

Original Article

The Effect of Happiness on Social and Economic Decision-Making Utility

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Abstract

Introduction:

Neuroeconomics is a field of study that brings together economics, psychology and neuroscience. Human economic and rational decision making is affected by mood and feelings like happiness, sadness, etc. In the current study, effects of happiness in economic decision making was examined, using the Prisoner's Dilemma game.

Materials and Methods: Male participants were chosen for each group based on self-rating about their feeling of happiness in life, followed by Oxford Happiness Questionnaire. Two groups were considered: group one who felt happy and group two who did not feel happy. The ability of making rational decision was examined in Prisoner's Dilemma game. Two players simultaneously decide their strategy: betray the other by testifying that the other committed the crime, or cooperate with the other by remaining silent.

Results: The influence of feeling happy on social and economic decision-making was detected in two different groups; the percentage of cooperation in the group which did not feel happy (group two) was 1.5 fold (**P<0.001) which was more than other group. This data manifests non-rational decision making in group two (unhappy) compared to group one.

Conclusion: The main finding of the present study is the significant relationship between happiness and economic decision making. Game theory paradigms suggested that cooperation is not considered as a rational decision. Current data shows that cooperative choices were significantly more in the group which was not happy, showing the effect of happiness in rational decision making.

Keywords: Neuroeconomics, Decision making, Economic Decision Utility

1. Introduction

Decision utility is related to the way people make decisions among different choices. Utility is related to the pleasures of our choices. The best economic model in society is the one in which most people are pleased with their economic choices [1]. Human cognitive biases underlie Sense of Utility [2]. The relationship between neuroscience and economics is Neuroeconomics [3]. There are different

tasks and techniques using in neuroeconomic studies [4]. One of the best tasks is Prisoner's Dilemma game which is a standard example of neuroeconomic games [5]. The Prisoner's Dilemma game has been used in different human behavior studies due to its obvious ability to show the ever-present challenge between individual self-interest (economic decision making) and social benefit. Human rational decision making is affected by different mood

conditions [6]. Some published articles suggest that people under stressful condition are more likely to cooperate in prisoner's dilemma game and some other articles reject the idea. Human behavior is directly influenced by social interactions and cultures [7]. Also human rational decision making is affected by mood and feelings like happiness, sadness and etc. One of the positive concept involve in maintaining health is happiness [8]. Happiness has been defined as “a lasting, complete, and justified satisfaction with life as a whole”[9] According to Kraut (1979), happiness includes “the belief that one is getting the important things one wants, as well as certain pleasant effects that normally go along with this belief” [10]. Happiness is “the degree to which an individual judges the overall quality of his or her life as a whole favorably” [11]. Many tests of happiness have been used in the literature. In several studies, Oxford Happiness Inventory was used for measuring happiness [12]. This study tends to investigate happiness effect on the neuroeconomics choices using Prisoner's Dilemma experiment. As it is obvious, national character and local culture have clear influence on life satisfaction and happiness [13], so it is important to study the effect of such feeling in making decision in different cultures and countries.

2. Materials and Methods

2.1 Participants

Male participants were recruited via advertisements in social media. Following telephone screening from more than 300 men, potential participants (101 men) came to the research center for more extensive psychiatric and medical interviews. About 30 men were chosen for each group based on self-rating; then, around half of them were omitted from study as the self-rating were not confirmed by Oxford Happiness Inventory. The final number of participant (n=15 for each group) was chosen by pervious similar studies [14,

15]. Two groups were considered; Group one who feels happy (confirmed by Oxford Happiness Inventory) and group two who did not feel happy (confirmed by Oxford Happiness Inventory).

