Effects of the Use of a Therapeutic Videogame to Enhance the Treatment of Women with Perinatal Depression

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Abstract **– The general objective of this research is to enhance the treatment of perinatal depression by utilizing a therapeutic video game in various hospitals and maternity centers located in Trujillo during the year 2023, the study conducted a pure experimental research design, utilizing a sample of 60 randomly chosen women split into two groups of 30 individuals in both the control and experimental groups. The experimental group was exposed to a video game for four weeks, while the evaluation used the EVEA and D2 tests. Notably, there was an increase in levels of attentiveness, concentration, and happiness. On the other hand, there was a decrease in levels of anxiety. Although there was a significant reduction in hostility, it was the indicator that showed the least improvement compared to the other indicators. The results suggest that the utilization of a therapeutic video game could prove to be advantageous in enhancing the treatment of women experiencing perinatal depression. Arcade video games have proven to be a promising approach to elevating happiness levels and reducing anxiety, indicating their potential efficacy in treating this condition.**

Keywords **– Videogame, mental health, perinatal, depression, postpartum, SUM methodology.**

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1. Introduction

During the COVID-19 pandemic, the birth rate declined considerably, on Europe more than 50% of couples who had planned to have a child, decided to postpone this idea, in the United States alone in the month of December 2020, there was a decrease of 8% in the birth rate [1]. After the lifting of the security measures in the year 2022, the increase in pregnancies increased compared to the years prior to the pandemic, especially among young people, due to the fact that sexual behaviors have undergone significant changes due to cultural and social changes, among which the early age of sexual relations from 15 to 19 years of age stands out [2].

Pregnancies in young people are due to the lack of sex education in different areas of the country, which leads to various diseases such as sexually transmitted diseases, unwanted pregnancies, abortions, among others [3]. In Chile, the research by Domeyko-Prieto *et al*. [4] mentioned a series of sociocultural problems that pregnant women face, since they have to leave their studies or work and even, in the worst cases, are abandoned by their partners, which leaves them in a situation of affective, economic and social abandonment, thus generating perinatal depression.

Perinatal depression is a prevalent disorder that impacts a significant proportion of pregnant and postpartum women worldwide. Despite its prevalence, this disorder is frequently overlooked in clinical diagnoses. This can be attributed to a tendency to attribute its symptoms to the natural gestational and childbirth process. The criteria for perinatal depression diagnosis varies based on the evaluating clinician and can be influenced by factors such as observation timing, under diagnosis, and awareness among healthcare professionals. In addition, the economic level of the country plays an important role: those with a high economic level have between 10% and 15% of cases, while countries with a medium or low economic level have a total of between 20% and 25% of cases [5].

In Lima, the capital of Peru, a prevalence of depression was detected in 34% of cases at the Dos de Mayo National Hospital, and 31.4% at the Cayetano Heredia National Hospital. During this period, the use of technology was greatly supported due to the development of informative help pages and new methods to contact a professional and solve their doubts; however, wrong information or misinterpretation by pregnant women generated more concern and aggravated their symptoms [6].

Various factors can affect women during pregnancy and the postpartum stage. These factors include previous depressive states, complications during pregnancy, anxiety, psychosocial factors, economic level, and family support. The postpartum stage triggers obstructions in lactation, decreased levels of hormones such as estrogen and progesterone, and lack of sleep, among others, potentially worsening the perinatal distress. These factors can cause sadness and depression in women, which can negatively impact the mother and even the newborn [7].

Taking this into account, the general problem was posed: How will the use of a therapeutic video game influence the treatment of perinatal depression? Likewise, the specific objectives were to increase the levels of happiness (NA), attention (NAT), and concentration (NC) and to decrease the levels of anxiety (NAN) and hostility (NH) In addition, it was hypothesized that: if a therapeutic video game is used, then it will significantly enhance the treatment of perinatal depression in the maternal hospitals of the city of Trujillo.

