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Marriage Games: A Game Theory Exploration of Marital Relationships

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Marriage Games: A Game Theory Exploration of Marital Relationships

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By

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This Project Thesis, directed and approved by the candidate's committee, has been accepted by the Honors College of Abilene Christian University in partial fulfillment of the requirements for the distinction

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Abstract

The prisoners' dilemma may be one of the most studied games in economic strategy due to its application to reality and its implications for cooperation. Despite the inherent alignment between the game and marital relationships, very little research has been conducted on married partners in a PD game. We wanted to observe the extent to which behavior in a PD game predicted marital satisfaction. Participants were recruited from a church couple's group in Abilene, Texas (n = 40). Results of this preliminary research indicate that a couple's competitiveness in the PD game has a positive relationship to marital satisfaction. The length of an individual's marriage and how often individuals cooperate with one another are negatively correlated with an individual's marital satisfaction. Results further indicate that a respondent's likelihood to forgive his partner for defection had no relationship to their marital satisfaction. We provide some possible reasons for these divergent findings. This study adds to current research on game theory and current research on marital satisfaction and relationships, while filling a gap in the current research on these topics.

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Literature Review

Over the past few decades, game theory has gone from a rarely used tool for economic analysis to one of the most used economic theories. It is inherently interdisciplinary in nature and has implications for various fields of research. According to Crawford, "game theory has fulfilled a large part of its promise, giving systematic, illuminating analyses of many central questions. Indeed, game theory has also begun to unify the rest of the social sciences, transforming parts of political science, computer science, and evolutionary biology" (2016). Game theory attempts to explain complex human interactions with other humans in mathematical terms that can be documented and analyzed. In Game theory, the goal is to find equilibrium: a point at which all players (given the information they have) will continue to use the same strategy over and over without change. The purpose here is to maximize payoffs. There are multiple types of interactions that game theory explores. There are simultaneous games, where players both make decisions at the same time and are unaware of what the other player is choosing. These games explore how people interact with one another with no knowledge of what decision the other player is choosing. Other games are sequential, where players must make decisions in order. For example, chess is a sequential game, where one player makes a move, and the other interacts after seeing what move the first player makes (Brams et al., 2017).

The Prisoners' Dilemma

Consider the specific game used in this study: the prisoners' dilemma (PD). Creaded by Merril Flood and Melvin Dresher and then further developed by Albert

Tucker, the prisoners' dilemma is a simultaneous game that explores how two players interact with one another (Dixit & Barry, 2017). Each player has two options: defect or cooperate. An individual's payoff is determined by the interaction between the two player's choices. For example, Table 1a. below shows the payoffs from a hypothetical PD game matrix. The payoff for player A for any given interaction is on the right and the payoff for player B is on the left. According to this matrix, if both players choose to cooperate then they each will receive a score of 11 and if both choose to defect then both will receive a score of 8. However, if player A cooperates whereas player B chooses to defect then Player A will receive a score of 0 and player B will receive a score of 20. The payoffs are reversed if their behaviors are reversed. If player A defects whereas player B chooses to cooperate then Player A will receive a score of 20 and player B will receive a score of 0.

Table 1a.

		Player A			
		Cooperate		Defect	
Player B	Cooperate	11	11	20	0
	Defect	0	20	8	8

It is always a dominate strategy to defect in a single round PD game. This is because regardless of the other player's decision, one can always receive a higher payoff

by choosing to defect rather than cooperate. Consider the payoffs from table 1 again. If player A cooperates, then player B will receive either a score of 11 (cooperate) or 20 (defect). If player A defects, then player B will receive either a score of 0 (cooperate) or 8 (defect). When both players are acting economically in a single round PD game, both will choose to defect and both would receive a payoff of 8.

However, when multiple rounds of the game are played, players potentially have a better option. When both players defect, they each receive a score of 8. However, when both players decide to cooperate, they could each receive a score of 11. According to Crawford, when the game is played with multiple rounds, and players are properly motivated by future payoffs, the decision for both players to cooperate becomes "consistent with subgame-perfect equilibrium. For example, both players could follow the "grim trigger" strategy "Cooperate until the other player Defects, then Defect forever," which happens to be a subgame-perfect equilibrium and yields the outcome {Cooperate, Cooperate} in every period" (Crawford, 2016). Therefore if the game is played for an unknown amount of rounds, it is possible that they could cooperate every round.

