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# The relationship between computer game types and sleep rhythm, and creativity

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**ABSTRACT: The present study aims to determine the relationship between computer game types and sleep-wake rhythm and creativity of male students studying in academic year 2014-2015, within this course. The sample of this study consists of 205 male students that were selected randomly. The instruments include researcher-made questionnaire, computer games, Torrens creativity test form B and morning-evening rhythm test. The data was analyzed using multiple regression analysis and aiding SPSS. Results indicated a significant relationship between computer games and flexibility, but no significant relationship existed between performance of computer games and other elements of creativity, as well as between computer games and sleep-wake rhythm, and between sleep-wake rhythm and creativity.**

**Keywords:** Computer Games, Sleep-Wake Rhythm, Creativity, Students

## INTRODUCTION

Computer game that is a type of game for the children and adolescents of the current generation is not only dependent to the extent of youths' welcome to them, but this popularity is referred to the psychological nature of its performance, and requires special mental skills and agility in working with the numbers by the players. The computer feature of these games results in players' familiarity with the world of computers and the young generation are assumed as players of this kind of game. Computer game means a type of game and entertainment that is performed by a person as player and a machine that has a virtual environment therein (Kaplan, 2000; Firouzbakht, 2007, 542). Computer feature of these games causes familiarity of the players to the world of computers that young generation accept it naturally from cultural environment. This cognitive skill that has a close association with internalization and interpretation of data available in the images and not the words, is an important form of learning and understanding in a world therein computers are gravity center of activity in commercial, training, educating and entertaining fields (Barrie Gunter, 2000; trans. Naeini, 2008). In addition, these games engender new behavioral rules. On the other side, time is under consideration and if age and gender are added thereto, this problem may be taken into consideration in two forms: one, preparation of children for tendency to proportionality to family values and secondly, returning the children to the games that family deems appropriate. How the family chooses among computer games proportional to its child and intervenes in this matter is highly important (Hatami, Tafreshi & Salajeghe, 2010).

Nowadays, computer games is the concern of most of children and adolescents and those who have access to these games, spend lots of time days and nights for these games. The damages thereof are so deep that even is observed in the adults (Farhoodi, 2008). Computer games may have various impacts such as physical, cultural, moral and training effects that are follows by different psychological and educational consequences (Keshavarzi, 2009). For instance, in training factor, Farhoodi (2008) indicated that the training computer games increase two factors of flexibility and originality out of four factors constituting the relativity in third grade elementary school students. Or, computer games increase the attention and focus in reading and calculation skills (Ponzer, 2005, quoted by Atashak, Baradaran & Ahmadvand, 2013). Due to the spellbinding attraction of these games, the adolescents spend lots of time for these games and go to bed after spending a mental and neural energy with a tired mind, and sometimes wakeup early morning and play until going to the school. They have less power to manipulation and most times become inactive to the computer and assumed their self-reliance instable before the product and advancement of others. Moreover, these games delude the brain cells and train frustrated, depressed, immovable and unconstructive humans instead of creative, innovative and thinker persons (quoted by Manteghi, 2001). The problem is that although this relationship between two variables together is observed, as researcher followed, but relationship between three variables with each other was not seen in any research and the researcher intended to use three variables together in this study.