2. Previous Research

This section describes some research on the use of video games as a health solution. In the research by Garaigordobil and Martínez-Valderrey [8] it is proposed whether the use of video games helps to reduce the rates of bullying and cyberbullying in adolescents. 176 people participated in the study, 93 were assigned to the experimental group (EG) and 83 to the control group (CG), the video game has 25 objectives that must be fulfilled to complete it, after this an evaluation of 120 questions was performed, the results were interpreted by ANOVA tests, MANOVA, 30 aspects about bullying were evaluated, of which the most outstanding were obtained as: empathy capacity for the CG 0. 19 and SG 11.77, perpetration of bullying for CG 20.80 and SG 5.46, verbal violence between students for CG 31.43 and CG 11.49, among others.

Likewise, in the research by Xu *et al* [9] the possibility of using a virtual reality (VR) video game to reduce anxiety and depression in university students was analyzed.

Thirty-one people participated in the study, attending for 6 weeks (2 sessions of 30 min per week), at the end of this period, their state was evaluated using the Beck Depression-II test, the Perceived Stress Scale and the Beck Anxiety Inventory, the results showed a significant decrease in depression, going from 8.33 (SD 5.98) to 5.40 (SD 5.14) after the intervention (P=0.01).

Ken *et al.* [10] in an analysis of 40 participants divided into groups of 20 was conducted, tested whether the use of a video game reduces anxiety levels in the short term, 3 sessions of 30 to 60 minutes duration were applied, in each session 2 different scenarios of the game were presented. To evaluate the results, the Beck Anxiety Inventory (BAI) and the State-Trait Anxiety Inventory (STAIS-5) were used, from which significant results were obtained in anxiety reduction between the experimental group and the control group, obtaining a decrease of 45.1% in the experimental group, compared to the control group. 1% in the experimental group, compared to a reduction of 13.3% in the control group.

The research by Cheng *et al*. [11], provides an analysis of Pokémon Go game users in different areas of 12 countries. Their objective was to analyze whether the didactics of the game that is to move outdoors and live with other users could cure or reduce depression, after monitoring for a year, they analyzed the data obtained by comparing them with areas of other countries that did not have access to this game. Their way of measuring the level of depression was through a Google tool on the amount of search made to the words depression, stress and anxiety, as a conclusion they obtained data that the Pokémon Go game could help people with mild depression, but, it cannot be assured or applied in cases with chronic or severe depression.

Gallardo *et al.* [12] in their research aimed to design and develop a video game to improve attention and concentration, which is affected by hyperactivity disorder (ADHD), It was applied to 30 children divided into 2 groups, 15 children (experimental group) that were applied 16 sessions of 30-45 min with the video game and the other 15 children (control group) in pencil and paper format, the data obtained were evaluated with the CSAT-R, CARAS-R and MFTT-20 tests, in 3 times: at the beginning, in the ninth session and at the end of the treatment, as results were obtained that, both groups improved with the tools used, but those in the experimental group showed a greater increase in selective attention (CARAS-R test), differences between means =-21. 33 $p<0.001$, as main conclusion, the treatment with video game is applicable to the field of study to improve ADHD symptoms, taking into account the limitations of the research, such as the age of those evaluated, the different degree of the disorder, among others.

3. Methodology

This section describes the research design, the development of the video game, the SUM Methodology, the selection of participants and the processing of the data analysis.

3.1. Research Design

Type of research: Applied, this research focuses on addressing social or practical needs; examples can be found ranging from improving air quality in urban areas, developing methods to increase product durability, and solving difficulties in production processes, among others [13].

Research design: Pure experimental; this design involves the manipulation of one or more independent variables with the purpose of generating specific effects. These effects are measured in relation to the dependent variable, being fundamental that such manipulation generates measurable impacts. Its essential characteristic lies in the strict control that ensures the validity of the study, strengthening its methodological basis [14].