All included participants gave written consent to participate in this study. For both groups, age was between 25–40, with no history of drug abuse, a minimum of two years of academic education and an absence of co-morbid psychotic syndromes. A set of factors that could affect subjective happiness were checked. Some factors like gender, age, religion, health [16, 17] and income [18] are important in happiness and were used as control variables in the present study. In some published articles, self-rating of happiness in men was higher than women; therefore, only the effect of happiness among men was investigated in order to to avoid sex difference [19]. Another important factor in feeling happiness is age; older people report more positive feeling and higher levels of happiness compared to younger adults, and that is why the samples were from approximately same age [20]. Also based on some studies religious people seem to be happier than non-religious people [13, 21, 22]. All in all, attachment to religion was considered by personal self-report; frequency of prayer and frequency of worship service attendance – are singled out for in-depth demographic analysis.

2.2 Prisoner's Dilemma Test

The Prisoner's Dilemma test has been explained before [23]. Subjects are imaginary members of a criminal group who are arrested by police and prisoned. Police gives each one the offer to examine if the other committed a crime or not and, if one cooperates with the other by remaining silent or not. Nevertheless, each offer would have resulted in the consequences shown in table 1. According to the game theory, the dominant strategy for each participant would be defection, because it offers a better payoff than cooperation (remaining

silent), regardless of the other player's choice. From an economic point of view, it is supposed that cooperation is an unwise

choice, since it does not provide the highest amount of intimate utility.

Table1. Payoff matrix used in the Prisoner's dilemma [23]

| | | Player1 | |
|---------|-----------|--|--|
| | | Betray | Cooperate |
| Player2 | Betray | Both players lose one million dollars | Player 1 loses 3 million dollars and player 2 wins 5 million dollars |
| | Cooperate | Player 1 wins 5 million dollars and player 2 loses 3 million dollars | Both players win 3 million dollars |

Each player has two options, cooperate or betray, and there are four outcomes based on both players' decisions. The payoff scheme is designed to encourage betrayal, as betraying assumes the other cooperates to be associated with the highest gains.

2.3 Happiness

There are tools and methods for measuring happiness. The best method to use depends on many factors, including the population of intended use, the psychometric characteristics of the measure, the number of items, and scale accessibility. Oxford Happiness Inventory has a 29-item questionnaire based on a six-degree Likert scale and the more one gains score, the happier he/she would be [24,25]. In current study first self-rating scales were used to assess happiness. This question was asked: Do you feel happy in general? 0 = No; 10 = Always. The criterion-related validity of the self-rating scale of happiness was confirmed by the Oxford Happiness Inventory [27] in its Persian form.

2.4 Data Analysis

Mean \pm SEM (standard error of mean) was used in order to express the data, which was processed by Graph Pad Prism® 5.0. T-

Test was used. P value less than 0.05 ($P < 0.05$) was considered as statistically significant.

3. Results

Between groups comparisons on socio-demographic data are presented in Table 2. There was not any significance difference in age and academic education between participants of group 1 and 2. Moreover, participants of group 2 reported significantly higher rates of single status vs. married. Happiness was more in group 1 compared to group 2.

Data from last row in table 2 shows that in the Prisoner's Dilemma game, participants of group 2 opted significantly more often to remain silent (cooperate) compared with group1 ($***P < 0.001$). This data indicates non-rational decision making in group two compared to group one (Table 2).

Table 2. Group1 (happy) and Group2 (unhappy) Socio-demographic report and between-group comparisons regarding social decision-making experiment in the Prisoner's Dilemma game

| | Group1 (happy) n=15 | Group2 (unhappy) n=15 | p-Value |
|---|------------------------|--------------------------|---------|
| Self-ratings of Happiness | 7.05 (1.21) | 4.02 (1.1) | 0.0001 |
| Age (years) – mean (SD) | 28 (7) | 31 (6) | 0.316 |
| Income (Million Tomans) – mean (SD) | 6 (2) | 5.5 (1) | 0.992 |
| Years of academic education – mean (SD) | 4 (2) | 4(2) | 0.8 |
| Marital status (single) – % (n) | 80% (12) | 66% (10) | 0.001 |
| Utility in economics decision makings-% (Based on self-report) | Over 80% | Below 50% | 0.0001 |
| Remain silent or cooperation (means do not betray other participant) – % (n) | 33% (6) | 53% (9) | 0.001 |

