paserman (2007) utilizes the notion of the importance of a game point as a measure of the pressure experienced by a player. However, in our case, acquiring comprehensive historical data on players from their previous matches is not feasible. Therefore, we employ the second approach proposed by Cohen-Zada et al. (2017), which involves ranking the pressure in each point-by-point scenario while also considering the concept of importance as outlined in Paserman (2007).

Since this paper focuses on players' serving performance, we specifically examine the pressure experienced by the server. Assuming that players aim to hold their serving games, we categorize the pressures servers encounter into two types during a match. The first type is the pressure originating from the game itself. When the scores are close, regardless of whether the server is winning or losing, servers face higher pressure. In this study, we refer to this type of pressure as relative pressure, which is calculated based on the differences in players' points, game counts, and set counts.³

The second type of pressure arises from the passage of time. As the match approaches its conclusion, players experience increased pressure. This is referred to as absolute pressure.⁴ To determine a player's overall pressure at any point in the match, we calculate their combined pressure per point, game, and set. This is done by multiplying the relative pressure and absolute pressure per point, game, and set. The player's overall pressure is the product of their combined point, game, and set pressure.⁵

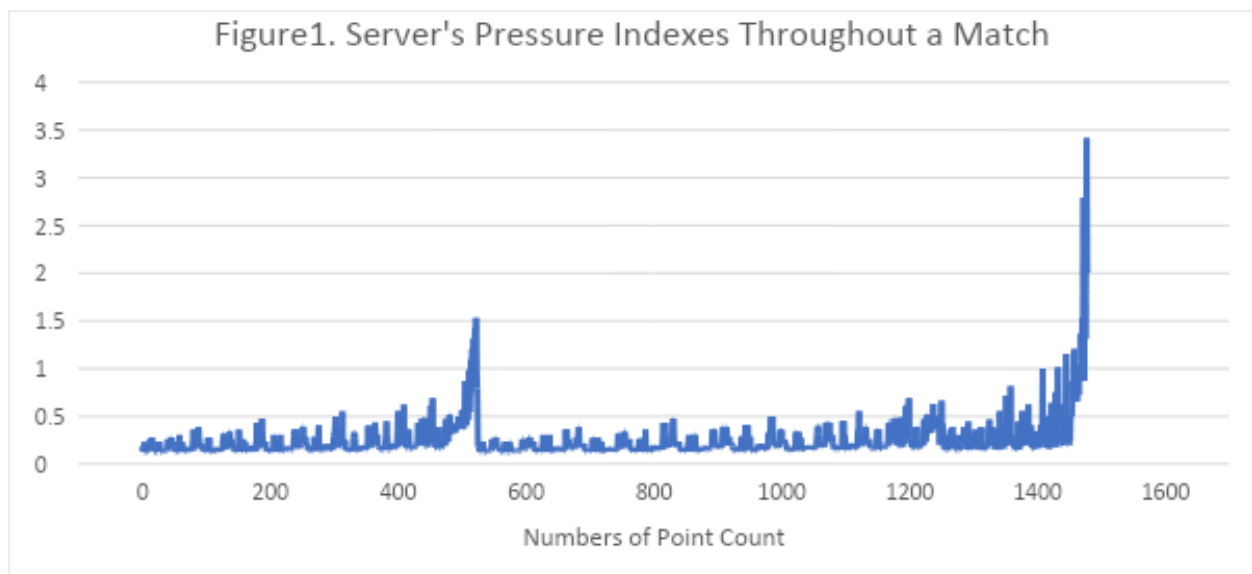
³ We calculate a server's releasing indexes first, and the pressure indexes are derived as the inverse of the releasing indexes. The relative pressure index is obtained by taking the inverse of the relative releasing index, which is computed as the absolute value of the difference between the server's own point, game count, and set count, and the opponent's point, game count, and set count. To prevent a denominator of zero, we add 1 to all relative releasing point, game, and set indexes.

