A Study of Digital Games as a Method of Reducing Stress for Students in the Modern World

Study took place at Indian Institute of Information Technology Dharwad (IIIT Dharwad)

1st Digant Singh
Dept. Computer Science and Eng.
IIIT Dharwad
Dharwad, India
22bcs037@iiitdwd.ac.in

2nd Devwardhan Kothari
Dept. Computer Science and Eng.
IIIT Dharwad
Dharwad, India
22bcs035@iiitdwd.ac.in

3rd Lupam K Saha
Dept. Computer Science and Eng.
IIIT Dharwad
Dharwad, India
22bcs063@iiitdwd.ac.in

ABSTRACT

Objective: This research explores the link between playing digital games and stress reduction among students across diverse educational levels. The study investigates optimal gaming duration for stress reduction. **Method**: The study employs two approaches: a broad survey capturing student opinions and a focused method involving 14 volunteers playing games while monitoring stress levels using a questionnaire pre-gaming and post-gaming, over a 21-day span. **Key Results**: The general survey indicates that over 80% of students find digital games helpful in stress reduction. However, an in-depth analysis reveals around 55% to 60% experience actual relaxation post-gaming, typically lasting less than 2 hours. Few exhibit consistent long-term stress reduction. The focus group shows daily stress reduction for some, with occasional spikes attributed to academic stress. **Conclusion**: Digital games have a positive impact on student stress levels, providing effective daily stress reduction in short gaming sessions of 15 to 30 minutes. The impact of longer gaming duration remains beyond this study's scope.

***Index Terms*—students, digital games, stress reduction**

I. Outline

Playing digital games releases dopamine, which is a hormone released for pleasure. We can correlate stress reduction to dopamine release and therefore, can ask the question, does playing digital games reduce stress?

The study attempts to look at the effects of playing digital games on the stress level of students at different levels of education. This extends from elementary schooling right up to the doctoral level. We try to understand whether the student playing these digital games feel good about playing the game. But there is a clear distinction between feeling good about playing a game and releasing stress by playing the game. And yet, these two things are connected to each other by virtue of personal feelings.

Therefore, we will try to look at this paradigm from multiple outlooks and conclude from our findings to a certain level of clarity, whether digital games reduce stress in students or not.

II. Introduction

A. The Motivation of the Study

The modern world is seeing a rise in digital media. Along with this, there is a proportional rise in the engagement of students in digital games. Most of the market for new and upcoming digital games is young teenagers. And therefore we are begged to ask the question, is it possible to reduce stress among students using digital games? Because if it is true, it will open new avenues in the gaming sector that will work to actively reduce the stress levels of these youngsters.

The problem of stress affects most of the population around the world and by estimates, it will increase in the future. In this landscape, if we can provide a constant dose of soothing and relaxing digital games, we will be able to cater to a large section of society.

B. Objectives of the Study

The clear objective of the study is to gain insight into the student's behavior in response to digital games and how it affects the students' stress levels.

We will also try to distinguish between relaxation in the long term and relaxation in the short term period post gaming. it is imperative that we think through the entire process of stress reduction. A digital game may relax a student temporarily for a few hours, but what about the general adaptive relaxation of the person, is it being full-filled by the digital game.

Another objective is to find the duration of time for which a student engages in gaming and how it affects the stress reduction aspect of gaming. Once we know the duration for which the gaming is most effective, we can design gaming segments that can be played for that duration and hence be more effective.

C. Possible Applications of the Study's Outcomes

Based on the outcome of the study, we can develop new digital games that can cater to very specific stress reduction methods for the users and help them relax on a daily basis. This is also discussed further in the paper.

Furthermore, any company developing games for fun can

incorporate these factors in the development of the digital game, hence making the game development industry more aware of the effect of digital games on their users.

