



COVID-19 AND HEART RATE BASED ON ANXIETY IN ADOLESCENTS WHILE PLAYING FORTNITE: ECUADOR CASE

COVID-19 Y RITMO CARDIACO EN FUNCIÓN A LA ANSIEDAD EN ADOLESCENTES MIENTRAS JUEGAN FORTNITE: CASO ECUADOR

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ABSTRACT:

The objective of the research was to investigate how the heart rate varies according to anxiety in adolescents while playing Fortnite in time of COVID-19 understood as a contagious disease that has modified lifestyles apparently developed within the contexts of everyday life. Given the emerging measures taken especially by the Ministerial Ministry of Education, face-to-face classes took on a virtual learning modality, apparently guaranteed by policies, plans and programs that guarantee learning and the use of free time. This aspect has allowed more time to be devoted to electronic games, especially fortnite, and generates anxiety. The aforementioned has been verified through a quantitative methodology based on the Hamilton Anxiety Scale. Test consisting of 14 descriptors capable of identifying both physical and psychological symptoms. Anxiety to play this video game is directly related to an increase in heart rate, it is considered a tachycardia problem when the beats per minute exceed the value of 100 in moments of sedentary lifestyle, and some of the participants in this research work exceeded this amount when playing video games. Which allowed us to conclude that being part of this virtual life for a period of time greater than two hours is harmful to health, leading to heart, respiratory and digestive problems, fatigue, exhaustion and even gradual loss of sleep.

Keywords: Electronic games, sport, leisure, health, free time.

RESUMEN:

El objetivo de la investigación fue investigar como varía el ritmo cardiaco en función a la ansiedad en adolescentes mientras juegan Fortnite en tiempo de COVID-19 entendida como una enfermedad contagiosa que ha modificado estilos de vida desarrollados aparentemente dentro de los contextos de la cotidianidad. Ante las medidas emergentes tomadas especialmente por la cartera ministerial de Educación las clases presenciales tomaron una modalidad virtual de aprendizaje, aparentemente garantizadas por políticas, planes y programas que garantizan el aprendizaje y el uso del tiempo libre. Este aspecto ha permitido que se dedique mayor tiempo a juegos electrónicos especialmente de fortnite y se genere ansiedad. Lo mencionado se ha comprobado a través de una metodología cuantitativa basada en la Escala de Ansiedad de Hamilton. Test que consta de 14 descriptores capaces de identificar síntomas tanto físicos como psicológicos. La ansiedad por jugar este video juego está directamente relacionada al aumento de ritmo cardiaco, se considera un problema de taquicardia cuando las pulsaciones por minuto superan el valor de 100 en momentos de sedentarismo, y algunos de los participantes de este trabajo investigativo superaron esta cantidad al jugar video juegos. Lo que permitió concluir que ser parte de esta vida virtual por un periodo de tiempo superior a dos horas es perjudicial para la salud conllevando a problemas cardiacos, respiratorios, digestivos, cansancio, agotamiento y hasta pérdida gradual del sueño.

Palabras Clave: Juegos electrónicos, deporte, ocio, salud, tiempo libre.

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1. INTRODUCTION

On March 11, 2020, a state of emergency was declared in several countries worldwide, including Ecuador in response to the World Health Organization's declaration that Covid-19 is a rapidly transmitted pandemic (Word, 2020).

The COVID-19 pandemic and the containment measures adopted have aroused greater interest in the economic impact than in the social impact with justifications for low levels of production and employment reflected in serious liquidity problems, cold statistical figures through measurements of gross domestic product (GDP) pending monetary regulation (Inter-American Development Bank, 2020).

In the face of economic attention, it is also urgent to attend to the effects of the measures contemplated as in the case of education that by executive decree was considered virtual classes as a process of learning and proper use of free time. The Constitution of the Republic of 2008 guarantees rest and the right of people to free time depending on the development of the personality (National, 2008).

Confinement as one of the emerging measures taken by governments caused the activities usually carried out by the population to be altered, especially psychological factors, exercise and humor that has been replaced by streaming platforms associated with video games and music (Ortega, 2020).

Technology is no longer just a useful tool for employment, it is now used for recreational purposes. Global society has reached such a point that video games are considered a sport. Information supported by the Royal Academy of Language under the basis of the presence of competitiveness, training, regulatory organization and physical activity. This is how South Korea, a pioneering country in this initiative, created its first professional leagues of cyber players in 2000 (Editors of the newspaper El País, 2018).