3.2. Videogame

A video game was created based on the psychotherapeutic treatment used to treat perinatal depression and consists of two mini-games, which were developed in Unity using the 2D platform and SUM methodology [15], [16], [17]. (download: https://n9.cl/vitradep)

3.2.1. SUM Methodology

This methodology consists of five phases: concept, planning, elaboration, beta, and closing (Figure 1), each of which was developed as follows.

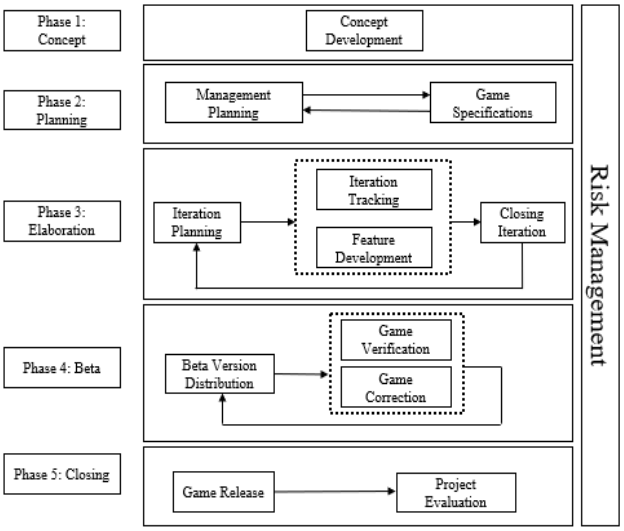

Figure 1. SUM methodology

In the concept phase were defined aspects of the game, the elements that will have, story and gameplay as well as development tools such as Unity and code editor as Visual Studio. In the concept phase, aspects of the game were defined, including its elements, story, and gameplay. Additionally, development tools such as Unity and the Visual Studio code editor were chosen. The objective of this stage was to improve the treatment of perinatal depression based on five indicators: level of happiness, anxiety, anger, attention, and concentration. To achieve this a therapeutic game was used featuring two mini-games with simple gameplay, where the player performs basic movements like moving the character left to right or jumping. In the planning phase, the roles of each participant, the functional and non-functional characteristics of the videogame were defined, as well as the project budget and the development schedule for each stage.

Continuing with the third phase, the elaboration phase, further divided into three stages, constitutes a pivotal stage in the project's progression. The first stage is devoted to meticulous planning, encompassing the delineation of objectives, tracking metrics, and the identification of tasks essential for project completion. The second stage involves the execution of the meticulously laid-out plan, coupled with vigilant monitoring to ensure alignment with the defined objectives. The final stage entails the comprehensive verification of the game's status, permitting necessary adjustments based on outcomes to ensure the realization of the predetermined objectives, within this framework, the process commenced with the curation of images, sounds, and effects for integration into the game. A main menu was artfully designed, providing access to the mini-games and their respective levels, each accompanied by its unique storyline and gameplay instructions (Figure 2).

Figure 2. Main Menu

The first mini-game, FlyinDragon (Figure 3), is designed to strengthen the relationship between mother and child.

In this game, the player will need to help a baby dragon overcome obstacles to reunite with its mother. When the goal is achieved, a message of gratitude and encouragement is displayed to the patient. All while listening to calming and soothing sounds incorporated into the game, rounding up its ambiance.

Figure 3. Minigame 1: FlyinDragon's message of gratitude and encouragement

The second mini-game, Woman-Dodge (Figure 4), is developed thinking about normalizing the emotional state they are going through. The goal is to avoid the monsters that are falling randomly; each color represents an emotion, such as red being anger, light blue for sadness, or purple portraying anxiety, and must fill a bar of happiness that increases when the player catches yellow monsters, which represents the easiness, to achieve this, the player has 60 seconds. Finally, the game also has relaxing sounds and motivational messages implemented into it.