III. Methodology

Approach 1

The approach employed for the extensive data collection encompassed the utilization of digital forms, employing surveys as the primary methodology. The scope of this method was to conduct an expansive survey targeting a diverse pool of students with varying backgrounds. The survey was disseminated across numerous educational institutions throughout the nation. Initially, the anticipation was a modest turnout of approximately 100 students. However, the response surpassed expectations, nearly doubling the projected participation rate. The demographics reached through this survey effort will be succinctly outlined in subsequent sections. Through this comprehensive initiative, fundamental inquiries were posed to the participants concerning their gaming behaviors. These inquiries encompassed the duration of their gaming sessions and the specific genres of games they engaged with. Furthermore, the survey delved into their perspectives regarding stress reduction, encompassing the exploration of two distinct strategies. The intention behind this line of questioning was to acquire insights into their viewpoints on how gaming aligns with stress alleviation. This comprehensive study aims to offer a comprehensive analysis of the broader landscape of students' gaming habits and their perceptions concerning stress management strategies.

Strategy 1*:* : The survey straightforwardly asked for the participants' views on using games for stress reduction, based on the assumption that students possess the self-awareness to provide honest responses about their own perceptions.

Strategy 2*:* : Recognizing the potential limitations of the straightforward approach, the survey incorporated additional queries. These questions, such as whether engaging in digital games provided a sense of accomplishment even during periods of emotional downturn, were designed to reveal subtleties in behavior. The focus on these unbiased questions was intentional, aimed at reducing the potential for personal bias and manipulation.

Approach 2

The chosen approach is notably focused, aiming to provide a comprehensive view of students' stress levels before and after gaming over a span of 20 days. The study's duration was even extended for participants willing to contribute, stretching to 30 days. This extended time frame facilitated the acquisition of highly specific data points concerning the stress-reduction attributes of digital games. In a targeted effort, 14 volunteers were requested to engage in a calming, non-violent game for approximately 15 to 20 minutes. Subsequently, they were asked to complete a pre and post-activity questionnaire containing both direct and indirect inquiries about their stress levels. The collected data were normalized, allowing for the calculation of the average stress levels before and after each gaming session on a daily basis. This analytical approach yields insights into the immediate and prolonged effects of digital game engagement on stress levels.

IV. Representation and Interpretation of Data

After collecting data from the group of 14 volunteers, we talked to them to get their thoughts on the experience. Whatever suggestions they had were taken into account when we processed their data. For example, one student mentioned that the study was affecting their school work, so we had a discussion with them and let them stop participating halfway through to avoid any negative impact on their studies.
The data collected will be analyzed per day and across the duration of the day. Thus when plotting the data on a graph, the x-axis will be the 'day' of the study, while the y-axis will represent the stress level normalized to a scale of 5. The understanding is that on a scale of 5, 1 and 2 are low levels of stress which are not too alarming while anything upwards of 3 will pose a threat to the student's mental health level. Every day will have two points, one pre-gaming and one post-gaming.

*A. **Focus Group***

Volunteer 1

In the case of Volunteer 1, we can observe one anomaly wherein the volunteer feels stressed even after the gaming session. When enquired about it, he noted that it was a stressful day with an assignment due the next day. In the long term, the stress level is reduced by a very little margin.

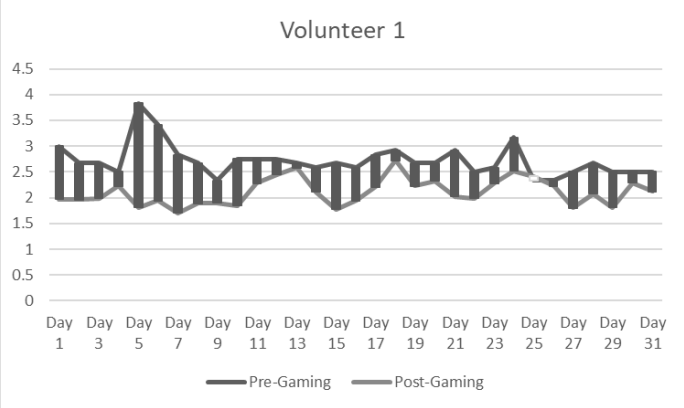

Fig. 1. Volunteer 1

Volunteer 2

Volunteer 2 felt that he could reduce his stress levels by a higher margin if he played the game for lesser time, for example on day 8 he played 15 minutes, and on day 12 he played for 20 minutes.