⁴ Similar to the computation of relative pressure, the absolute pressure index is calculated as the inverse of the absolute releasing index. To compute the absolute releasing index for a point, game, and set, you divide the sum of both the server's and receiver's points, game counts, and set counts. To ensure that the last tied points, games, and sets have the lowest absolute releasing indexes of 1, you have selected 95, 13, and 3 as the numerator for the absolute point, game, and set releasing indexes.

⁵ The overall releasing index at any point in the match is computed as the product of a server's combined releasing indexes for the point, game, and set. Each combined releasing index is obtained by multiplying the relative releasing index and the absolute releasing index for that specific point. In turn, the overall pressure index at any point in the match is calculated as the inverse of the logarithm of the overall releasing index for that point, plus one. This adjustment ensures that the overall pressure index does not have negative values.

One unique characteristic of college matches is the implementation of the no-add rule. In our study, we consider the no-add cases as a benchmark, as they have the highest combined pressure points within a game. Tiebreaks present another exception within a match. There are two types of tiebreaks: regular tiebreaks and super tiebreaks. Regular tiebreaks occur when the set is tied at 6 games to 6. In a regular tiebreak, players play to 7 points to determine the winner of the set. On the other hand, super tiebreaks take place when two players have split the first two sets. The super tiebreak decides the outcome of the match, and in this case, players play to 10 points. Since regular tiebreaks conclude a set and a super tiebreak determines the outcome of a match, we consider the pressure indexes during tiebreaks to be higher than the benchmark in most cases.⁶

In Figure 1, we present the dynamics of the pressure index throughout a match, considering all potential scores, including deuces (no-add) and tiebreaks. This representation aligns with the concept of importance as discussed in Paserman (2007) since it illustrates that a server's pressure intensifies as the game nears the point that determines each game and set. Notably, during tiebreaks, players experience significantly heightened pressure, both in regular tiebreaks and particularly in the super tiebreak. This highlights the pronounced pressure faced by players in these tiebreak situations.



Note: The order of the x-axis is based on the sum of points, game counts, and set counts. Starting from the far left in Figure 1, a match begins with a score of 0-0 in game 1, set 1. The subsequent score combinations are as follows: 15-0, 0-15, 15-15, 30-15, 15-30, 40-15, 15-40, 30-30, 40-30, 30-40, and then 40-40 (known as deuce). As the match progresses, there can be more possible score combinations.

In our analysis, we use a gender dummy variable denoted as W_m is a gender dummy variable to differentiate between male and female players. By examining the coefficient β_1 , we can assess the influence of pressure on male players. On the other hand, the effect of pressure on

⁶ The only setting in tiebreak that different from other regular point is in calculating absolute releasing indexes. the numerator for the absolute releasing indexes in tiebreaks is set to 7. This means that a score of 6-0 or 0-6 in the tiebreak will have the same absolute releasing index as our benchmark.

female players can be determined by the sum of the effect of β_1 and β_2 . If the coefficient β_2 is negative, it suggests that the performance of female players is more negatively affected by pressure compared to male players.

A player’s skill level and technique play a crucial role in determining the outcome of a tennis match. One commonly used measure to assess a player's skill is their rating in the Universal Tennis Rating (UTR) system. The UTR provides a numerical representation of a player's overall tennis ability based on their match results against other rated players. In this study, the relative skill difference between the server and receiver can be captured by calculating the UTRD (UTR difference). A higher-ranked player is typically expected to have a stronger skill set and technique, which can translate into a greater ability to dominate their opponent during their serving games. Therefore, a positive coefficient for UTRD aligns with the expectation that a higher-ranked player would have an advantage in their own serving game against a lower-ranked opponent.

3.2 Data

The dataset utilized for our analysis was obtained through scorecards from the Intercollegiate Tennis Association (ITA) and the Indoor National Championship tournament. There were twenty-six matches, and forty-six players (thirteen male and thirteen female players) participated from universities in NCAA Division One and Division Two during January to March 2023 in the Midwest region of the United States of America. All matches in our dataset were held indoors on hard-court surfaces.