Figure 4. Minigame 2: Woman-Dodge

In the beta phase the first version (Figure 5) was launched to review functionality and get feedback, by recommendations of the testers, a modification was made in the second mini-game, because its gameplay was not very interactive for the participant and did not achieve its goal. In the beta phase, the first version of the game (Figure 5) was launched to review functionality and gather feedback.

Based on the testers' recommendations, a modification was made to the second mini-game, as its gameplay was not very interactive for the participants and did not achieve its goal. Originally, the movements were controlled with arrows, which were not engaging for the participants. Therefore, the decision was made to update the code to allow for more interactive touch-based controls (Figure 6).

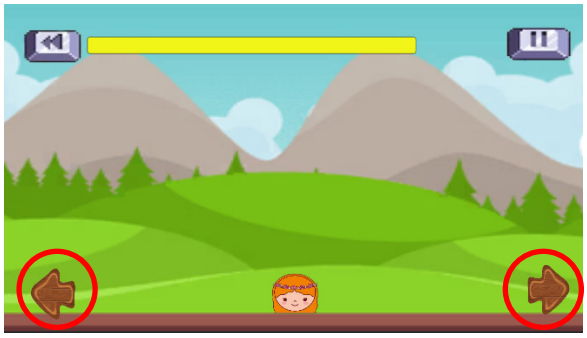

Figure 5. Minigame 2: First Version Arrow Movement

Figure 6. Minigame 2: Last Version Touch Movement

Ultimately, the video game was delivered as agreed, and a comprehensive evaluation of the entire process ensued. This evaluation encompassed a reflection on encountered challenges, attained milestones, and the overall achievement of project objectives, providing valuable feedback for methodological improvement. It is worth noting that, although not explicitly incorporated into the methodology, risk management is an integral part of the project, consistently applied throughout its duration to identify and mitigate potential issues, thereby minimizing their impact and occurrence.

3.3. The Participants

The study was carried out in Trujillo, Peru, where women were selected under the inclusion criteria of having a diagnosis or symptoms of perinatal depression and were in the last trimester of gestation or up to 40 days post-partum (Figure 7). Women who were in the last trimester of gestation or up to 40 days post-partum but did not have a diagnosis or symptoms of perinatal depression were excluded from the study.

The women who participated in the study were also from different maternal health centers.