However, the decision to either cooperate or defect is not that cut and dry, as humans are rarely ever purely economical and rational beings. Research has found that there are many other factors that might affect an individual's likelihood to cooperate or defect. Becker et al (2012) found that the big 5 personality traits (extraversion, agreeableness, openness, conscientiousness and neuroticism) all seem to affect the way a person decides to act in economic situations where there is a potential payoff. Kagle and McGee (2014) attempted to predict an individual's likelihood to cooperate in early

rounds of a PD game by using these personality traits. They found that agreeableness had a strong positive relationship towards early round cooperation. This suggest that there are certain motives other than maximizing payoffs that affect the way people play the PD game.

Further research indicates that there are some universal factors affecting how individuals choose to play the PD game. Rather than players fully understanding the most economical way to approach the PD game from the start, research finds that players experiment throughout early rounds to determine the best possible strategy (Fudenberg et. al., 2016). Their results indicate that players rarely held grudges against one another when the opposing player defected. Rather than punishing the defective player, the participant would "forgive" the defection, allowing for both players to eventually cooperate with one another and maximize their payoffs (ibid).

Further research from Fudenberg in 2014 attempted to predict cooperation in a PD game using various demographic information and a person's altruistic tendencies. However, they found that "none of the commonly observed strategies are better explained by inequity aversion or efficiency concerns than money maximization," which implies that in repeated games, cooperation is motivated more by payoffs than various social factors. Players sought to maximize their payoff above everything else. Cooperation seems to be directly tied to personal benefit, that is: we seem to be most likely to cooperate when it benefits us. So while players might be willing to forgive another player after one or several defections, the authors contend that "leniency and forgiveness seem to be motivated by strategic concerns rather than social preferences" (2014).

Marriage and the Game

Previous research seems to focus completely on how two strangers decide to play the PD game, and the research suggests that strangers focus on individual payoffs and disregard how their decision might affect the opposing person. However, the same might not be true for individuals who live in close social context with one another. These types of players will have much more intimate knowledge of one another, which might affect how they play.

The bond of marriage might be one of most intimate types of social contexts apparent today. Research shows that couples must make intimate and difficult decisions daily. These decisions can determine whether their marriage will be successful or not (Lavner, et. al, 2014). Essentially, couples must decide daily how they are going to interact with one another. Much like the prisoners' dilemma, in marriages, couples choose to either defect, or cooperate with one another. Kalifian and Barry further find that couples learn how to navigate marital problems, and the inability to successfully cope and address these issues results in marital stress and potential marital transgressions (2016).

It seems as though the way a couple interacts in the PD game might map well onto how the interact with one another throughout marriage. For example, a spouse decides whether or not they will assist with chores around the house (cleaning, washing dishes, food preparation, etc.) and choosing to not cooperate with their spouse on these issues could easily be seen as defection by their spouse. Despite this inherent alignment between the game and marital relationships, very little research has been conducted on married partners in a PD game.

It seems that one's marital satisfaction could be predicted by their interactions with their spouse in a PD game. Married couples who play the PD game can either choose to work together to maximize their collective payoff, or they could choose to defect and attempt to maximize their own payoff. Based on the previous research discussed, it seems that couples with high rates of defection would be less satisfied with their marriage.

Research Question

This research attempts to predict a person's martial satisfaction based on the interactions with their spouse in the PD game. Previous research indicated that age, gender, and education all can be used to predict marital satisfaction. Specifically, Jose and Alfons found that "Men tend to show higher levels of marital satisfaction compared with women," and that "highly educated women had higher rates of unstable marriages" (Jose & Alfons 2007). Even when controlling for these demographics, we hoped to see an effect on marital satisfaction from the PD game.

Methodology

Participants were recruited from a local church group in Abilene, Texas (n=40). This specific church group was designed for couples who wished to improve their marriage, and as much, a majority of our participants had expressed difficulties in their marriage. Data was collected over the course of several Wednesdays between the dates of January 18, 2017 and March 22, 2017. On any given week of data collection there would be 4 to 12 participants.

First, participants took a marital satisfaction survey using 30 questions from the Couples Satistfaction Index (Funk & Rogge, 2007). They then provided additional demographic information such as gender, ethnicity, and length of marriage. Questions were on a scale from 1 to 6 and we used their average score as their individual marital satisfaction score. Question's addressed issues regarding relationship strength, desire to continue in the relationship and how well a person's needs were met by their spouse. *See appendix 1 for the complete survey.*

Self-report tests are, at best, noisy estimates of some true, underlying variable. To the extent that they are reliable estimates of an underlying variable, in this case, marital satisfaction, it is possible that a principal components analysis could help elucidate the signal from the noise. We ran a principle components analysis on individual's responses to the survey. The first principle component explained approximately 65% of the variance in the dataset. We used this first principle component as their marital satisfaction score- the dependent variable in our analysis.