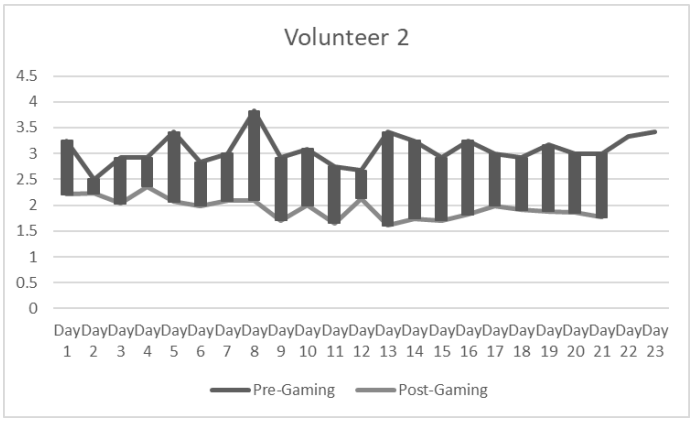

Fig. 2. Volunteer 2

Volunteer 3

The volunteer said that they could really see the appeal of digital games reducing stress on a daily basis. But since students have a busy schedule that keeps going through academic stress peaks, looking at it as a long-term solution is not viable.

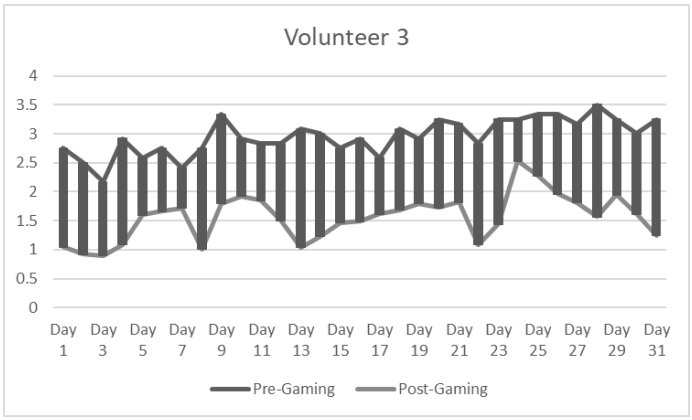

Fig. 3. Volunteer 3

Volunteer 4

The volunteer told us that he couldn't really see themselves relaxing after playing a digital game. But as they completed the study, they had a change of heart.

Volunteer 5

The volunteer did not feel the stress reduction due to gaming in the later half of the test. When asked about it, they told that it was a tough time for them because they had exams coming up and every time they played a digital game, they felt that they had robbed themselves of precious time. We do need to keep in mind that examinations are a part of student life and digital games are not soothing enough.