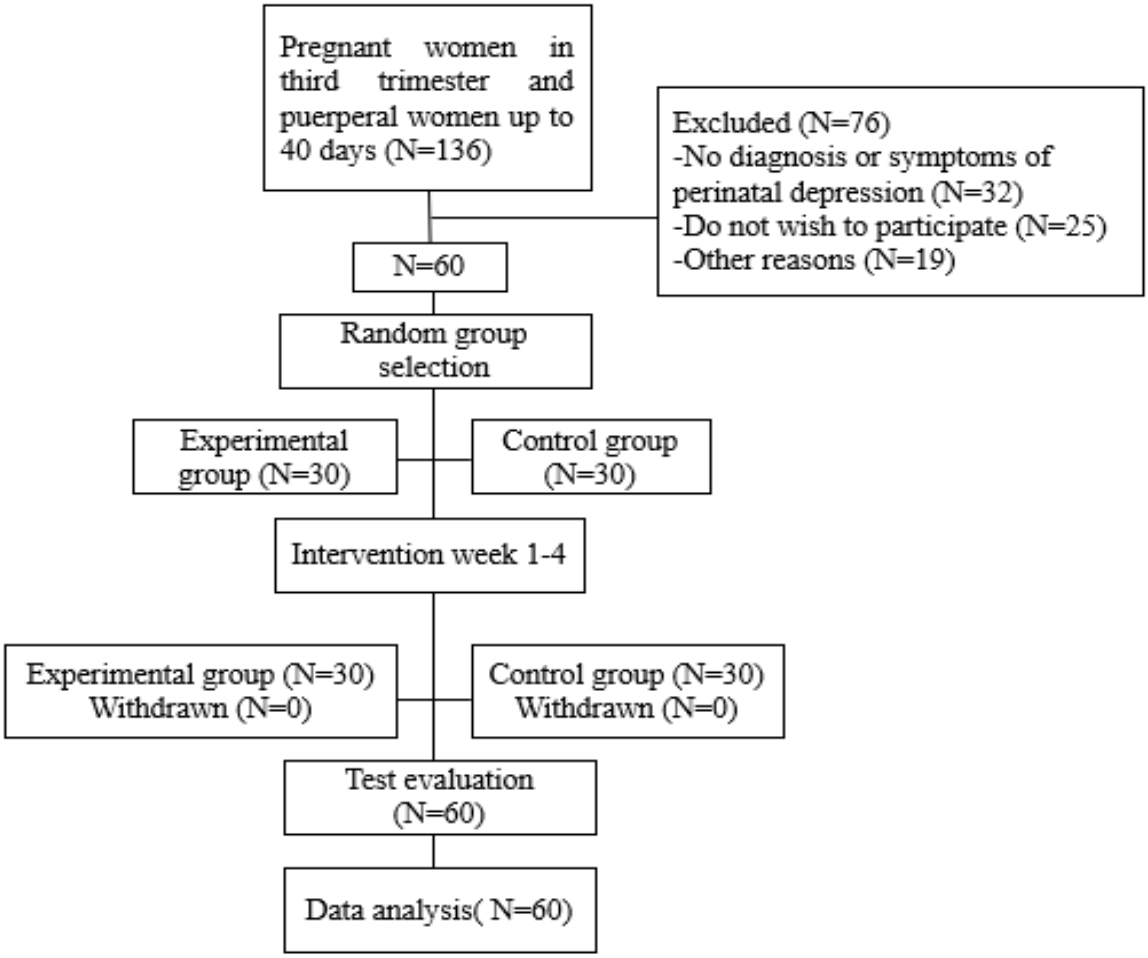

Figure 7. Research flowchart

3.4. Data Analysis

For data analysis, Jamovi v2.3.28 statistical software for Windows was used [18]. Descriptive statistics included the mean and standard deviation for all study measurements. The normal distribution of the data was confirmed using the Shapiro-Wilk test. In addition, parametric (Student's t-test) and non-parametric (Mann-Whitney U) tests were used for independent samples.

The EVEA test was used to measure the indicators of happiness, anxiety, and hostility, and the D2 test was used for the indicators of attentiveness and concentration. In addition, detailed descriptions of each of the indicators with their respective hypotheses were included. The analysis of the data obtained in this study was also carried out in a descriptive manner [19], [20].

3.5. Coding

In this section we present the main codes of each minigame for the development of the video game we using the IDE Visual Studio Code, whit the C# language, the obstacle generation logic of the FlyinDragon mini-game is shown, in which an obstacle is loaded at the beginning of the game so that it never changes position and it is easier for the participant to start, also each generated obstacle has a destruction time of 8 seconds to avoid overloading the game, also shows the final part when overcoming the required obstacles, the object "final" changes to "TRUE" state and the dragon mom is shown (Figure 8).

Likewise, the logic of mobility of the character of the game Woman-Dodge is shown, making an identification of the number of touches (if (Input. touchCount == 1), if it is the correct one it performs the movement to the right or left depending on the direction of the selected vector, also the scoring logic that when hitting a "Block" object the slider is reduced and when touching a "Player" object the slider will increase (Figure 9).

```
public class GenerarObstaculos : MonoBehaviour
{
    public float tiempoMax = 1;
    private float tiempoInicial = 0;
    public GameObject obstaculo;
    public float altura;
    public GameObject final;
    public static int pfinal = 0;
    void Start()
    {
        GameObject obstaculoNuevo = Instantiate(obstaculo);
        obstaculoNuevo.transform.position = transform.position + new Vector3(0, 0, 0);
        Destroy(obstaculoNuevo, 8);
    }
    void Update()
    {
        if(LogicaPuntaje.puntaje <18){
        if(tiempoInicial > tiempoMax){
            GameObject obstaculoNuevo = Instantiate(obstaculo);
            obstaculoNuevo.transform.position = transform.position + new Vector3(0, Random.Range(-altura, altura), 0);
            Destroy(obstaculoNuevo, 8);
            tiempoInicial=0;
        }
        else{
            tiempoInicial += Time.deltaTime;
        }
    }
    else{
        if(LogicaPuntaje.puntaje == 18){

        final.SetActive(true);
    }
```