These scorecards contained valuable information about the players, including their names, the schools they attend, and their rankings. The scorecards also provide information regarding the performance and outcomes of the matches. The involvement of referees ensured the accuracy and reliability of the data, as they are experienced professionals responsible for recording match results. This partnership allowed us to access a rich collection of real-time data directly from the matches, providing valuable insights into the performances of both Division One and Division Two tennis athletes.

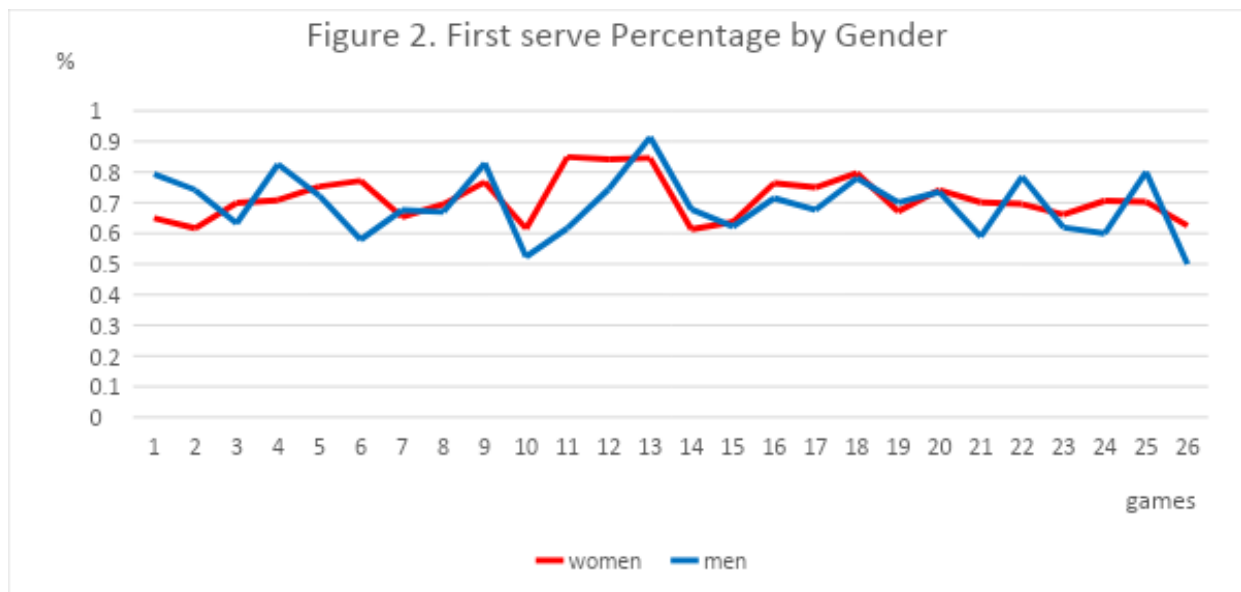
Table 1 shows some descriptive statistics of those players in this study. The average UTR of male players is higher than that of female players, indicating a slight difference in skill level between the two groups. The UTR difference shows that female matches are more intense and competitive than male players' matches. Female matches tend to have a longer duration compared to male matches, as reflected by the average number of games per match.

Table 1. Describe Statistics

female (24 players, 13 matches)				male (22 players, 13 matches)			
average	max	min	S.D.	average	max	min	S.D.

UTR	9.32	10.81	8.16	0.73	12.34	13.47	11.42	0.58
UTR difference	0.43	0.98	0.05	0.27	0.56	1.16	0.04	0.30
# of games per match	20.62	30.00	12.00	6.21	17.23	23.00	13.00	2.95
# of double faults per match	6.62	15.00	0.00	4.33	4.23	10.00	0.00	2.98
First serve %	71.02	86.25	61.30	7.82	69.27	84.03	59.22	8.13
Win % on 1 st serve	56.18	68.63	46.84	7.32	62.26	76.00	52.73	7.66
Win % on 2 nd serve	46.93	59.52	35.14	8.72	46.66	59.52	35.29	6.62
#of service point won	69.54	104.00	39.00	21.62	63.69	87.00	44.00	13.67

In terms of serving performance, female players have a higher number of double faults compared to male players but they exhibit a higher first server percentage. In Figure 2, we can observe that the percentage of successful first serves for both male and female players increases at the start of the match and then begins to decline after the midpoint. There is no apparent difference between male and female players in terms of their first serve percentage.