Hayer, Kalke, Meyer, & Brosowski (2018:929) "As technology has developed, the international gambling market has changed markedly in recent years" Also, one of the most recent and popular games in the global industry is Fortnite, so this research will be directed by this prototype. It may seem like a new, fresh and innovative topic,



but little is said about the negative repercussions that this phenomenon attributes to the health of individuals who are fond of this sport.

The concern lies in the various manifestations that can cause the excessive hours that are being used apparently to cover the use of free time, especially nervousness to not have enough coverage, so it would be impossible to play, aspect associated with anxiety.

Anxiety is a biological stimulus whose function is to alert the individual to some type of danger and provide him with the concentration and energy necessary for defense. However, this manifestation can become risky when the sufferer is unable to control it. This is when the main causes of this clinical picture, genetic, physical and environmental factors are analyzed (Editores of May Clinic, 2018). The selected sample of adolescents between 14 and 17 years old presents anxiety due to environmental factors.

Being subjected to virtual realities perfectly designed to generate sensations of ecstasy and concentration, the environment manages to absorb them completely. Which

causes a true psychic connection between the players, the plot and the space.

Having the effect that each of the participants in this population shows symptoms of anxiety during and after the end of the play time. Once the departure is over, they present repetitive symptoms in their daily life such as chronic discomfort in relation to people and situations that they cannot control, repetitive behaviors, changes in appetite, muscle tension, body aches, affectations in memory and dominant feelings of nervousness. While during play they share a pattern of behavioral symptoms like social isolation, restlessness, walking back and forth, startled responses. As well as feeling light-headed, imbalance in body temperature, stomach conditions, accelerated thoughts and affectations in the heart rhythm (Mardomingo, n.f).

It has also been decided to verify the influence of ergogenic aids because for more performance seventy percent of the population surveyed for this research work has resolved that it consumes at least one caffeine-based energizer of 400 ml per game to increase performance in the game. Failure to understand the health reaching of this chemical stimulus could bring risks to



humanity. For the same reason, it has been thought vital to compare the scopes of the coffee-based drink and that of a placebo, to effectively measure the risks of uncontrolled movement and pressure in systole and diastole as a function of substance A versus substance B.

Returning to the explanation of the link between anxiety and heart rate it is necessary to treat the presence of catecholamines. Which are neurotransmitters that are released into the blood, their chemical composition consists of hormones such as adrenaline, norepinephrine and dopamine, hormones. Its main function is to help counteract stress. It is for this very reason that two catecholamines are released into the bloodstream when an individual generates psychological stimuli of anxiety. The main consequences of the presence of this neurotransmitter are improved alertness, anxiety as well as fear and paranoia are psychic states that have evolved in the nervous system to help since ancient times the human in his survival as in any other animal. That is why a state of alertness is generated with the contraction of the respiratory system, intentional release of

energy through lipolysis in stored glucose, alterations in the digestive system and an increase in the heart rate (Editores of Colombia, 2018).

The purpose of an increase in heart rate is to respond to the lack of oxygen and increase nutrient or energy levels in case you are in risk situations. The real problem arises when risk situations do not justify the energy released and it is not used. Adding the fact that the heart will reach points of exhaustion and in extreme cases to a heart attack (Pinheiro, 2018). Therefore, if a sedentary individual daily finds himself in unreal situations of danger he will waste energy and long-term damage to the functioning of his cardiac system.

2. METHODOLOGY

It should first be noted that the most common mechanism for assessing anxiety levels and giving a reliable verdict is the Hamilton Anxiety Scale. Test consisting of 14 descriptors capable of identifying both physical and psychological symptoms and answered the question:

To what extent do teenagers suffer a variation in their heart rate as a function of



anxiety caused by playing Fortnite?.
Confirming the hypothesis: Playing Fortnite generates anxiety, which in turn raises heart rate levels in adolescents who spend their time in the face of Covid -19 confinement.

By controlling the variables, anxiety and heart rate variation were determined:

Anxiety, because it is a clinical picture previously identified with the use of the Hamilton Anxiety Scale. Their results vary between 25 and 38 points. The interview was aimed at studying the symptoms that the sample subjects presented during and after departure. This experimentation contains no margin for error because it explores the unbiased nature of these individuals' behavior.