Second, individuals participated in a minimum of 20 rounds of the prisoners' dilemma game against their spouse. We used z-Tree: Zurich Toolbox, a computer

software program to run the PD game (Fischbacher, 2007). Individuals were given an instruction sheet and had these instructions read to them before the game occurred. *See appendix 2 for the complete instruction sheet.* Due to constraints in location, couples played the game in the same room as one another, but on different sides of the room so that they were unable to see each other's computer screen. Payoffs per round are described in table 1b. below. Individuals received a payoff for participating in this study in the form of a restaurant gift card based on their preferences indicated on the survey. We used a random round from the PD game to determine the amount of money received on the gift card. For example, if the random round chosen was round 5, and a player recievd a score of 11 on round 5, their payoff would be an $11 gift card. In this way, individuals were encouraged to maximize their payoff on every round.

Table 1b.

		Player A			
		Cooperate		Defect	
Player B	Cooperate	11	11	20	0
	Defect	0	20	8	8

We added a 1/8th probability of "error," in our PD game, following similar methods as Fudenberg, Rand and Dreber in their 2012 study. For example, on any given round one, or both player's choice to either cooperate or defect could be changed to the

opposite decision, at a probability of 1/8. If an "error" occurred, neither the one who sent it nor the one who received it would be aware that this was not the intended play. The player who sent the error would receive the payout as if their actual decision was made, whereas the individual who received the error would receive the payout in accordance to the error. This "communication error" properly mimics actual marital interactions, where an individual is not always completely aware of his or her spouse's true intentions.

After the 20th round of the PD game, the game had a 20% chance of another round occurring in keeping with Fudenberg et. al. (2012). Crawford suggests that when the PD game is played for a specific and known number of rounds, "that players' preferences are defined by the addition of players' payoffs across plays of the game… The unique equilibrium then entails both players choosing Defect in every period" (Crawford, 2016). In other words, it would be in both player's best self-interest to defect every round if there is a specified number of rounds.

By creating a modified PD game with both error and a chance of continuance after round 20, we can properly "test what happens when subjects play an infinitely repeated prisoners' dilemma with error" (Fudenberg, 2012). This method is reliable to both reduce the chance that an individual will keep to one strategy throughout the game, and properly mimics the reality of married life- where length of time is not predetermined and knowledge is not absolute.

We trimmed the first 5 responses of the PD game off the dataset in order to reduce the noise from individuals learning how to properly play the game in early rounds (Fudengberg, 2012). For each respondent, we had a minimum of 15 rounds of decision

making in the PD game, along with the decisions made by their spouse, the interaction between those decisions, and their specific demographic information.

Results

Demographics

As previously stated, there was a total of 40 participants. Each respondent provided their ethnicity, age, gender, years married and education level. Due to our location in Abilene, Texas the overwhelming majority of respondents reported their ethnicity as White (n= 37). Because of this, ethnicity was excluded from the analysis.

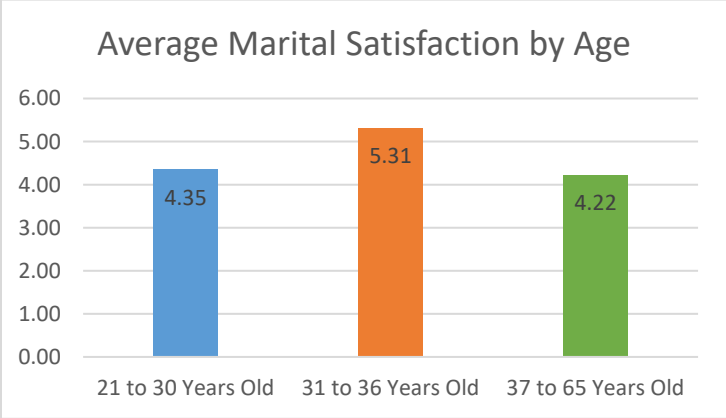
Age

Table 2 shows the breakdown of participants by age. All of the respondents fell between the age 21 and 65, with the all but 7 respondents falling under the age of 40. To determine the effect of age on a person's marital satisfaction score, we divided our respondents into three age bins: 21 to 30, 31 to 36, and 37 to 65 (See Table 2 below for details). Chart 1 depicts the average marital satisfaction score of each age bin. Those in the age group 31 to 36 had the highest marital satisfaction with an average score of 5.31 and those youngest and oldest categories had the lowest marital satisfaction scores with 4.35 and 4.22 respectfully. Of particular interest was whether age was related to a person's marital satisfaction. We tested this by running a single factor ANOVA comparing a person's marital satisfaction score to their age bin, the results of which was significant. A post hoc analysis shows that there is a statistically significant difference in the average score between those in the age category 31 to 36 and the rest of the respondents (p =.0093).

