

# Effect of Audio-Visual Appeal on Game Enjoyment: Sample from Turkey

Naz Almaç

**M.A Naz Almaç, Res. Ass.**

*Başkent University  
Faculty of Communication  
Bağlıca Kampüsü Fatih Sultan Mahallesi  
06790 Etimesgut, Ankara  
TURKEY  
nazalmac@gmail.com*



Naz Almaç completed her undergraduate degree at İstanbul Bilgi University Communication Faculty, Photography, and Video Department in 2014. She worked as a photographer for independent magazines and participated in several short film projects. She obtained her M.A. degree in 2018 from Bahçeşehir University Cinema and Television department with the thesis titled 'Her Story: Use of Film Language in Full-motion Video Games'. Currently, she works as a research assistant at Başkent University Radio, Television, and Cinema Department in Ankara and studies her PhD in the same department.

## ABSTRACT:

A player's subjective interaction with a digital game is referred to as player experience. The consequence of playing a game affects a player's thoughts, feelings, attitudes, and behaviours. To measure player experience there are various qualitative and quantitative methods. Iterative game development and play testing sessions enhance and optimize game designs, to determine the impact of functional and psychosocial consequences of gaming in various cultures, a credible scale is required. To be able to measure and analyse player experience, this study aimed at adapting the 'Player Experience Inventory' (PXI) scale developed by V. V. Abeele<sup>1</sup> to Turkish. The results of test-retest analysis and back-and-forth translation demonstrate that linguistic equivalence is not applicable for the Turkish variant. Only one item for functional – audio-visual appeal – and two items from psychosocial – immersion and autonomy – consequence of gaming have a proper factor structure. In this way an adaption study was carried out by confirmatory factor analysis (CFA) and explanatory factor analysis (EFA) with three items from the scale. The validity and reliability of the scale and relationship of audio-visual appeal of gaming on game enjoyment were tested and this article proposes a model for the functional and psychosocial consequences of gaming.

## KEY WORDS:

digital games, game user research, moderation effect, player experience, scale adaptation.

## DOI:

10.34135/actaludologica.2023-6-2.42-61

---

# Introduction

The gaming industry has expanded rapidly since the 2000s due to players' demands and technological advancements in computer science. As an academic discipline, game studies brings together quite different disciplines and allows the examination of different dimensions of the situation we define as play. The mathematical pattern of the games, their mechanics, and thus their formal components can be examined, as well as the players and their communities who play the games, as well as the role and meaning of the games that exist together with culture in social life. Thus, what games serve in the historical process is investigated by sociologists, the motivation and psychology of players by psychologists, and the relationship between culture and games by anthropologists.

As the literature suggests, players constitute maybe the most essential part of the gaming industry.<sup>2</sup> Therefore, both digital game companies and academia research players' experiences to understand what motivates people to play and the consequences of gaming. Nowadays, research on player experience has attracted many scholars from different

---

1 See: ABEELE, V. V. et al.: Development and Validation of the Player Experience Inventory: A Scale to Measure Player Experiences at the Level of Functional and Psychosocial Consequences. In *International Journal of Human-Computer Studies*, 2020, Vol. 135, No. 1, p. 1-47. [online]. [2023-11-22]. Available at: <<https://doi.org/10.1016/j.ijhcs.2019.102370>>.

2 SALEN, K., ZIMMERMAN, E.: *Rules of Play*. Cambridge, MA : The MIT Press, 2003, p. 313.; JÄRVINEN, A.: *Games without Frontiers: Theories and Methods for Game Studies and Design*. Saarbrücken : VDM Verlag, 2009, p. 96.

fields such as psychology, human-computer interaction, computer science, and game user research (GUR). Evaluation of the player experience varies because of the approaches of the studies as both quantitative and qualitative researches have been carried out by scholars. Although there exist many research designs, such as players writing diaries of their play experience,<sup>3</sup> the most used tools are generally quantitative surveys. However, researchers are still debating which factors of digital game influence game experience. In this way, several newly developed tools measure the experiences of players. GUR experts are collaborating with the digital game industry to produce high-quality games. Several newly developed tools measure players' experiences in terms of engagement, flow, immersion, and presence.