The variation of the heart rate in the aforementioned population, because this reaction is completely linked to a biological process to deal with the feeling of danger (Gutiérrez, Amat, Ruiz, & Sanchis, 2003). The same one that is constantly present by the stimuli generated thanks to Fortnite. Collaborating to the check the controlled variables:

- ✓ The size of the population to be studied, it was decided to include only 10

adolescents in order to compare the results in a broader way.

- ✓ The age range between 14 and 17 years, to obtain a more homogeneous sample where chemical and biological reactions are not affected by age.
- ✓ The use of the Hamilton Test to assess anxiety.
- ✓ The video game Fortnite, is necessary so that the research is directed in the same direction, where all the participants have the facility to connect in the same environment. Allowing your anxiety to develop under the same factors and thus get optimally comparable data.
- ✓ Playing time, measurements will be made every 10 minutes for two hours on each player to get enough data.

The materials used were:

- ✓ Hamilton's test
- ✓ Apple Watch Series 2
- ✓ Table of records
- ✓ Xbox
- ✓ A Fortnite video game
- ✓ The Stopwatch of a Samsung J2 cell phone



A group of first, second and third year high school participants from an educational unit in the province of Tungurahua were selected from the sample at random. Each question was directed to know the virtual gaming habits corresponding to each individual, with the purpose of selecting the most suitable participants to explore results consistent with the hypothesis.

Once the group was selected for the experiment, virtually everyone was interviewed for fifteen minutes to learn about their degree of anxiety according to the Hamilton Anxiety Scale. Postulates 1, 4, 6, 12 and 14 were those that were carried out in this first interview, as they were symptoms that could appear after the playtime used. While the rest of the literals were applied at the time of departure through observation, to understand the implications of stress transcends dimensions of the period of play to be a condition present daily.

The results of the 10 scales that were practiced were added. Once this process was completed, the data were grouped in a table to compare the values with the ranges that indicate the degree of danger of the anxiety

of each participant. See Hamilton's range table 1.

Finally, depending on what was planned, the players were virtually observed with the help of a family member who was asked to follow in turn with the stopwatch the times that the Apple Watch Series 2 located on the wrists of the players recorded based on the movement of their heart rate that with the aim of identifying signs of anxiety in their behavior. Taking into account that the data recordings will be carried out every ten minutes for two hours.

3. RESULTS

At no time was the life of the test subjects in danger, nor was any damage caused to the environment. All considerations were taken for confinement. The condition of the alterations in the heart rhythm was always controlled by time, so as not to cause fatigue or major affections to the cardiovascular system of the same. Permission was requested from the parents of the players to take this test by means of a commitment letter and in turn their help was requested. Nor was any solid or stimulating substance supplied to the participants' diet for better results.



Table 1. Ordered data on the results of the Hamilton Anxiety Scale according to the participants of the practice (Alvarez).

Participant Number	Age (years)	Total (numerical interpretation of the Hamilton Scale)	Interpretation
1	14	24	Clinically Manifest Anxiety
2	14	25	Clinically Manifest Anxiety
3	15	27	Clinically Manifest Anxiety
4	16	26	Clinically Manifest Anxiety
5	16	24	Clinically Manifest Anxiety

Source: Prepared by the authors.

Table 2.

	Participant				
	#1	#2	#3	#4	#5
Times	Heart Rhythm (bpm)				
1	73	72	125	85	85
2	64	60	117	80	80
3	61	74	121	105	105
4	67	78	136	99	99
5	69	86	112	80	80
6	79	96	121	95	95
7	86	102	112	102	102
8	83	90	115	87	87
9	92	96	104	98	98
10	84	102	107	93	93
11	96	108	131	104	104
12	102	120	109	107	107

Source: Prepared by the authors.

They respond to the collection of data from the 6 participants in the experiment. In a relationship of Time Vs. Heart Rate. Each time has a representation of 10 minutes,

starting with this value. Same that determine the moments to collect the data of the heart rate measured in (beats per minute).



Table 3.

Participant Number	Average Heart Rate (bpm)
1	79,66
2	90,33
3	117,5
4	94,58
5	76,83

Source: Prepared by the authors.

The table shows the average heart rate based on the values in Table two, in order to give way to a single amount per participant in relation to play time, to obtain a more efficient analysis of the relationship between anxiety and heart rate. It also cave emphasize that an average helps to represent a value that is presumed as constant.