Table 2

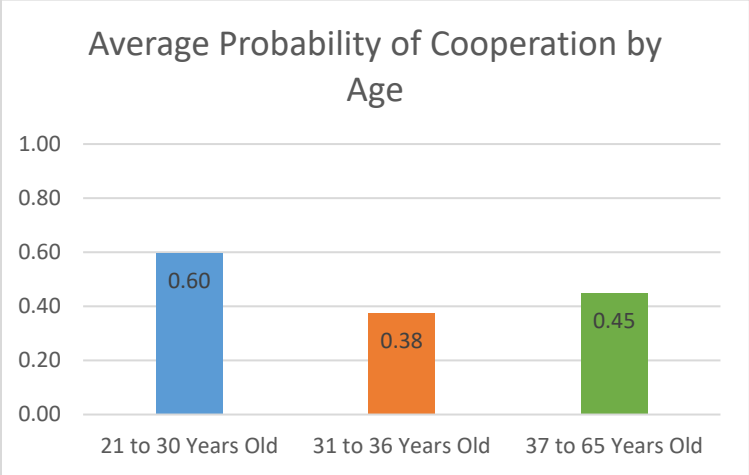
Age Bins	Avg. Score	N
21-30	4.34579	14
31-36	5.30519	12
37-65	4.22073	14

Chart 1



We then tested to see if a person's age had any effect on their probability of cooperating in the PD game. A person's probability of cooperation is defined as their average rate of cooperation over all rounds of the PD game. Chart 2 shows each person's probability of cooperating with their spouse on any given round. As respondents age increased, their rate of defection rose and thus older individuals had a lower probability of cooperation. In order to determine if there is a relationship between a person's age and their probability of cooperation, we ran a single factor ANOVA comparing a person's probability of cooperation to their age bin, the results of which were insignificant ($p = .15$). We saw no relationship between a person's age and their probability of cooperation in the PD game.

Chart 2



Gender

We tested to see if gender had any effect on marital satisfaction or a person's probability of cooperation. Chart 3 shows that on a scale from 1 to 6, men had slightly higher reported marital satisfaction scores. Chart 4 shows that there was almost no difference between men and women's likelihood to cooperate with one another. We wished to see if there was a relationship between a person's gender and either their marital satisfaction or their probability of cooperation. To test this, we ran two 1-tailed t-tests assuming unequal variance comparing gender to these variables and the results of both were insignificant ($p = .15, .35$). We found that gender had no effect on either marital satisfaction or probability of cooperation.

Chart 3

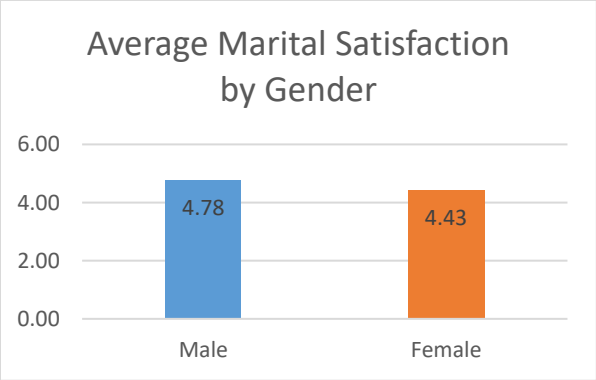
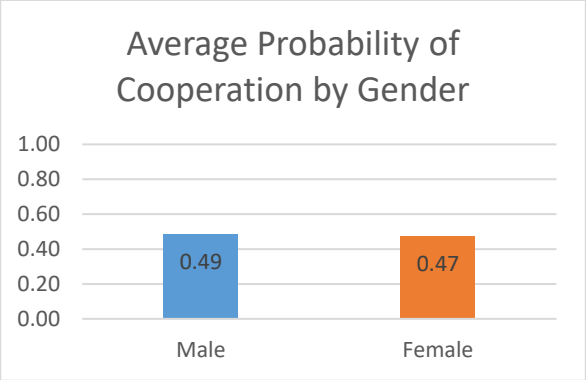


Chart 4



Years married

We binned respondent's number of years married into three categories as depicted in Table 3. Twenty-seven participants had been married less than nine years. Charts 5 and 6 show that those who had been married longer reported lower marital satisfaction scores while also reporting lower levels of cooperation. We wished to see if length of marriage was related to a person's marital satisfaction score or their probability of cooperation. To test this, we ran two single factor ANOVAs comparing a person's length of marriage bin to their marital satisfaction score and their probability of cooperation, the results of which were insignificant (p = .642, .698). We saw no relationship between a respondent's number of years married and either their marital satisfaction or their probability of cooperation.