On the other side, circadian rhythms include those with 24-hrs cycle or course. The most evident rhythm is sleep and wake cycle. Within every 24-hrs course, we sleep and get up, but the time spending for sleep and wake differs from a person to another and from a culture to another culture. Furthermore, this time is varied upon aging. The rhythm, without external signs, means body's natural time that follows a 25-hrs course. The effect of external factors such as light cycle-light, routine issues, food having times and other external coordinators cause the people to follow a 24-hrs cycle. The sleep is also under effect of biological rhythms. During a 24-hrs cycle, a few people sleep one time and a few other sleep two times. There are two kinds of REM and slow wave sleep and in the current world that acts based on 24-hrs days, these interactions become important increasingly, day to day (Kaplan, 2007; Rezaei, 2013, p. 363). Koren (1996) believes that many people have a Non-REM (NREM) sleep (Oibently, 1947; trans. Zavieh, 2003). In fact, through identification of body rhythms, we understand that within hours of day, a few of activities, skills, capabilities and creativities are culminated and it is understandable through studying the brain waves. The waves of our brain consisted of 4 types: Alpha, beta, theta and gamma. Creativity in alpha and theta wave is culminated and so can increase the learning and creativity abilities, and theta meditation increases creativity and reinforcement of learning ability (Hosseini, 2005). In the study applied by Giampletro & Cavallera (2007) on the relationship between morning and evening types and creative thinking on 120 male and female, they concluded that there was no significant difference between states seen at nights and ability of works done based on divergent thinking by visual content, but there were lots of differences in terms of age groups. These results indicate that deeper studies are required for analysis of morning and evening types and its relationship with creativity. In another study applied by Melinda, Laurens & Robertsegal (2014) on the effects of deprivation of sleep and lack of chronic sleep, they concluded that the effects of deprivation of sleep include fatigue and lethargy, lack of motivation, mood swings and irritability and reduce the creativity and problem solving skill, inability in coping with stress and also reduces the safety, results in repeated cold and infection, non-focus and memory problems, overweight, motional skills disorder and increase of accidents risk, disorder of decision making and increase of risk of infecting with diabetes, cardiac diseases and other health problems.

Torrens (1974), an American researcher stated that "We to survive need to motivate the creativity of children, because at this age, despite of mental stresses, there is no weapon excluding creativity that can help us to fight with the problems (quoted by Salmanian, 2009). Mateo Littman (1983) during his studies on the effect of distinguish and reasoning on the humans life, concluded that many students and even university students have no ability of appropriate reasoning and arbitration that is the result of lack of training the thinking and reasoning to them within childhood. Creativity means the ability of creation of a new and innovative thing (Pourafkari, 2002), Gilford (1950) defined the creativity consisted of 8 factors including sensitivity to problem, fluidity, modern thoughts, flexibility, composition, analysis, complexity and evaluation.

The studies indicate that challenging the ideas, opinions and common obligations between students and teachers in the team games increased the creativity among them (Tschang, 2003; Valfiz, Zekariason & Wilson, 2006). In the research provided by Squire (2006), the students with high perception had also higher creativity and the both were associated with each other. In another study applied on 28 students (6 years old) with skills in Indian pottery, they received creative training program using the principles of group modeling and their cognitive learning. The findings indicated that the control group students that received traditional trainings showed no considerable change in the creativity ranking, and a significant difference was seen between test and control group. The teachers that use video games in the growth of their training programs, that needs many complexities, resulted in creation and promotion of creativity among them, for the students as well as the teachers that were users of computer game. 84% of students with high perception received it from their creativity (Wilson (2006); Shalley, Gilson (2004); Mumfered (2000)). In addition, results of study performed by Neda Karbalaei (2009) in erlation to the creativity and game types showed that association between creativity and symbolic dramatic game is more than correlation between creativity and brain teasers and correlation between creativity and computer game was negative. However, the importance of the study is because of demonstrating the necessity and importance of familiarity with sleep-wake rhythm and circadian rhythm, body's 24-hrs changes cycle physiologically, e.g. at the midnight, the stroke, severe pains and asthma attacks and recurrence of wounds are culminated (quoted by Asteki, Moghadas & Naseri, 2008).

In addition to the circadian rhythm and cognitive performance of man, psychological diversity, awareness and effective performance of man upon familiarity with biological tips are very helpful, for instance 9am has been introduced for creative thinking, writing, amending the affairs and organizing and planning (Lamberg, 1994; quoted by Asteki, Moghadas & Naseri, 2008). Nowadays, creativity as a luxury knowledge not only a need, neither a necessity, but is the survival prerequisite for all societies particularly developing societies (Bozan, 2009; quoted by Salehi, 2008). Many researches have been applied on the factors affecting creativity, so far.