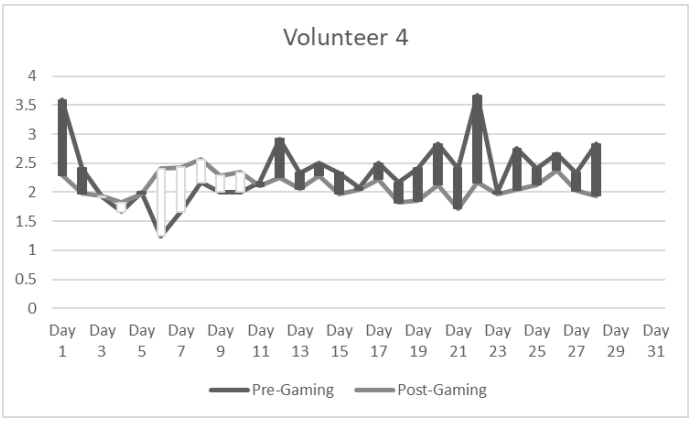

Fig. 4. Volunteer 4

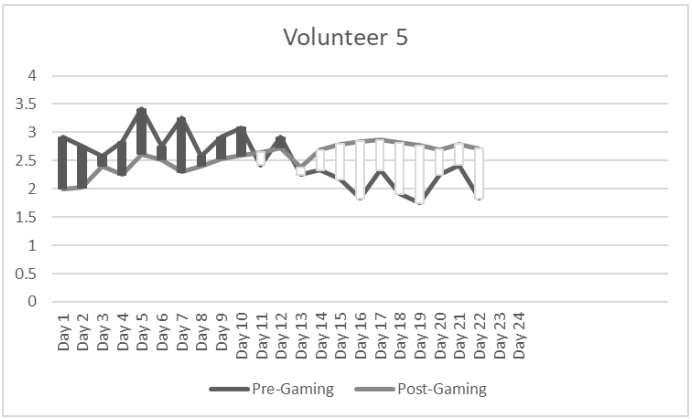

Fig. 5. Volunteer 5

Volunteer 6

The volunteer has erratic pre-gaming stress levels, but the stress levels post-gaming show almost ideal stress level change. The stress level also shows a steady decrease during the study. The anomalies are due to academic stress, but post-gaming the volunteer shows reduced stress levels.

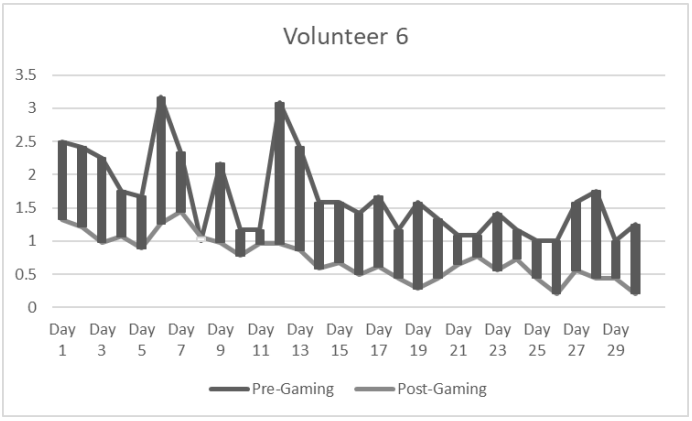

Fig. 6. Volunteer 6

Volunteer 7

On the other hand, volunteer 7 has very stable pre-gaming stress and erratic post-gaming stress levels. This was because, as they described, they were quite good at academics and thus weren't affected by changing academic stress. They also told us that they play for exactly 15 minutes. They felt that having a time bounding is good for them.

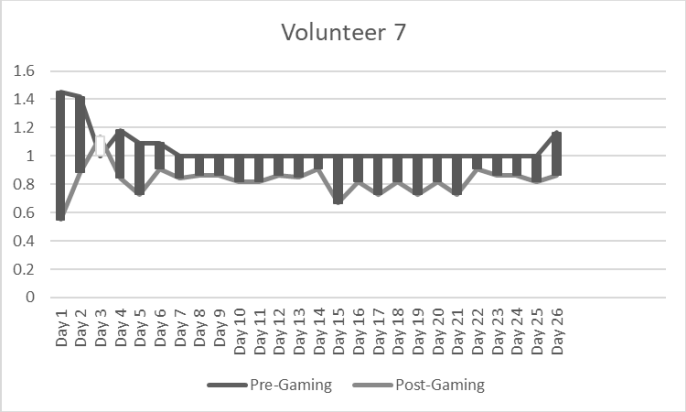

Fig. 7. Volunteer 7

Volunteer 8

This is a classic case wherein the student's stress is increasing and the games help them to decrease their stress. We observe that the pre-gaming stress level of the volunteer increases for the duration of the study. Furthermore, we see that as time increases, the margin by which the stress is changing increases, meaning that the volunteer feels good about the process, and his stress is reduced by playing digital games.