Table 3

Years Married Bins	Average Score	N
1 to 4	4.796	14
5 to 9	4.510	13
9 or More	4.447	13

Chart 5

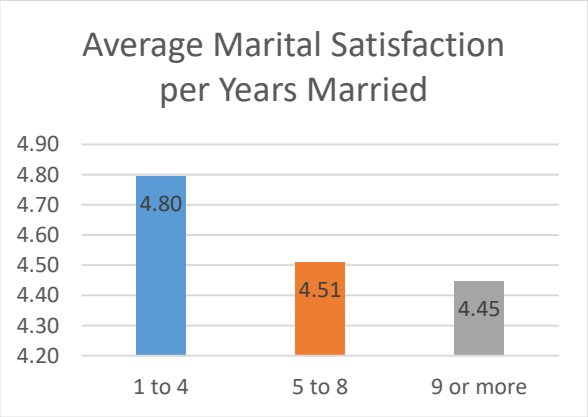
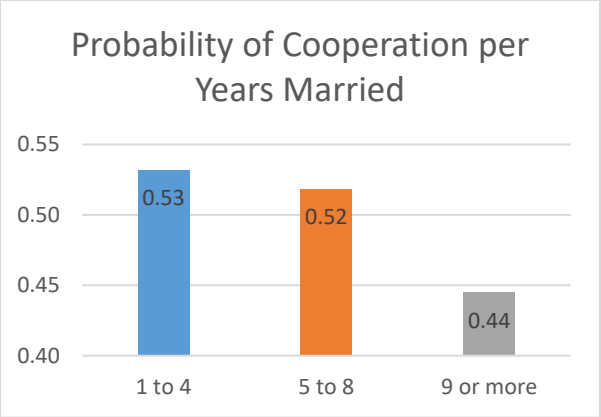


Chart 6



Education Level

Respondents reported their education level by six different categories: less that high school, high school equivalency, some college but no degree, associate's degree, bachelor's degree, and graduate or professional degree. We combined these six categories into three distinct categories: those with a high school education or less, those with some college, and those with a bachelor's degree or higher. See table 4 for more details.

Table 4

Education Bins	*N*	*Marital Satisfaction*
High School or Less	7	4.905
Some Colelge	14	4.223
Bachelors or More	19	4.744

Chart 6 and 7 show that those with a mid-range education level report the lowest marital satisfaction while also having the highest level of cooperation. Of particular interest was if there was a relationship between a person's education level and either their marital satisfaction or their probability of cooperation. To test this, we ran two single factor ANOVAs comparing respondent's education level bin to both their marital satisfaction score and their probability of cooperating, the results of which were insignificant (p =

.231, .621). We saw no relationship between a respondent's level of education and either their marital satisfaction or their probability of cooperation.

Chart 6

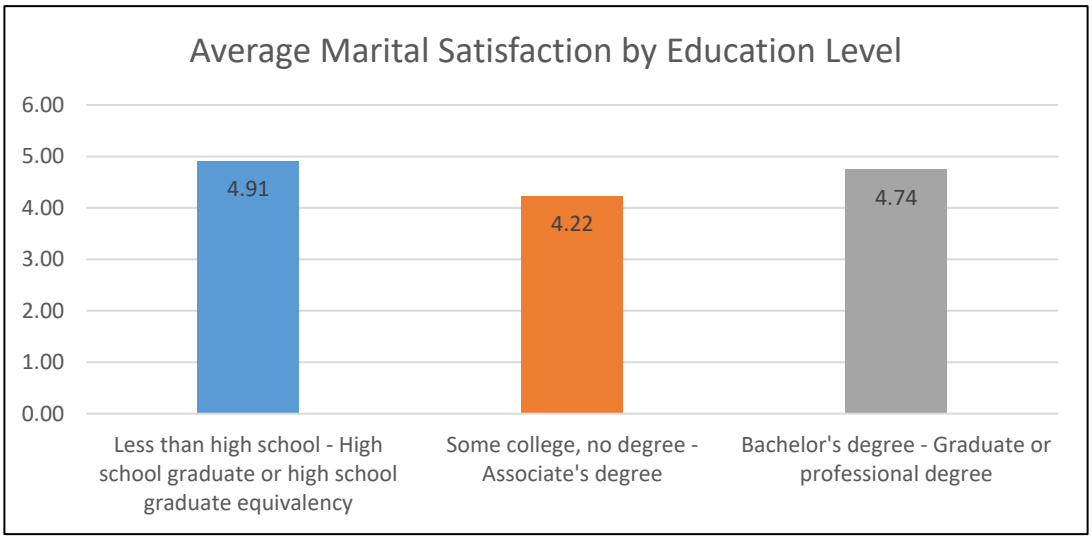
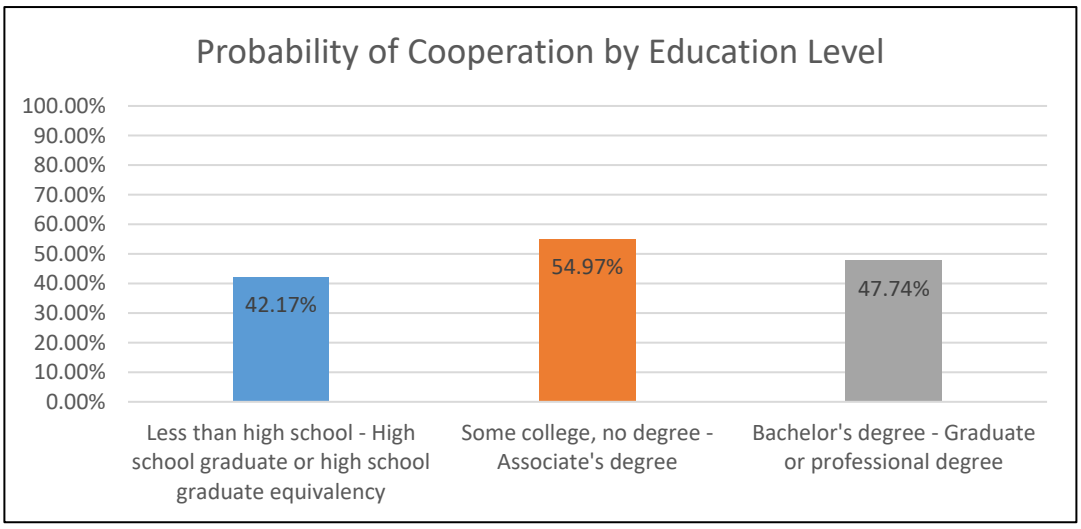