As the viewpoint of experts, a group of cognitive factors (such as talent and intelligence), environmental variables (such as political, cultural and socioeconomic factors) and personality variables such as internal motivation, self-leadership or other-leadership are effective on creativity. They believe that the creativity is not appeared only by having an individual characteristic (Buden, 1984, trans. Khanzadeh, 2006). One of the most important factors affecting creativity is brain waves that may be specified by neuro feedback, of which four brain waves alpha, beta, theta and delta are more known. Alpha and theta are assumed as the most effective factors in creativity engender (Barazandeh, 2004). In consideration of the foregoing, general objective in this study is determination of relationship between computer game types and sleep-wake rhythm, and creativity.

## RESEARCH METHODOLOGY

The present study is a correlative research and categorized as non-experimental convenience researches. In this study, the researcher has no direct control on independent variables, because they have been occurred formerly, or principally may not be manipulated, and provides inferences thereof without direct intervention in the relationship between variables (Sharifi, 1998). Whereas, the main objective of this study is analyzing the relationship between computer game types and sleep-wake rhythm and creativity, thus this study is a correlative research. Population of this study consists of all male middle school students of Tehran Dist. 14 that were studied in academic year 2014-2015) equal to ….. persons. The sample size is 205 middle school male students that were selected based on Morgan & Grejsi table (1970, quoted by Ardabili, 1996, Vaziri et al, 2004) and randomly. In relation to the details, it is notable that at first one school of Dist. 14 was selected randomly, later 7 classes of this school were selected by convenience sampling.

*A. Data collection instrument*

**Computer games.** In this study, the purpose is making an instrument that computer games words are measured based on its quantity. For this purpose, a researcher-made questionnaire was used. Computer games are divided in all types of action and fighting, sport and match, adventure and fictional, and strategic and management games. The questionnaire is comprised of 29 questions of which 10 questions assesse the negative factors of computer games and 10 thereof assess positive factors. These 20 questions are scored based on Likert four-point scale and 9 other questions are related to the information about various types of computer games that four-option questions were used for making and scoring thereof. In general, the questions are referred to the computer games types, play style, the device selected for game and playing period and procedure of performing single- or two-player game or multi-playing and the effect of game and if it creates any situation similar to computer game or not, and the positive and negative effect of computer game on the creativity and management of sleep and waking.

The priority of questions was referred more to the interest of students to computer games style, and next priority was the game period and single-player game or play with the peers. Later, questions about supervision of parents on the play time, game content and age range thereof were propounded. At end, questions about the effect of computer games on the fantasy and adolescents' sleep time and duration were asked. To assess the validity of questionnaire, they were shown to some professors such as advisor and counseling advisor and they confirmed that the questions assess what to be assessed. The reliability was also calculated by a small 30-person sample based on Cronbach's alpha, equal to 0.76.

*B. Creativity test*

Creative thinking test of Torrens, form B was used for creativity. The writer of this test is Paul Torrens (1969) and translated by Karami and Fazaeli in 1999. The visual form is suitable for use for kindergarten to master's degree. Visual form of creative thinking tests of Torrens needs answers that majorly are graphical or visual. At first the examinee is asked to write his individual particulars. Everyone must have a booklet and pencil. This test has three practices and 10min is enough for each practice. First practice is related to making images, second practice related to completion of images and third practice related to the circles. The examinee is asked to make a new shape and selects a title for each shape. When the examinee is asked to select a title for the drawn images that doesn't need much writing, he must have a booklet and a pencil. The first activity assesses the initiative and elaboration and second activity assesses the fluidity, innovation and flexibility. In this practice, fluidity means repeated or unrepeated obtains the score of 10 and third activity assesses the flexibility, originality (initiative) and elaboration and fluidity including number of repeated images minus unrepeated images. According to the scoring and items mentioned in the booklet, there is a range of score for making any image and even use of colors that researcher can use it for obtaining the measurable score from total scores of each element.