This study aims to adapt the English version of the player experience survey PXI (Player Experience Inventory) to Turkish which is developed by V. V. Abeele. This survey stands out because scholars separate the gaming experience into two topics: functional and psychosocial consequences of gaming. Functional consequences are the direct effects of digital game mechanics on players. Scholars categorize functional consequences as; ease of control, progress feedback, audio-visual appeal, clarity of goals, and challenge. Psychosocial consequences are secondary effects and can be continued after playing. Psychosocial consequences can be listed as; mastery, curiosity, immersion, autonomy, and meaning. PXI's theoretical framework suggests that the direct effect of functional features of digital games is the primary reason of players feeling fun while gaming, according to the scholars this effect is mediated by psychosocial consequences. In this way, direct experience of the functional aspects of the gaming environment produces states such as immersion and autonomy. While developing a Turkish variant for the PXI survey, this paper also asks if the mediation effect of audio-visual appeal on enjoyment mediated by immersion and autonomy is relevant to the Turkish gaming community.

In Turkey, mobile gaming culture, especially the hyper-casual mobile gaming industry, and consumption, has developed rapidly in recent years. Furthermore, universities opened both undergraduate and graduate game design departments. These developments in Turkey have also contributed to the global digital game culture. For this reason, researchers and developers need theoretical tools to measure player experience. Game developers and scholars in Turkey would benefit from measuring player experience by surveying gaming consequences. The only adaptation study of the player experience survey known is conducted by M. İ. Berkman, B. Bostan and S. Şenyer.<sup>4</sup> This study aims to contribute to player experience studies in Turkey and help both developers and researchers understand the gaming experience.

## Research Framework

### a) Immersion

Science-fiction horror movie *eXistenZ*<sup>5</sup> presents a future that imagines people using biotechnical gear to get into a virtual reality game. The bodies of citizens were transformed surgically to be able to wear the devices. In the movie, the game companies

---

3 For more information, see: HILLMAN, S.: Diary Methods in AAA Games User Research. In KAYE, J. et al. (eds.): *CHI EA '16: Proceedings of the 2016 CHI Conference Extended Abstracts on Human Factors in Computing Systems*. New York, NY : ACM, 2016, p. 1879-1885.

4 See also: BERKMAN, M. İ., BOSTAN, B., ŞENYER, S.: Turkish Adaptation Study of the Game User Experience Satisfaction Scale: GUESS-TR. In *International Journal of Human-Computer Interaction*, 2022, Vol. 38, No. 11, p. 1081-1093. [online]. [2023-11-22]. Available at: <<https://www.tandfonline.com/doi/full/10.1080/10447318.2021.1987679>>.

5 CRONENBERG, D. (Director): *eXistenZ*. [DVD]. Toronto : Alliance Atlantis, Momentum Pictures, 1999.

created digital games that feel like reality, and several so-called realists fight against these companies to save reality from deforming. This virtual reality machine which resembles reality is a common trope in science-fiction literature, especially cyberpunk movies.

Any medium can suspend the reality of the audience, even traditional movements in arts aim at making a perfect representation of reality. Reading, movie watching, or playing a game sometimes feels like being in an alternate reality. Narrative in any medium, as J. Murray suggests, is experienced by the audience in great intensity, as a result, the world around us does not feel the same.<sup>6</sup> However, in digital media, unlike reading a book, players can feel agency<sup>7</sup> towards the narrative. In this way digital media – or more precisely digital games – immerses players more than traditional narrative structures. As players control a system and take feedback on those actions, the space becomes more absorbing.<sup>8</sup>

In literature, immersion and presence are sometimes used interchangeably but, M. Slater defines two terms as different notions, as according to the author immersion is “simply for what the technology delivers from an objective point of view”<sup>9</sup> and presence is “a human reaction to immersion”.<sup>10</sup> G. Calleja interprets these definitions as “immersion is being used to describe affective properties of the hardware, while presence is the psychological response to this technology”.<sup>11</sup> Nowadays the game industry markets games by their immersive attributes such as photorealistic graphics, high-quality audio, engaging narrative, replayability value, or procedural generation techniques. Listed attributes impact the experience of players and engagement towards the game deepens.<sup>12</sup>

In her groundbreaking book *Hamlet on the Holodeck*, J. Murray defines immersion as: “Immersion is a metaphorical term derived from the physical experience of being submerged in water. We seek the same feeling from psychologically immersive experiences that we do from a plunge in the ocean or swimming pool: the sensation of being surrounded by a completely other reality, as different as water is from the air, that takes over all of our attention, our whole perceptual apparatus”.<sup>13</sup>

Although reading a science-fiction book or listening to a piece of music can be immersive; participatory activities do this by giving a system governed by rules to players whereby players learn these systems and act according to those rules. Boundaries<sup>14</sup> created by the digital system creates a special time and space other than the ordinary world.