Chart 7



Multiple Linear Regression (MLR)

The goal of this research is to see if any factors from the PD game could be used to predict a person's marital satisfaction score. We first ran a best subset multiple linear regression (MLR) using nine different variables. This method of MLR finds the best

combination of some or all of the independent variables to predict the dependent variable. The dependent variable we used was the first principle component of each person's answers to the survey.

Several of our independent variables had to be modified before we could use them in the MLR analysis. MLR assumes that the relationship between the independent variable and the dependent variable is linear. However, several of our independent variables had non-linear relationship to marital satisfaction. In order to mitigate this, we used the logarithm of both years married and age, as these two variables seemed to have a non-linear relationship to marital satisfaction. We used both a person's self-reported education level (on a scale from 1 to 6) and their education level squared, as this variable too had a non-linear relationship to a participant's marital satisfaction- in a seemingly bell-curve shape. Gender was also included in this original model.

We included 4 variables from the PD game. We chose a person' probability to cooperate, their partner's probability to cooperate, an interaction variable between these two probabilities, and a person's relative level of cooperation given their partner defected on the last round. This final variable – relative level of cooperation given their partner defected last round- is a forgiveness variable. It measures how likely an individual is to forgive their spouse for not cooperating the round before. By trimming the first 5 rounds of the PD game (see Methods for details) we ensured that we were seeing genuine forgiveness rather that participants learning how to play the game in early rounds. In our model, we expected to see that these variables from the PD game would have a positive relationship to marital satisfaction.

The MLR best-subset produced a four-variable model, with each variable having statistical significance. Using this model, a person's marital satisfaction can be described using the following formula:

PCA(Marital Satisfaction) = -3.56 -.96(YearsMarried) + 2.22(Education) - .26(Education^2) -1.69(InteractionProbability)

A persons' number of years married had a negative relationship to their marital satisfaction (p = .05). High levels of education had a positive relationship to marital satisfaction (p = .018). However, after a point, a very high level of education begins to have a negative relationship to marital satisfaction as seen in the negative coefficient of education squared (p= .035).

Input Variables	Coefficient	P-Value
Intercept	-3.56	0.034
Years Married	-0.96	0.053
Education Level	2.22	0.018
Education Level Squared	-0.26	0.035
Interaction Pr Coop Trimmed	-1.69	0.035

Only one variable from the PD game appeared in this best-subset model: the interaction variable between a couple's probability of cooperation (p= .035). Contradictory to what we expected, a couple's group cooperation actually lowered their marital satisfaction. Also surprising, a person's likelihood to forgive their spouse for defection was not in the model, as it was a poor predictor of marital satisfaction.

Discussion & Recommendations

Due to the obvious limitations of a small sample size and similar demographic information of all respondents, this research is not generalizable to either Abilene, or married couples in general. Rather, this research is intended to provide preliminary information about how the PD game can be used to predict marital satisfaction.