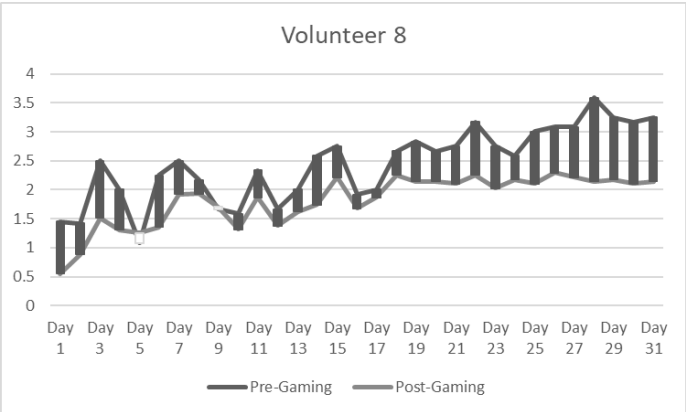

Fig. 8. Volunteer 8

Volunteer 9

The stress level pre-gaming seems to be very stable, given a few abnormalities. What is important to notice is that the volunteer shows great response to the gaming sessions of 20 minutes.

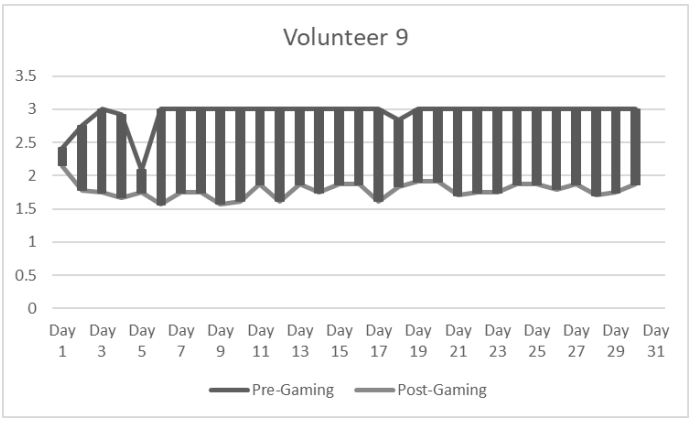

Fig. 9. Volunteer 9

Volunteer 10

The volunteer responded well to the study and had high levels of relaxation post-gaming, although, they don't show a long-term response to playing digital games and reducing stress

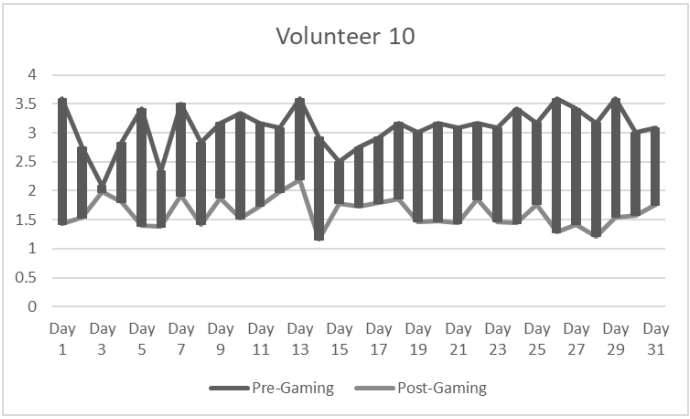

Fig. 10. Volunteer 10

Volunteer 11

The first day of the volunteer seems very high stress reducing. When asked about it, they responded that it was the questionnaire that they responded to. We had to explain some of the questions and after that, it was corrected. We can see a pattern of stress reduction across the duration of the study, although it is not too much margin.

Volunteer 12

We can observe that the volunteer reverts to a level of relaxation after every gaming session, even if their pre-gaming stress levels are varying. This shows a case wherein the person uses a digital game to gain focus in their life and reduce stress. After an interview with the volunteer, they told us that digital games help him to gain perspective in life and motivate them to do his tasks to completion.