4. Discussion

The effects of utility in economic and social decision making are examined, using the Prisoner's Dilemma game. The key finding is that the group which was unhappy with their economic decision opted significantly more often to not betray in the Prisoner's Dilemma game. It was revealed that about 53% of males from unhappy group opted to remain silent and not betray player 2. Based on the game theory, it is proposed that this way of "cooperation" in the Prisoner's Dilemma game is an irrational economic choice, as it does not gain the highest amount of individual utility [28]. It has previously been suggested that economic decision-making is a completely logical function but recently it has been suggested that emotions like happiness and sadness could change individual's decision-making ability, particularly in a social and economic context [28, 29]. The economics of happiness or happiness economics can be measured; it does not have any direct relation to wealth, income or profit [30, 31]. Happiness activates several parts of the central nervous system, such as the right frontal cortex, the precuneus which is a part of superior parietal lobule, the left amygdala nucleus [as a feeling center of brain], and the left insula lobe (important in self-awareness)[32]. An important role of frontal cortex and the precuneus in **economic** choices has been confirmed by anatomy and lesion studies [33]. Also, it has been suggested that amygdala codes economic choices information [34]. On the other hand, insula lobe as a center of evaluative processes and emotional integration has role in **economic decision-making** [35]. Altogether, it is obvious that brain regions involved in happiness and economic decision making are identical [36].

Happiness and economic utility are very personal feelings, not comparable to other peoples' emotions [37]. It is difficult to compare happiness and economic utility across different countries and cultures;

hence, investigation over these must be done independently across different societies [37, 38]. Governments are aware of the essential influence of happiness as a societal factor in quality of life and economic improvement [39]. Accordingly, happiness is a fundamental part of modern social life [39].

Besides feeling happy, other emotional status are involved in individual's economic decision making. People who suffer from major depression and other negative feelings are less cooperative in Prisoner's Dilemma game and betray more, and they are liable to selecting wrong economic decisions [40]. The result from mild depression was reverse [41]. A feeling of fulfillment impacts an individual's happiness and may reflect on the quality of economic decision making [42].

One of the best tasks as to investigate neuroeconomic decision making is Prisoner's Dilemma game. When there is no consistency of money (as a fine, mulct, rehabilitation or restitution reputation charge), it shows social decision making. But when it involves getting or losing money, it shows economic decision making. The current study showed that having negative feeling and lack of happiness increases the percentage of choosing bad economic options.

5. Conclusion

Economic choice behavior is the calculation and measurement of subjective values. A central role of neuroeconomics has been to show that subjective values are expressed at the nervous system. Neuroeconomics manifests how subjective values and brain work to make economic decisions. According to the current data, feeling happy is an important factor in making social and economic decisions. Also, emotions basically underlie the brain processing during decision-making and it may not be related to incomes or salary. As it is obvious, happiness is an important goal

of global economic activities; on the other hand, happiness can affect the way people make decisions. Consequently, the current data suggest that happiness and economic decision making have a direct effect on each other, requiring more investigations.

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Conflict of interest

The authors declare no conflict of interest.