- Description of Symbology:

Q: Average

Σ : Summation

x: Values in a dataset

n: Number of data

- Example:

The values in the Table were used. 2

P

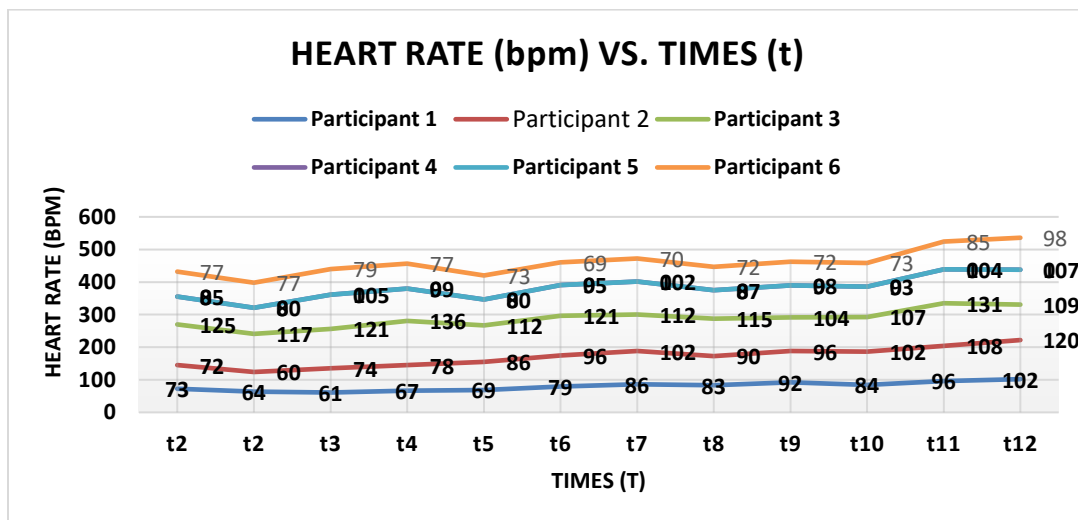
$$= \frac{73 + 64 + 61 + 67 + 69 + 79 + 86 + 83 + 92 + 84 + 96 + 102}{12}$$

- Fórmula:

$$P = \frac{\Sigma x}{n}$$

$$P = 79,66$$

Figure 1. Data Processed



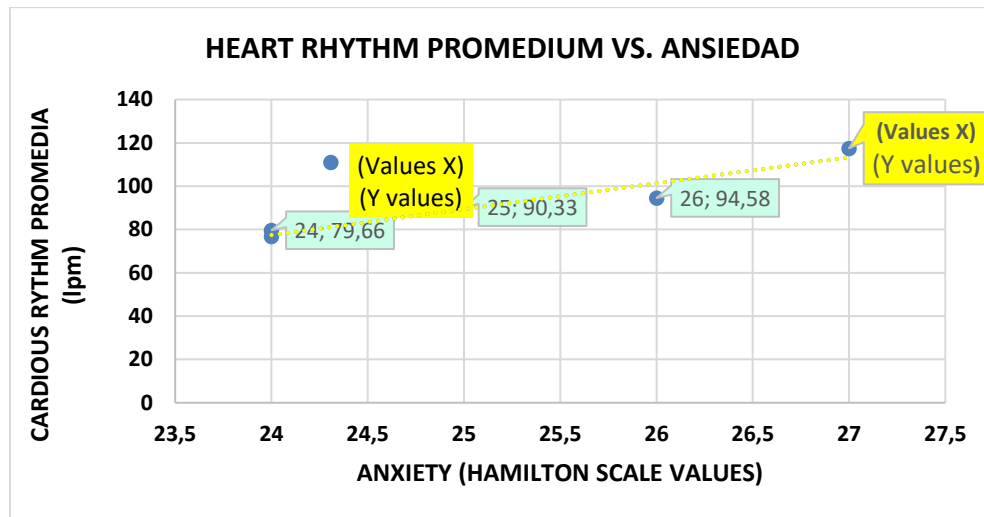
Source: Prepared by the authors.



This graph indicates the variation of the actual heart rate data in relation to the previous times of the average. Its purpose is

to show in a more precise way how the dependent variable increases or decreases as a function of the independent one.

Figure 2.



Source: Prepared by the authors.

This graph shows the variations of the average heart rate (bpm) depending on the amount of anxiety of each participant. Same values from which a trend line arises that makes more visible the direction in which the scatter points (data) are accommodated. The values in yellow boxes will be used for the slope calculation.