*C. Sleep-wake rhythm instrument*

Sleep-wake rhythm test -morning-evening circadian rhythm (Branigan, 2000, trans. Nabavi Al Agha, 2002) was used, which consisted of 19 questions.

First question is related to a report and the examinee should write the daily dreams within three days. Second question onward to be answered respectively and the answerer is not entitled to go back while answering and each question has graded responses. According to the total graded scores, the researcher can obtain a unit score that is calculated based on a graded value made by Horn that is the morning and evening rhythm of everybody. Circadian cycle includes biological changes occurring within 24 hours and not only affects our sleep-wake cycle, but also effects any other process such as heart beat and body temperature and blood sugar level etc. This test was made by Horn. The individual answering this test assesses his body rhythms and understands if has a morning or evening rhythm or between the both and this test has a high validity and reliability.

*D. Data analysis*

In this study, multiple regression analysis aiding SPSS was used for data analysis. In order to analyze the data and answer the question of study, multivariate regression models (for analysis of relationship between computer games and sleep-wake rhythms and effect on creativity) and simultaneous multivariate Pearson's correlation coefficient used for responding all hypotheses.

**H1:** There is a relationship between sleep-wake rhythm and creativity.

The result of Pearson correlation coefficient in above table indicates a positive association between sleep-wake rhythm and creativity; it means regular sleep-wake rhythm in students increases the creativity, but this association was not significant, because the significance level observed for this coefficient was higher than 0.05. Therefore, relationship between sleep-wake rhythm and creativity was not statistically significant.

**H2:** There is a relationship between sleep-wake rhythm and creativity elements.

The result of Pearson correlation coefficient in above table indicates a positive association between sleep-wake rhythm and creativity elements; it means regular sleep-wake rhythm in students increases the creativity elements, but this association was not significant, because the significance level observed for this coefficient was higher than 0.05. Therefore, relationship between sleep-wake rhythm and creativity elements was not statistically significant.

**H3:** There is a relationship between computer games and creativity.

The result of Pearson correlation coefficient in above table indicates that the native and positive effect of computer games on the creativity was not significant, because the significance level observed for this coefficient was higher than 0.05. Therefore, relationship between computer games and creativity was not statistically significant.

**H4:** There is a relationship between computer games and creativity elements.

The result of Pearson correlation coefficient in above table indicates that the positive effect of computer games on flexibility was significant ($r=0.152$, $P<0.05$), but negative and positive effect of computer games on other creativity elements of students was not significant, because the significance level observed for this coefficient was higher than 0.05. Therefore, excluding the association between positive effect of computer games on the flexibility, relationship between computer games and creativity elements was not statistically significant.

Question: How much computer games and sleep-wake rhythm can predict the creativity?

Multiple regression analysis was used to answer this question. Multiple correlation between computer games and sleep-wake rhythm and students creativity was 0.123. In fact, composition of computer games and sleep-wake rhythm of students predict the variance of students' creativity 1.5%. Summary of analysis of variance of total squares resulted from regression is shown in following table.

Whereas in decomposition of total squares in regression analysis $F (201.3)=1.029$, $P>0.05$), thus relationship between computer games and sleep-wake rhythm, and creativity is not significant (significance level was higher than 0.05). Therefore, computer games and sleep-wake rhythm had no significant effect on the creativity of students.

## DISCUSSION AND CONCLUSION

The results indicated no significant association between computer game types and sleep-wake rhythm, and creativity and only there was a significant relationship between performance of computer games and flexibility. No significant relationship existed between computer game types and other creativity elements. Perhaps, one of inconsistency causes is non-applying the present study on two female and male sex and comparison thereof, and use of various questionnaire may be another effective factor.