Results from the MLR model seem to contradict the current research on how people play the PD game. The fact that the participants were recruited from a marital self-help group might explain this. For example, a couple that is recent married might desire to attend such a group even if they report high marital satisfaction whereas a couples that has been married for many years might only attend such a group if they are experiencing major problems in their marriage.

We found that there was no relationship between a person's likelihood to forgive their spouse for defection and marital satisfaction. Perhaps individuals who are quick to forgive their spouse, while likely to be happy at first, end up facing a more defective partner in the long run. If a person is not "punished" for defection, they could be more likely to continue to defect. This result seems to agree with the research of McNulty and Fincham who contend that "forgiveness may not always be so beneficial…Rather, forgiveness is a process that can be either beneficial or harmful, depending on characteristics of the relationship in which it occurs (McNulty & Fincham, 2012).

Perhaps most interesting is that the interaction between a couple's probability of cooperation actually predicted lower levels of marital satisfaction. We suggest that this has to do with playfulness. In other words, couples that have no competitiveness between one another, and therefore cooperate continuously, do not feel the same kind of passion

and joy in their relationship as couple's that compete with one another do. In research from Driver and Gottman they found that a couple's playfulness was correlated to their ability to resolve conflict. Specifically, they found "that the husband's playful bids in daily life seem to have an important role for both conflict and everyday interactions. His ability to initiate playfulness was strongly related to both the wife's playfulness and her own enthusiasm. His playfulness was also related to the couple's ability to access humor during conflict" (2004). It therefore makes sense that couples who are able to play well against one another would have a higher marital satisfaction.

Another point of interest is the apparent decline in marital satisfaction for those who have been married for over nine years and are over 37 years of age. We believe that this might have something to do with children. Previous research posits that children can have a major effect on individual happiness, particularly in the mother (Taraban et. al. 2017). Those who have been married over nine years and in this age bracket are at an age where, if they have children, their children are beginning to start school, which could be stress inducing for the family. Future research should examine the role of children in marital satisfaction.

As we move forward in this study, we hope to have a larger and more diverse sample size, as this was our greatest limitation. However, as preliminary research to a much larger project, this research proves to be extremely beneficial. We see that there seems to be some relationship between how couples interact in the PD game and their self-reported marital satisfaction. Currently, game theory has not been used to map marital satisfaction, but could perhaps be a helpful tool for couples, therapists and social scientists in future research.

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Appendix

Wick et al. Marriage Survey: (data was collected through online survey format through Google Drive)

Taken from Funk, J. L. & Rogge, R. D. (2007). Testing the ruler with item response theory: Increasing precision of measurement for relationship satisfaction with the Couples Satisfaction Index. Journal of Family Psychology, 21, 572-583.

Questions about your marriage relationship:

1. Please indicate the degree of happiness, all things considered, of your relationship.

Extremely Unhappy	Fairly Unhappy	A Little Unhappy	Happy	Very Happy	Extremely Happy	Perfect

Most people have disagreements in their relationships. Please indicate below the approximate extent of agreement or disagreement between you and your partner for each item on the following list.

	Always Agree	Almost Always Agree	Occasionally Disagree	Frequently Disagree	Almost Always Disagree	Always Disagree
2. Amount of time spent together						
3. Making major decisions						
4. Demonstrations of affection						

	All the Time	Most of the Time	More Often than Not	Occasionally	Rarely	Never
5. In general, how often do you think that things between you and your partner are going well?						
6. How often do you wish you hadn't gotten into this						

relationship?						

	Not at all True	A little True	Somewhat True	Mostly True	Almost Completely True	Completely True
7. I still feel a strong connection with my partner						
8. If I had my life to live over, I would marry (or live with/date) the same person						
9. Our relationship is strong						
10. I sometimes wonder if there is someone else out there for me						
11. My relationship with my partner makes me happy						
12. I have a warm and comfortable relationship with my partner						
13. I can't imagine ending my relationship with my partner						
14. I feel that I can confide in my partner about virtually anything						
15. I have had second thoughts about this relationship recently						
16. For me, my partner is the perfect romantic partner						
17. I really feel like part of a team with my partner						
18. I cannot imagine another person making me as happy as my partner does						

	Not at All	A Little	Some-what	Mostly	Almost completely	Completely
19. How rewarding is your relationship with your partner?						
20. How well does your partner meet your needs?						
22. In general, how satisfied are you with your relationship?						

	Worse than all others (extremely bad)					Better than all others (extremelygood)
23. How good is your relationship compared to most?						

	Never	Less than once a month	Once or twice a month	Once or twice a week	Once a day	More Often
24. Do you enjoy your partner's company?						
25. How often do you and your partner have fun together?						