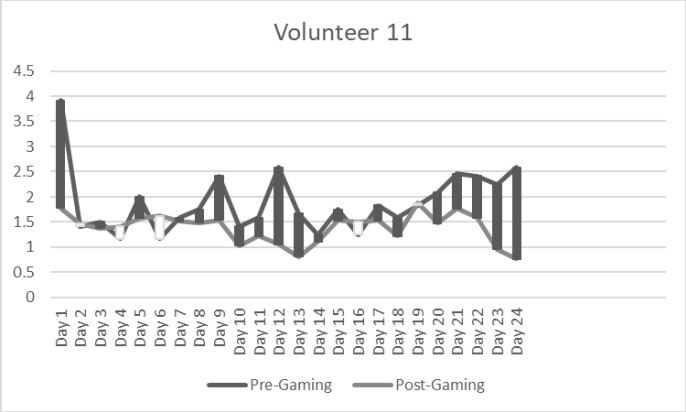

Fig. 11. Volunteer 11

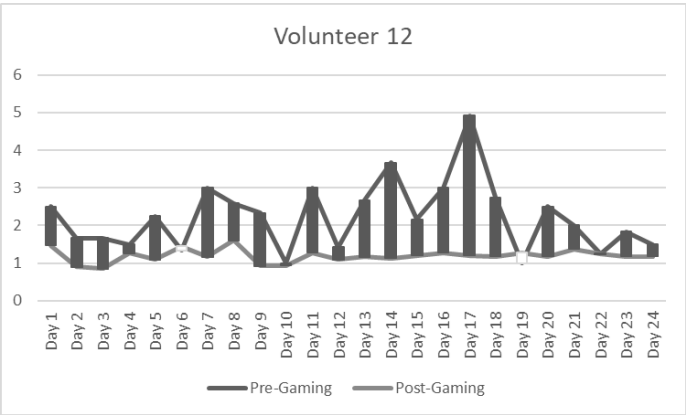

Fig. 12. Volunteer 12

Volunteer 13

The volunteer feels very relaxed after the gaming session and said that they would continue to play digital games even after the study is completed and see digital games as a method of relaxation. They were also very advent in adding that digital games give a method of finding a relaxed mind. They also added that excessive gaming is bad for them and that going upwards of 25 minutes gives them a sense of anxiety.

Volunteer 14

The volunteer asked that their stint be cut short since they felt that the study was adversely affecting them. After an exit interview was conducted, the volunteer was removed from the study. But, this also tells us that digital games can have very adverse effects on certain individuals and therefore must be regulated.

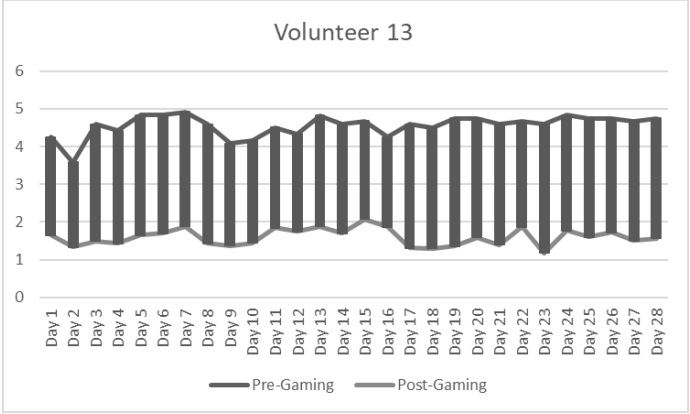

Fig. 13. Volunteer 13

B. *General Survey*

The general survey yielded a much broader perspective of the students. The students told us about their general gaming practices and were asked about their stress levels. More than 80% of the 196 respondents reported that they felt that gaming reduces stress, which also tracks with the focus group data.

Although, on asking more specific questions, students think and answer differently. When asked about the effects of digital games on their general relaxation, the student's response shifts by around 30% to partially agreeing with it. When we look at the scale, we consider the 4 and 5 to be more relaxed after playing digital games.