**H1:** Summary of results indicates that no significant association existed between sleep-wake rhythm and creativity, thus the result of H1 demonstrates lack of association between sleep-wake rhythm and creativity; it means quality of healthy and unhealthy sleep is not effective on creativity of students. The studies applied by Giampletro & Cavallera (2006) are consistent to first hypothesis of present study. It means deprivation of sleep is ineffective on creativity. Researches provided by Melinda, Laurence and Robertsegal (2014) show inconsistent results to first hypothesis of this study; deprivation of sleep may be effective on creativity and other cognitive performances.

**H2:** According to the obtained results, and focusing on correlation coefficient between "sleep-wake rhythm" and "creativity elements".

It is concluded that no significant association existed between sleep-wake rhythm and creativity elements. Therefore, it is concluded that sleep-wake rhythm was associated with none of creativity elements (fluidity, flexibility, initiative and elaboration). No research was found whether consistent or inconsistent to the second hypothesis of present study.

**H3:** The results indicate no significant association between positive and negative effect of computer games and creativity. The studies applied by Neda Karbalaei (2009), Shalley & Gilson (2004); Mumford (2000); Shalley (2004) are inconsistent to third hypothesis of present study. The reason of inconsistency between present study and recent researches included as follows: creativity test has been performed on the students, researchers used another form as 90-item questionnaire, a few researchers used form A of Torrens creativity.

**H4:** Summary of this hypothesis indicates no significant association between computer games and creativity elements (fluidity, flexibility, initiative and elaboration), as well as correlation coefficient between negative effect of computer games and all four creativity elements indicated no association, but correlation coefficient obtained between the positive effect of computer games and flexibility showed significant association, thus summary of Pearson correlation coefficient shows that the positive effective of performing computer games and flexibility have significant association, but the positive and negative effect of computer games and other creativity elements have no significant association. Findings of Farhoodi (2008) are consistent to the results of fourth hypothesis of present study, but no research was found to be inconsistent to the present study.

In general conclusion and to answer the question (how much computer games and sleep-wake rhythm can affect the creativity?)

The data indicated that out of three variables (computer games, sleep-wake rhythm, creativity and its elements: elaboration, flexibility, fluidity and initiative), excluding positive effect of computer games and flexibility that had significant association, no significant relationship was observed between positive and negative effect of computer games on other creativity elements. The data indicates that through performing computer games, flexibility may be increased positively as one of creativity elements. It means, performance of computer games neither has positive nor negative effect on creativity and its elements, excluding the positive effect of computer games on flexibility that had a significant correlation (P>0.5); performance of computer games along with the positive effects, is effective on flexibility and performance of a few computer games is effective on flexibility of people toward creativity.

Cognitive elements of creativity include intelligence, fluidity, flexibility, initiative, elaboration, composition, fantasy. Flexibility means variability and diversity of mind, and this ability has close relationship with fluidity. The flexibility diversify the produced thoughts and not to be equal and uniform. Flexibility causes the thought to exit from an area and extended to other fields and contexts. The flexible thought is multidimensional, whilst the fluid thought is single-dimensional (Pirkhaefi, 2008). A few findings complete this idea that development of video games creates the conditions that protect the creative skills of students.

In general, no significant relationship is observed between computer game types and sleep-wake rhythm, and creativity. Therefore, the present study based on the data demonstrates that new results were obtained that has no consistent and inconsistent research and that the computer games and sleep-wake rhythm has no positive and negative effect on the creativity of children and adolescents and are ineffective. Inconsistency may be due to following causes: within adolescence, the rhythm of adolescents is disordered, within adolescence, due to disordering the body rhythms, the accuracy is also changed, use of a sex in the present study and non-applying on two male and female sex, and applying the present study in all educational courses and particularly in the elementary school instead of applying only on middle school course and using the questionnaire and tests with higher validity and reliability. However, the applied recommendation is providing information about sleep-wake rhythm and its relationship with computer games to the students and their parents, or informing the parents, children and adolescents about positive and negative effects of computer games and their effects on creativity, as well as informing about planning of computer games of children and adolescents considering their age range and taking this matter importantly into consideration and accordingly reduce the negative effects therein.

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