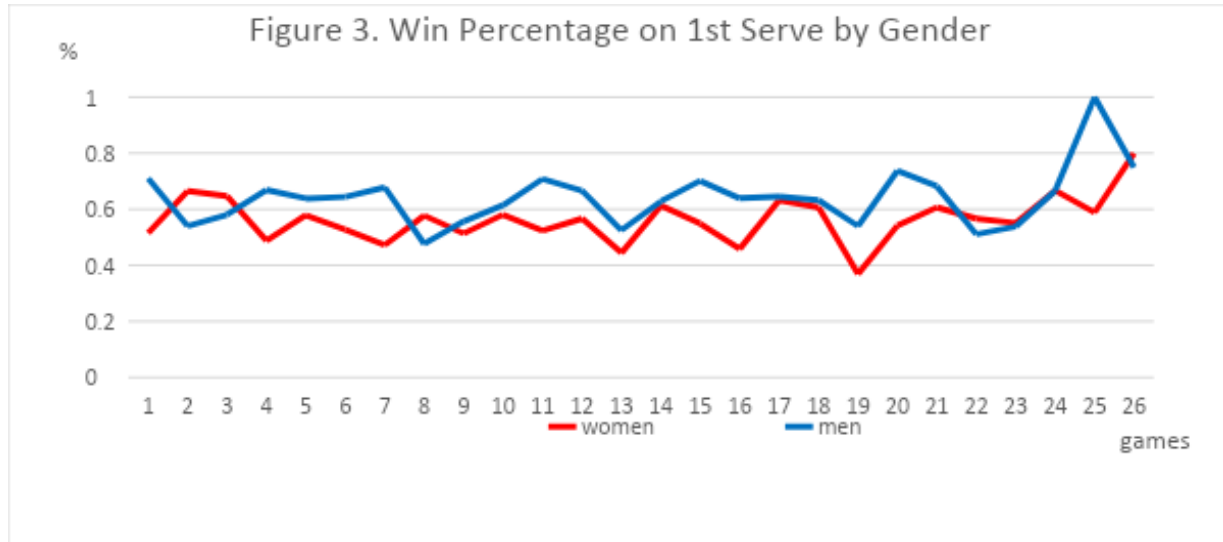
However, it is worth noting that the higher percentage on the first serve does not significantly increase the winning percentage of their first serve for female players. This fact is