For each of the following items, select the answer that best describes *how you feel about your relationship.* Base your responses on your first impressions and immediate feelings

about the item.

26.	INTERESTING	5	4	3	2	1	0	BORING
27.	BAD	5	4	3	2	1	0	GOOD
28.	FULL	5	4	3	2	1	0	EMPTY
29.	LONELY	5	4	3	2	1	0	FRIENDLY
30.	STURDY	5	4	3	2	1	0	FRAGILE
31.	DISCOURAGING	5	4	3	2	1	0	HOPEFUL
32.	ENJOYABLE	5	4	3	2	1	0	MISERABLE

Additional Questions not from Funk and Rogge (2007):

33. How many years have you been married? (Please round to the nearest whole number.)

_____

	Strongly Disagree	Somewhat Disagree	Neither Agree or Disagree	Somewhat Agree	Strongly Agree
34. We have experienced major problems in our marriage.					

If you agree that you have experienced major problems in your marriage, please indicate which of the following you have experienced (check all that apply):

__ Separation

__ Death of a child

__ Financial problems

__ Health problems

__ Children with special needs

__ Marital infidelity

__ Pornography

__ Other: _____

Demographic Information:

Gender: Male Female

Age:

Age of spouse:

Ethnicity: (select one) White Hispanic or Latino Black or African American

Native American or American Indian Asian / Pacific Islander

Other

Education: What is the highest degree or level of school you have completed?

___ Less than high school
___ High school graduate (includes equivalency)
___ Some college, no degree
___ Associate's degree
___ Bachelor's degree
___ Graduate or professional degree

Restaurant Preferences:

On a scale of -5 (greatly dislike) to 5 (greatly enjoy), please rate your preference for the following restaurants –

	-5	-4	-3	-2	-1	0	1	2	3	4	5
Jason's Deli											
Buffalo Wild Wings											
Hickory Street Cafe											
Golden Corral											

Appendix 2- Modified Prisoners' Dilemma Game Instructions (page 1/2)

Instructions:

Thank you for participating in this experiment!

Please read the following instructions carefully. If you have any questions, do not hesitate to ask us. Aside from this, no communication is allowed during the experiment.

This experiment is about decision making. You will be matched with your spouse in another room. You will be able to earn a restaurant gift card (to be delivered next week) based on your preferences and the decisions you and your spouse make in the experiment.

The Session:

The session is divided into a series of interactions between you and your spouse in the other room.

In each interaction, you play a random number of rounds. In each round, you and your spouse can choose one of two options.

In each round of the experiment, the same two possible options are available to both of you: A or B.

Your round-total income for each possible action by you and the other player is described in the table below. Your payoff is listed first and is in **bold** and your spouse's payoff is listed second.

		Your Spouse's Choice	
		A	B
Your Choice	A	**11**, 11	**0**, 20
	B	**20**, 0	**8**, 8

For example:
If you play A and the other person plays A, you would both get 11 units.
If you play A and the other person plays B, you would get 0 units, and they would get 20 units.
If you play B and the other person plays A, you would get 20 units, and they would get 0 units.
If you play B and the other person plays B, you would both get 8 units.

Your income for each round will be calculated and presented to you on your computer screen.

You must enter your choice within 30 seconds or a random choice will be made for you.

Appendix 2- Modified Prisoners' Dilemma Game Instructions (page 2/2)

A chance that your choice is flipped:

There is a large probability that the move you choose actually occurs. But with a small probability, your move will be flipped to the opposite of what you chose. That is:

- When you choose A, there is a large chance that you will actually play A, and small chance that instead you play B. The same is true for the other player.
- When you choose B, there is a large chance that you will actually play B, and small chance that instead you play A. The same is true for the other player.

When a choice flip or error occurs, the person sending the error will not know that their choice has been switched. For example, if the wife chooses A and with the small probability it is flipped to B, her husband will receive the payoff as if she chose B but she will receive the payoff associated with her true choice of A. The husband will not be informed that B was not her original choice.

Number of Rounds:

You will play at least 20 rounds of this decision experiment with your spouse. After the 20th round, there is an 80% probability of another round, and 20% probability that the interaction will end. Successive rounds will occur with probability 80% each time, until the interaction ends (with probability 20% after each round).

Summary

To summarize, every interaction you have with your spouse in the experiment includes 20 rounds with a random number of rounds added thereafter. Your behavior has no effect on the number of rounds or the number of interactions.

There is a small probability that the option (A or B) you choose will be flipped and the opposite option occurs instead, and the same is true for your spouse. If your choice is switched, you will not know and your payoff will not be affected. If your choice is switched, your spouse will be told which move actually occurred, but they will not know what move you actually chose.