Figure 8. Logic obstacle generation FlyinDragon

```
void Update()
{
    if (Input.touchCount == 1)
    {
        Touch touch = Input.GetTouch(0);
        if (touch.phase == TouchPhase.Began)
        {
            touchStart1 = Camera.main.ScreenToWorldPoint(touch.position);
            touchStart1.z = 0f;
        }
        else if (touch.phase == TouchPhase.Moved)
        {
            Vector3 direction = Camera.main.ScreenToWorldPoint(touch.position) - touchStart1;
            float desplazamientoX = direction.x * sensitividad1 * Time.deltaTime * velocidad1;
            Vector3 newPosition = transform.position + new Vector3(desplazamientoX, 0, 0);
            newPosition.x = Mathf.Clamp(newPosition.x, limiteIzquierdo1, limiteDerecho1);
            transform.position = newPosition;
        }
    }
}
 private void OnCollisionEnter2D(Collision2D collision)
{
    if (collision.gameObject.tag == "Block")
    {
        sliderVidas.value--;
        Destroy(collision.gameObject);
        if (sliderVidas.value <= 0)
        {
            Time.timeScale=0;
            AudioSource[] audios = FindObjectsOfType<AudioSource>();
            foreach(AudioSource a in audios)
                {
                    a.Pause();
                }
            perder.SetActive(true);
        }
        else if (sliderVidas.value == vida)
        {
            Time.timeScale=0;
            AudioSource[] audios = FindObjectsOfType<AudioSource>();
```

Figure 9. Logic movement and collision Woman-Dodge

4. Results

Five indicators were evaluated: level of happiness (LH), level of anxiety (LA), level of hostility (LHO), level of attentiveness LAT), and level of concentration (LC). The data obtained were as follows: for the LH, 96.7% of the control group was found at a low level and 93.3% of the experimental group at a medium level; for the LA, 100% of the control group was found at a medium level and 83.3% of the experimental group at a low level; for the LHO, 100% of the control group was found at a medium level and 86.7% of the experimental group at a low level; likewise, the LAT showed that 76.6% of the experimental group exceeded the goal. Finally, the LC showed that 90% of the experimental group did not exceed the goal of errors or omissions of response, identifying them with a high level of concentration (Table 1). Likewise, a normality test was performed for each indicator, using the student's t-test for those with normal distribution and the Mann-Whitney U-test for those without normal distribution.

Table 1. Descriptive statistics for the control group (CG) and experimental group (EG).

Average Data			
Indicator	**Group**	**Score**	**Level**
Happiness	CG	3.22	Low
	EG	6.06	Medium
Anxiety	CG	6.17	Medium
	EG	3.83	Low
Hostility	CG	5.58	Medium
	EG	3.82	Low
Attentiveness	CG	102	Low
	EG	134	High
Concentration	CG	23	Low
	EG	8	High

The results obtained from the Shapiro-Wilk normality test for both the control group (CG) and the experimental group (EG) are shown below, for the happiness indicator both CG and EG show values less than 0.05 and therefore not normally distributed. For the anxiety indicator, the value of the CG is greater than 0.05, but that of the CG is not, therefore, it is not normally distributed. Similarly, for the hostility indicator, the CG is greater than 0.05 and the GE is not, so it is not normally distributed. Finally, in the attention and concentration indicators, in both cases the CG and SG are greater than 0.05, therefore, they are normally distributed (Table 2). Depending on the case of the results obtained, the nonparametric Mann-Whitney U test and the parametric student's t-test were used.