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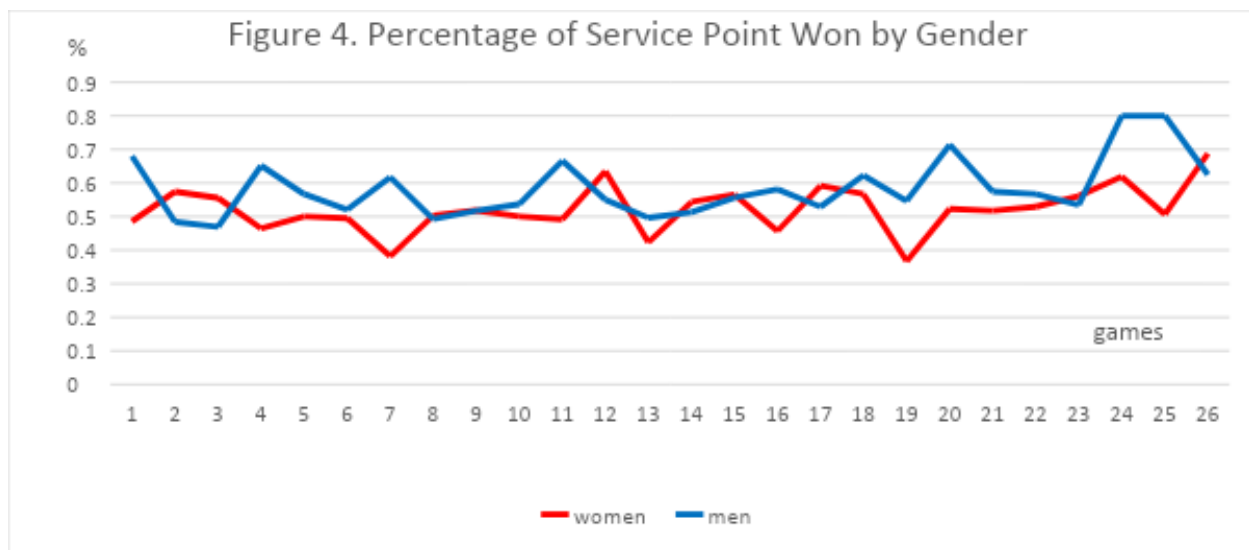
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evident from the numbers in Table 1, specifically the "Win % on 1st serve" column, as well as the lines depicted in Figure 3. It implies that female players prioritize consistency and placement with their first serve rather than going for outright winners, which is consistent with previous studies that suggest female players may be more cautious with their first serve, resulting in a conservative approach that does not necessarily lead to an increased winning percentage.



Both male and female players have higher win percentages on their first serves compared to their second serves, indicating the importance of a strong first serve in tennis. The win percentages on first serves for both genders exceed 50%, further emphasizing the significance of a well-executed first serve. Although Table 1 indicates that female players have a higher number of service points won compared to male players, the lines depicted in Figure 4 present a contrasting narrative. The figures show that both male and female players tend to win their matches with their serves, but male players, particularly towards the end of their matches, win more points with their serves.



4. Results

Because the dependent variable in equation (1) is a binary variable, we employed a logistic regression model to conduct the regression analyses.⁷ We initially conducted regression analyses solely on the data for women to examine whether female players' performance is influenced by pressure. Based on the findings presented in Table 2, it can be observed that women tend to decrease their chances of committing double faults and increase their first serve percentage when they are under pressure. However, there is no statistical evidence to suggest that pressure during matches negatively impacts female players' ability to win their games. Regarding male players, the results in Table 3 indicate that none of their performance measures were significantly affected by pressure.

Table 2. Women’s Performance under Pressure

	Double Fault	First Serve	Win on 1 st Serve	Win on 2 nd Serve	Service Won	Point Won
Pressure	-3.202** (0.022)	1.276*** (0.004)	-0.230 (0.438)	-1.139 (0.181)	-0.165 (0.549)	
UTR difference	-0.389 (0.114)	0.335*** (0.004)	0.244 (0.057)	0.656*** (0.003)	0.384*** (0.000)	
Constant	-2.319*** (0.000)	0.609*** (0.000)	0.281*** (0.002)	0.164 (0.432)	0.080 (0.319)	
p-value	0.006	0.000	0.123	0.004	0.001	
N	1775	1775	1258	431	3257	

Note: The numbers in parentheses are p-values. * p<0.1, ** p<0.05, *** p<0.01

⁷

Table 3. Men’s Performance under Pressure

	Double Fault	First Serve	Win on 1 st Serve	Win on 2 nd Serve	Service Won	Point
Pressure	-1.287 (0.410)	-0.063 (0.903)	0.094 (0.873)	1.302 (0.190)	0.466 (0.348)	
UTR difference	-0.128 (0.542)	0.143* (0.096)	0.267*** (0.006)	0.549*** (0.001)	0.337*** (0.000)	
Constant	-2.990*** (0.000)	0.808*** (0.000)	0.471*** (0.001)	-0.338 (0.155)	0.140 (0.238)	
p-value	0.559	0.248	0.021	0.002	0.000	
N	1482	1482	1019	408	1482	

Note: The numbers in parentheses are p-values. * p<0.1, ** p<0.05, *** p<0.01

Our main focus is to compare the performance of male and female players under pressure. By introducing the gender dummy variable in our equation, the results in Table 4 can provide insights into this comparison. We specifically focus on the coefficients of the interaction variable "Pressure*Women".