References

1. Ash C. o Our Economic Choices Make Us Happy?. In: Zsolnai L. (eds) Ethical Principles and Economic Transformation - A Buddhist Approach. Springer, Dordrecht.33.
2. Giusti EM, Pietrabissa G, Manzoni GM, Cattivelli R, Molinari E, Trompeter HR, et al. The Economic Utility of Clinical Psychology in the Multidisciplinary Management of Pain. *Front Psychol.* 2017;8:1860.
3. Glimcher PW, Rustichini A. Neuroeconomics: the consilience of brain and decision. *Science.* 2004;306(5695):447-52.
4. Robson SE, Repetto L, Gountouna VE, Nicodemus KK. A review of neuroeconomic gameplay in psychiatric disorders. *Mol Psychiatry.* 2020;25(1):67-81.
5. Gallotti R, Grujic J. A quantitative description of the transition between intuitive altruism and rational deliberation in iterated Prisoner's Dilemma experiments. *Sci Rep.* 2019;9(1):17046.
6. Gosling CJ, Caparos S, Moutier S. The interplay between the importance of a decision and emotion in decision-making. *Cogn Emot.* 2020:1-11.
7. Sutterlin C. Culture by Nature. Familial roots of ambivalent human social behavior and its cultural extensions in large-scale societies. A contribution of Human and Cultural Ethology. *Anthropol Anz.* 2019;76(3):195-210.
8. Barak Y. The immune system and happiness. *Autoimmunity reviews.* 2006;5(8):523-7.
9. Tatarikiewicz W. Analysis of happiness. The Hague, The Netherlands: Nijhoff. 1976.
10. Kraut R. Two conceptions of happiness. *. Philosophical Review.,* 1979;87:167-96.
11. Veenhoven R. Conditions of happiness. Dordrecht, The Netherlands: D Reidel Publishing Company. 1984:22.
12. Furnham A, Cheng H. Personality and happiness. *Psychological reports.* 1997;80(3 Pt 1):761-2.
13. Abdel-Khalek AM. Religiosity, health and happiness: significant relations in adolescents from Qatar. *The International journal of social psychiatry.* 2014;60(7):656-61.
14. Gowin SDLaJL. GABAergic modulation of human social interaction in a prisoner's dilemma model via acute administration of alprazolam *Behav Pharmacol.* 2009;20(7):657-61.
15. Kummerli R, Colliard C, Fiechter N, Petitpierre B, Russier F, Keller L. Human cooperation in social dilemmas: comparing the Snowdrift game with the Prisoner's Dilemma. *Proceedings Biological sciences.* 2007;274(1628):2965-70.
16. Halbreich U. Pursuit of Happiness, Prosperity and Health (P-HPH). *The International journal of social psychiatry.* 2018;64(4):307-8.
17. Lobos G, Lapo Mdel C, Schnettler B. In the choice between health and money, health comes first: an analysis of happiness among rural Chilean elderly. *Cadernos de saude publica.* 2016;32(5):e00032215.
18. Bartels M. Genetics of wellbeing and its components satisfaction with life, happiness, and quality of life: a review and meta-analysis of heritability studies. *Behavior genetics.* 2015;45(2):137-56.
19. Sar V, Turk T, Ozturk E. Fear of happiness among college students: The role of gender, childhood psychological trauma, and dissociation. *Indian journal of psychiatry.* 2019;61(4):389-94.
20. S Shrestha JH, G Gomez, J Vasquez, and J Bavineau. LIFE, LONGEVITY AND THE PURSUIT OF HAPPINESS *Innov Aging.* 2018;2:120.
21. Wade JB, Hayes RB, Wade JH, Bekenstein JW, Williams KD, Bajaj JS. Associations between Religiosity, Spirituality, and Happiness among Adults Living with Neurological Illness. *Geriatrics.* 2018;3(3).
22. Siqueira J, Fernandes NM, Moreira-Almeida A. Association between religiosity and happiness in patients with chronic kidney