*Table 2. **N**ormality test* Shapiro-Wilk *for the control group (CG) and experimental group (EG).*

Normality test Shapiro-Wilk			
Indicator	Group	Static	p
Happiness	GC	0.901	0.009
	EG	0.9	0.008
Anxiety	GC	0.95	0.174
	EG	0.87	0.002
Hostility	GC	0.979	0.791
	EG	0.915	0.02
Attentiveness	GC	0.933	0.059
	EG	0.937	0.077
Concentration	GC	0.989	0.981
	EG	0.96	0.307

The results obtained in the hypothesis test according to the type of distribution are also shown, the Mann-Whitney U test (Table 3) or student's t-test (Table 4) was applied, since in all cases the p-value is less than 0.001, demonstrating sufficient statistical evidence to accept the alternative hypothesis.

Table 3. Mann-Whitney U hypothesis test results

Indicator	Happiness	Anxiety	Hostility
Test	Mann-Whitney U	Mann-Whitney U	Mann-Whitney U
Statistic	0	0.5	6
p	<.001	<.001	<.001
Hypothesis	H_a: μ 1 < μ 2	H_a: μ 1 > μ 2	H_a: μ 1 > μ 2

Table 4. Student T hypothesis test results

Indicator	Attentiveness	Concentration
Test	Student T	Student T
Statistic	-9.75	16.2
p	<.001	<.001
Hypothesis	H_a: μ 1 < μ 2	H_a: μ 1 > μ 2
gl	58	58

5. Discussion

The results show that the treatment of perinatal depression, supported by the implementation of a video game, increased the level of happiness (LH), the level of attentiveness (LAT), and the level of concentration (LC), and decreased the levels of anxiety (LA) and the level of hostility (LHO); demonstrating that the implementation of a video game significantly improves the treatment of perinatal depression. With respect to the indicators of level of happiness (LH), level of anxiety (LA), and level of hostility (LHO), a scale was used to identify the low, medium, and high levels for the level of attentiveness (LAT) and concentration (LC) a goal was proposed that represents a low or high level, in this way the score obtained in the test can be interpreted.

With respect to the first indicator, which is the level of happiness (LH), a score of 3.22 was obtained for those who did not use the video game, and for the group that did use the video game, a score of 6.06. Comparing the results of both groups, an increase of 2.84 points can be observed, which means a 53. 13% increase in the level of happiness (LH) after using the video game; these results are similar to those obtained by Xu *et al.* [9], who demonstrated that the use of a virtual reality (VR) video game significantly reduces the states of depression in which the 31 students evaluated were found, during their pretest a score of 8.33 and in the post-test 5.14. Happiness is emotional evidence that things are going well, a satisfaction for completing desired results [21].

With respect to the second indicator, which is the level of anxiety (LA), a score of 6.17 was obtained for the control group, for the experimental group a score of 3.83, showing that, compared to the control group, 2.34 points were reduced for the women in the experimental group when using the proposed video game, representing a decrease of 37. 92%, these results are similar to the research of Ken *et al*. [22], who, through their game, ReWIND, managed to significantly reduce the initial results of a group of 20 students in their initial test of the BAI test of 24.05 points, compared to the test after the video game sessions to 13.20 points. Anxiety is a feeling that cannot be explained until one goes through it; the person may go through feelings of fear or worry in situations that would seem normal to others [23].

With respect to the third indicator, which is the level of hostility (LHO), a score of 5.58 was obtained for the control group, and for the experimental group, a score of 3.82, demonstrating a reduction of 1.76 points, representing a 31.54% reduction in hostility levels (NH). These results are similar to those of Garaigordobil *et al*. [8], who conducted research on the use of videogames to reduce cyberbullying, multiple types of bullying, and harassment, among others evaluated, in which a decrease was evidenced by the experimental group aggression-bullying from 16.40 to 6.87 and an increase in conflict problem solving from 3.41 to 16.89. Hostility is an emotional reaction that includes feelings of anger. Generally, these people have a negative attitude, seeking to enter into constant conflict with other people [24].