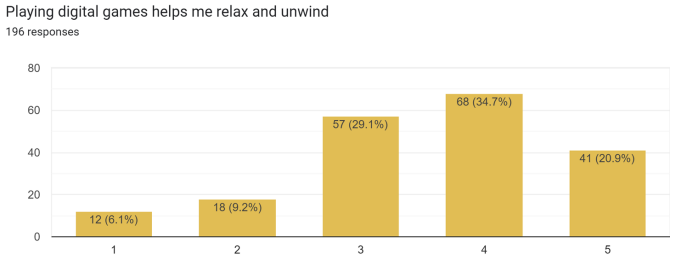

Fig. 14. 55.6% of respondents relax and unwind after playing digital games

Furthermore, students find that playing digital games can help them escape real-life stress.

The students do not remain aloof for too long as we can see from the long-term effects of digital games is not too much. We look at the positive side of the figure to be around 59.2%. But once we consider those who selected 3/5, the percentage booms up to 79.6%.

But when we look at the effects of digital games in the long run, they are very contrasting to the 82.1% of people feeling relaxed. Only 25% of the respondents feel that digital games

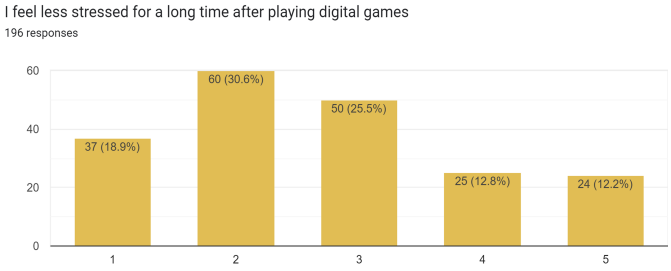

Fig. 15. 25% of the respondents experience long-term relaxing effect of playing digital games

have a long-term effect on their stress levels, meaning that digital games are only a way of reducing stress in the short term.

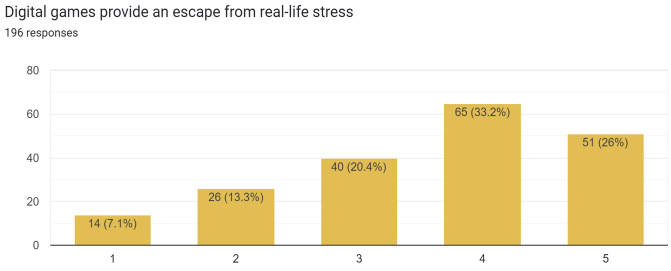

Fig. 16. 59.2% of respondents feel that they can escape real-life stress by playing digital games

Students also respond that they are being distracted from the problems that are causing this stress. 69.4% of the respondents report that they are being distracted by digital games. This means that the problem still exists but they are aloof. Thus, students must be advised to have shorter sessions of gaming.

Another aspect of digital games is the surroundings that a student plays in. It was reported that 75% of the respondents feel much more relaxed when they play with their friends and family.

Many respondents also felt that digital games helped them improve their mood. 45.9% of the respondents noted that playing digital games helped them improve their overall well-being.

With all these and many more data points, it can be inferred that students can release stress for a short term of time by engaging in digital games. Furthermore, it can be observed that students are more engaged when they are playing digital games within a community. This means that there is a social aspect to digital games as well.

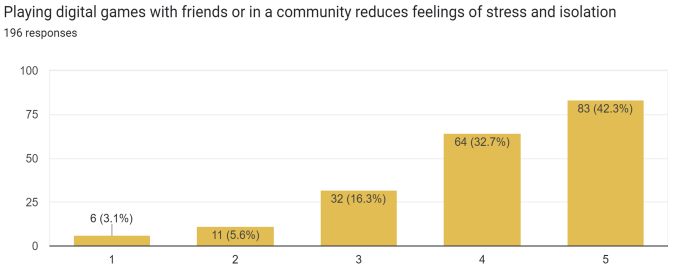

Fig. 17. 75% feel much better and relaxed if they play with friends

V. Result

The results of the study can be drawn out to be under the following points.