The coefficient of -0.959 indicates that male players perform better than female players in terms of making more first serve winners when both players are under pressure. Similarly, the negative and significant coefficient of "Pressure*Women" when service point win is the dependent variable indicates that female players, in terms of overall point-winning on their serves, perform worse than male players under pressure.

Therefore, based on these findings, we can conclude that under pressure, women tend to perform worse than men in terms of using their serves to win points. However, it is important to note that women's performance is not worse in terms of reducing mistakes or errors.

Table 4. Performance under Pressure by Gender

	Double Fault	First Serve	Win on 1 st Serve	Win on 2 nd Serve	Service Won	Point
Pressure	-3.151*** (0.009)	0.379 (0.326)	0.591 (0.137)	0.248 (0.725)	0.625* (0.061)	
Pressure*Women	1.050 (0.205)	0.598 (0.056)	-0.959*** (0.005)	-0.616 (0.281)	-0.841*** (0.003)	
UTR difference	-0.233 (0.141)	0.209*** (0.003)	0.258*** (0.001)	0.589*** (0.000)	0.354*** (0.000)	
Constant	-2.570*** (0.000)	0.692*** (0.000)	0.335*** (0.000)	-0.055 (0.716)	0.099 (0.140)	
p-value	0.012	0.000	0.000	0.000	0.000	
N	3257	3257	2278	839	3257	

Note: The numbers in parentheses are p-values. * p<0.1, ** p<0.05, *** p<0.01

5. Conclusion

The issue of whether pressure can affect players' performance has been widely studied in various professional sports. However, there is still a need for further evidence to understand the effects more comprehensively. In this study, we utilize tennis data specifically from college matches to investigate the impact of pressure on the performance of male and female tennis players. The choice of college tennis games as the dataset offers several advantages. Firstly, it helps to mitigate the influence of the wealth factor on players' performance. Unlike professional tennis, where financial considerations can potentially affect players' mindset and performance, college tennis provides a context where financial disparities are minimized, allowing for a more focused examination of pressure's effects.

Secondly, college tennis matches have unique features such as the implementation of the no-add rule and no-let rule. These rules have the effect of reducing the duration of the game and creating additional pressure situations for the players. By analyzing data from college matches, we can gain insights into how pressure affects players' performance in the presence of these specific match conditions.

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Our results indicate that when under pressure, female players tend to decrease their chances of committing double faults and increase their first serve percentage. However, our results also reveal that none of the performance measures for male players were significantly affected by pressure. Our results also state that male players tend to perform better than female players in terms of making more first serve winners when both players are under pressure. Additionally, female players, in terms of overall point-winning on their serves, perform worse than male players under pressure. However, it is important to note that women's performance is not worse in terms of reducing mistakes or errors.

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Appendix Table. Performance under Pressure by Gender: Probit model

	Double Fault	first serve	Win on 1 st serve	Win on 2 nd serve	Service Won	Point
Pressure	-1.385*** (0.008)	0.221 (0.333)	0.370 (0.130)	0.159 (0.719)	0.394 (0.058)	
Pressure*Women	0.443 (0.222)	0.360 (0.055)	-0.596*** (0.005)	-0.387 (0.279)	-0.527*** (0.003)	
UTR difference	-0.103 (0.148)	0.128*** (0.002)	0.161*** (0.001)	0.367*** (0.000)	0.221*** (0.000)	
Constant	-1.478*** (0.000)	0.432*** (0.000)	0.208*** (0.000)	-0.035 (0.710)	0.061 (0.142)	
p-value	0.011	0.000	0.000	0.000	0.000	
N	3257	3257	2278	839	3257	

Note: The numbers in parentheses are p-values. * p<0.1, ** p<0.05, *** p<0.01