With respect to the fourth indicator, which is the level of attentiveness (LAT), an average of 102 correct answers were obtained by the control group and an average of 134 correct answers by the experimental group, which represents an increase of 23.88%, which shows an increase in the levels of attentiveness (LAT) for the group that used the videogame. These results are similar to the study of Gallardo *et al.* [12], who, after comparing the initial results with those obtained at the end (16 sessions), managed to increase the number of correct answers by 58.44% in the CARAS-R test of the experimental group (use of the video game), compared to the control group that performed the standard treatment for ADHD personnel, who also improved by 34.4%. Attention is the basis of all cognitive processes that require a motor response for an activity, so it is important to maintain a positive level to achieve our proposed goals [25].

With respect to the fifth indicator, which is the level of concentration (LC), an average of 23 errors or omissions when marking the answers was obtained for the control group, compared to the average of the experimental group, which was eight errors or omissions after using the video game, which represents an improvement of 53.57%. These results are similar to the results of Auccahuasi *et al.* [26], who, in their research, evidenced a higher concentration of the students when using a video game, reaching levels of 70% minimum and a maximum of 90% in comparison when listening to a normal class the concentration levels (LC) were from 10% minimum to 60% maximum. Concentration is a function of the stability of their orientation toward a specific object or stimulus. Unlike attention, concentration requires greater intensity and focus towards an activity [25].

6. Conclusion

It was determined that there is a significant increase in the level of happiness (LH) for women with perinatal depression, showing that the percentages obtained, calculated with the formula, showed 93.3% in medium level and 6.7% in high level of happiness in the experimental group, compared with 3.3% in medium level and 96.7% in low level of happiness in the control group, which shows a significant improvement by the group that made use of the video game. In addition, a nonparametric Mann-Whitney U statistical test was performed, obtaining a p-value of 0.001 and providing sufficient statistical evidence to accept the alternative hypothesis.

It was determined that there is a significant decrease in the level of anxiety (LA) for women with perinatal depression, obtaining 100% in the medium level of anxiety by the control group, for the experimental group, 83.3% in the low level, and 16.7% medium level of anxiety, demonstrating that the use of video games managed to reduce the level of anxiety (LA) in the experimental group compared to the control group. In addition, a nonparametric Mann-Whitney U statistical test was performed, obtaining a p-value of 0.001 and providing sufficient statistical evidence to accept the alternative hypothesis.

It was the determined that there is a significant decrease in the hostility level (LHO) for women with perinatal depression, obtaining 100% medium level of hostility for the control group, for the experimental group 86.7% low level, and 13.3% medium level of hostility, demonstrating that the use of video games helps to reduce the level of hostility (LHO). Also, a nonparametric statistical test of Mann-Whitney U was performed, obtaining a p-value of 0.001, providing sufficient statistical evidence to accept the alternative hypothesis.

It was determined that there is a significant increase in the level of attentiveness (LAT) for women with perinatal depression, obtaining an average of 102 correct answers for the control group, compared to 134 correct answers for the experimental group, obtaining an increase of 23.88%, demonstrating that the use of video games increases the level of attentiveness (LAT). Also, a parametric statistical test of student's t-test was performed, obtaining a p-value of 0.001, providing sufficient statistical evidence to accept the alternative hypothesis.

It was determined that there was a significant increase in the level of concentration (LC) for women with perinatal depression, obtaining an average of 23 response errors or omissions for the control group. For the experimental group, an average of eight response errors or omissions was obtained, obtaining an increase of 53.57%, which shows that the use of videogames helps concentration. Also, a parametric statistical student's t-test was performed, obtaining a p-value of 0.001, providing sufficient statistical evidence to accept the alternative hypothesis.

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