1) Stress: : The study shows that digital games can reduce stress in the majority of students, yet it must be considered that some of the students might get adversely affected.

2) Duration: : Based on the focus group and the interviews of the volunteers conducted, we can come to a conservative time of 20 to 25 minutes. Yet it should be considered that individuals react differently to the duration of gaming sessions.

3) Variety: : The type of game that is played is also very crucial to stress reduction. It was found that general games without any violent aspects were much more effective at stress reduction. A piece of quaint background music was preferred by almost 10 out of the 14 volunteers.

4) Effectiveness: : The effectiveness of stress reduction of digital games is short-term and it must be considered when using games to relieve tension. Digital games are not a long-term cure for stress.

VI. Discussion

The implications of this study have a broad perspective. Many game development companies must keep in mind that games have a stress-reducing factor in them and they must strive to incorporate a model which should help students. Game developers can also build modules of games that are 20 to 25 minutes in duration and have an intensive engagement for the users. Furthermore, using specific digital games for stress management and coping with daily tension will be recommended.

VII. Limitations

1) General Survey: : The general survey had to cover a very large demographic and therefore, every question will get a little skewed result. The level of stress in an elementary student will be very different from the stress level in a doctorate scholar. Also, the age gap between the respondents means that each individual will have a range of emotional maturity. which means that everyone's understanding of stress will be different. Adding to that, the number of respondents is around 200. If we increase the number of respondents, the results might vary a little. In the end, stress is a psychological factor that

is extremely complex, and defining general stress reduction techniques will be very difficult.

2) Focus Group: : The focus group was highly prepared and was given very clear instructions for the questionnaire. But, due to a highly stressful academic calendar, the students were never really out of the range of academic stress. It is worth mentioning that end-semester exams were in two weeks after the study ended, and therefore, a little anxiety lurked amongst the volunteers. But, none of the volunteers were affected due to the study or any of its work.

VIII. Conclusions

In conclusion, it can be claimed that digital games can help students reduce stress, but under very specific prerequisites. The stress reduction capabilities of digital games are very short-term and can not be used as a long-term cure for stress. Thus, digital games can be used for mild cases of stress among students. The degree of confidence with which this is claimed is moderate. Based on the study conducted, using the two approaches helped to gain a macro as well as micro observation of the question that the study posed. As for the question of digital games as a method of reducing stress in the modern world, digital games provide relaxation, for the short term, to the students.

IX. Acknowledgements

This study was completed with the help of a lot of individuals. The first one was our guide through this study, Dr. S. Gokulraj, who helped to frame the entire study and guided the research at every turn. Further, the research volunteers, who helped the focus group to gain insights on the topic are also to be thanked. The research team also thanks the individuals who participated in the survey and gave their precious time to help the study.

References

[1] M. J. Koepp, R. N. Gunn, A. D. Lawrence, V. J. Cunningham, A. Dagher, T. Jones, D. J. Brooks, C. J. Bench & P. M. Grasby 'Evidence for striatal dopamine release during a video game'

[2] Simona Cabib, Stefano Puglisi-Allegra 'The mesoaccumbens dopamine in coping with stress'

[3] 'Dopamine and games – Liking, learning, or wanting to play?' Ben Lewis-Evans

[4] Han, Doug Hyun MD, PhD; Lee, Young Sik MD, PhD; Yang, Kevin C. BA; Kim, Eun Young MD, PhD; Lyoo, In Kyoon MD, PhD; Renshaw, Perry F. MD, PhD 'Dopamine Genes and Reward Dependence in Adolescents with Excessive Internet Video Game Play'

[5] 'The impact of stress on students in secondary school and higher education' Michaela C. Pascoea, Sarah E. Hetrick & Alexandra G. Parker

Details of the study and data can be accessed by anyone by asking for Google Sheets access on the email id of any author