- disease on hemodialysis. *Jornal brasileiro de nefrologia : 'orgao oficial de Sociedades Brasileira e Latino-Americana de Nefrologia*. 2019;41(1):22-8.
23. Thiago Wendt Viola JPON, Bruno Kluwe-Schiavon, Breno Sanvicente-Vieira and Rodrigo Grassi-Oliveira. Cocaine use disorder in females is associated with altered social decisionmaking: a study with the prisoner's dilemma and the ultimatum game Viola et al *BMC Psychiatry* 2019;19(211):2-9.
24. Kamthan S, Sharma S, Bansal R, Pant B, Saxena P, Chansoria S, et al. Happiness among second year MBBS students and its correlates using Oxford Happiness Questionnaire. *Journal of oral biology and craniofacial research*. 2019;9(2):190-2.
25. Lung FW, Shu BC. The Psychometric Properties of the Chinese Oxford Happiness Questionnaire in Taiwanese Adolescents: Taiwan Birth Cohort Study. *Community mental health journal*. 2020;56(1):135-8.
26. Yari A, Nadrian H, Rashidian H, Nedjat S, Esmaeilnasab N, Doroudi R, et al. Psychometric properties of the Persian version of Social Capital Questionnaire in Iran. *Medical journal of the Islamic Republic of Iran*. 2014;28:17.
27. Argyle M. *The psychology of happiness*. London: Methuen. 1986.
28. Lozano P, Antonioni A, Tomassini M, Sanchez A. Cooperation on dynamic networks within an uncertain reputation environment. *Sci Rep*. 2018;8(1):9093.
29. De Neve JE, Christakis NA, Fowler JH, Frey BS. Genes, Economics, and Happiness. *J Neurosci Psychol Econ*. 2012;5(4).
30. Fehr E, Camerer CF. Social neuroeconomics: the neural circuitry of social preferences. *Trends Cogn Sci*. 2007;11(10):419-27.
31. Antonioni A, Pereda M, Cronin KA, Tomassini M, Sanchez A. Collaborative hierarchy maintains cooperation in asymmetric games. *Sci Rep*. 2018;8(1):5375.
32. Warren SL, Zhang Y, Duberg K, Mistry P, Cai W, Qin S, et al. Anxiety and Stress Alter Decision-Making Dynamics and Causal Amygdala-Dorsolateral Prefrontal Cortex Circuits During Emotion Regulation in Children. *Biol Psychiatry*. 2020.
33. Padoa-Schioppa C, Conen KE. Orbitofrontal Cortex: A Neural Circuit for Economic Decisions. *Neuron*. 2017;96(4):736-54.
34. Roiser JP, de Martino B, Tan GC, Kumaran D, Seymour B, Wood NW, et al. A genetically mediated bias in decision making driven by failure of amygdala control. *J Neurosci*. 2009;29(18):5985-91.
35. Berntson GG, Norman GJ, Bechara A, Bruss J, Tranel D, Cacioppo JT. The insula and evaluative processes. *Psychol Sci*. 2011;22(1):80-6.
36. Harle KM, Sanfey AG. Social economic decision-making across the lifespan: An fMRI investigation. *Neuropsychologia*. 2012;50(7):1416-24.
37. Rosenfeld AJ. *The Neuroscience of Happiness and Well-Being: What Brain Findings from Optimism and Compassion Reveal*. *Child Adolesc Psychiatr Clin N Am*. 2019;28(2):137-46.
38. Zhu X, Wang K, Chen L, Cao A, Chen Q, Li J, et al. Together Means More Happiness: Relationship Status Moderates the Association between Brain Structure and Life Satisfaction. *Neuroscience*. 2018;384:406-16.
39. Falk A, Graeber T. Delayed negative effects of prosocial spending on happiness. *Proc Natl Acad Sci U S A*. 2020;117(12):6463-8.
40. Sorgi KM, van 't Wout M. The influence of cooperation and defection on social decision making in depression: A study of the iterated Prisoner's Dilemma Game. *Psychiatry Res*. 2016;246:512-9.
41. Cooper B. Strange bedfellows: economics, happiness and mental disorder. *Epidemiol Psychiatr Soc*. 2009;18(3):208-13.
42. Blachnio A. Be Happy, Be Honest: The Role of Self-Control, Self-Beliefs, and Satisfaction with Life in Honest Behavior. *J Relig Health*. 2019.