- The Slope:

Mathematical equation used to describe the direction and inclination of lines on a graph. Its points depend on quantitative values corresponding to the dependent variable and the independent variable. In the case of

this research work, if it is positive, it will affirm the hypothesis and if it is negative, it will deny the hypothesis.

- **Formula:**

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

- **Meaning:**

m= Slope

y₂= Final value of the dependent variable

y₁= Initial value of the dependent variable

x₂= Final value of the independent variable

x₁= Initial value of the independent variable



- **Resolution:**

$$m = \frac{117,5 - 76,83}{27 - 24}$$

$$m = \frac{38,67}{3}$$

$$m = 12,89$$

4. DISCUSSION

Puccinelli, Santos, Seffrin, & Barbosa (2021:8) "The level of physical activity was significantly reduced during the social distancing period. Prior to the COVID-19 pandemic period, 69% of the volunteers (83% male and 46% female) were classified as very active, and during the social distancing period, this percentage dropped to 39% (50% male and 31% female)". Indeed, the heart rate of adolescents in confinement due to COVID-19 increases depending on the levels of anxiety that individual's experience when playing Fortnite.

Jiménez & Chacón (2012:43) Videogames and everything related «to be» in front of a screen will be common to future generations, and therefore more systematic studies are required to determine the long-term exposure effects to these devices. It was not possible to expect a contrary result, taking into account as an indication the fact

that all participants were found affected by a degree of Clinically Manifest Anxiety although most of the symptoms such as respiratory problems, muscle aches, unjustified sweats, constant mood swings, digestive problems, anguish, nervousness and worry took place only during the game. The range of these values varies between 24 and 27, where according to the Hamilton Anxiety Scale, which is evaluated on 56 points (Alvarez).

King, y otros (2019:141) "A deeper analysis of video games may improve the quality of our understanding of problematic gaming and aid efforts to reduce gaming-related harm". Also during the collection of heart rate data, it was easy to intuit the certainty of the hypothesis, since the values varied between 72 (bpm) as the lowest amount for being an initial value, and 120 (bpm) at the end of one of the games.

Similarly, Graph 1. , allowed a clearer observation of the patterns of heart rate change as time increased. Although the data did not indicate consistent behavior, they all concluded by resembling an ascending line. A result that directly relates the proportional increase in heart rate as the 10-minute intervals also increased. Same observation



that allows classifying anxiety as a time-dependent variable. Since the greater the anxiety, the greater the number of beats per minute; and the more time, the more beats per minute.

5. CONCLUSIONS

The hypothesis presented is considered adequate, since it focuses both dependent variable (heart rate) and independent variable (anxiety) on a specific group of individuals that make the research topic more concrete. Likewise, the information collected is supported by information regarding heart rate, catecholamine cycle and anxiety. Similarly, it was an advantage to have used two stopwatch systems to have more accurate data, the cell phone and the one included in the clock that collects the amounts.

As weak points, identifying the degrees of anxiety with the Hamilton Anxiety Scale was complicated since the diagnosis depended almost entirely on observation and analysis of behaviors. Therefore, collecting this kind of information took longer than expected, especially because the interview was repeated up to three times to add credibility to the result. It would also have been more

feasible to use more test subjects in order to have a broader appreciation of the data. Similarly, as the research was conducted, a new variable emerged that related time and increased heart rate. Topic that could also have represented relevance to it.

Deepening further the credibility of the hypothesis pointed out at the beginning of this research work: being the positive slope, indicates that the line of the average heart rate as a function of anxiety increases proportionally especially, due to the greater number of time that adolescents devoted to this activity because they are in confinement in the face of a COVID-19 emergency.

Indeed it is already known that the anxiety to play this video game is directly related to the increase in heart rate. However, these results highlight the risk involved in making this virtual sport a habit of our daily lives. As already mentioned above, it is considered a tachycardia problem when the beats per minute exceed the value of 100 at times of sedentary lifestyle, and some of the participants of this research work exceeded this amount when playing video games. Which allowed us to conclude that being part of this virtual life for a period of time of more than two hours is harmful to health



leading to heart, respiratory, digestive problems, tiredness, exhaustion and even gradual loss of sleep.

Finally, video game players, especially Fortnite, are recommended to enjoy this virtual experience for a time not exceeding ONE HOUR with TWENTY MINUTES, where the range of the heart rate ranges between 72 and 93. While those who from the beginning had between 100 and 120 are recommended to practice at least forty minutes of physical activity, although walking, in order to reduce the production of catecholamine's because of the accumulated anxiety and stress.

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