---

6 MURRAY, J.: *Hamlet on the Holodeck, Updated Edition: The Future of Narrative in Cyberspace*. Cambridge, MA : The MIT Press, 2017, p. 123.

7 Remark by the author: In cyberspace, the agency is defined as taking meaningful actions in terms of the boundaries of space and seeing the result of these actions. When users type down words in search engines, click a folder on the desktop with a mouse, or use ‘W, A, S, D’ buttons for navigating in a digital game they expect to feel agency.

8 Remark by the author: According to J. Murray digital environments have four essential properties, these environments are procedural, participatory, spatial, and encyclopedic. Procedural and participatory characteristics of digital spaces refer to the interactive ability of the space, spatial and encyclopedic properties make the space navigable and similar to reality, these two make cyberspace immersive.; MURRAY, J.: *Hamlet on the Holodeck, Updated Edition: The Future of Narrative in Cyberspace*. Cambridge, MA : The MIT Press, 2017, p. 87.

9 SLATER, M.: *A Note on Presence Terminology*. [online]. [2023-11-23]. Available at: <[http://www0.cs.ucl.ac.uk/research/vr/Projects/Presencia/ConsortiumPublications/ucl\\_cs\\_papers/presence-terminology.htm](http://www0.cs.ucl.ac.uk/research/vr/Projects/Presencia/ConsortiumPublications/ucl_cs_papers/presence-terminology.htm)>.

10 Ibidem.

11 CALLEJA, G.: *In-Game: From Immersion to Incorporation*. Cambridge, MA : The MIT Press, 2011, p. 21.

12 Remark by the author: However, K. Salen and E. Zimmerman criticize this view, according to them the most important aspect of games is not their immersive ability, engagement can be reached through interesting mechanics too.; SALEN, K., ZIMMERMAN, E.: *Rules of Play*. Cambridge, MA : The MIT Press, 2003, p. 451.

13 MURRAY, J.: *Hamlet on the Holodeck, Updated Edition: The Future of Narrative in Cyberspace*. Cambridge, MA : The MIT Press, 2017, p. 124.

14 Remark by the author: J. Huizinga refers to special boundaries created by the play area as a ‘magic circle’, which differentiates reality. Play is often separated from reality by scholars however nowadays this division is criticized as players enter the play system with real-life knowledge as well.; See: HUIZINGA, J.: *Homo Ludens: Kültürün Oyun Unsuru Üzerine bir İnceleme*. İstanbul : Ayrıntı, 2023.

The computer screen, mouse, and joystick or audio-visual aesthetic of the digital space enhances the immersive ability of the experience. Compared to traditional media, cyberspace presents powerful audio-visual technics which enhance the immersion of users through technology. Whether the world wide web or a digital game; visuals of the digital media enhance the absorbing experience. In this way, it is possible to suggest that the audio-visual experience of digital media determines the level of immersion experienced by the player. As J. Murray suggests “[t]he more persuasive the sensory representation of the digital space, the more we feel that we are present in the virtual world and the wider range of actions we will seek to perform there”.<sup>15</sup>

In player experience studies immersion is an important construct for understanding the physical and psychological outcomes of playing.<sup>16</sup> E. Brown and P. Cairns look at immersion in three categories – engagement, engrossment, and total immersion. According to the authors, each level of immersion felt by the player makes them both physically and psychologically absorbed in the activity.<sup>17</sup> Players choose a specific game to play, then the first level of immersion is experienced by the player which is engagement. The second category is described as the player learning game controls and understanding the rules of the game system until the engrossment level emerges. Lastly, when the player becomes emotionally connected to the outcome of the game, the total immersion state is experienced. However, in player experience questionnaires scholars generally add immersion as one category, questions refer to player’s attention towards the game and how they react to outside stimuli while playing. In this context immersion also relates to the engagement notion.

Scholars established a measurement tool grounded in the immersion outcome of playing games called the Gameplay Experience Questionnaire (GEQ), where the attention of players was studied.<sup>18</sup> The study aims to construct a player-oriented game design process and an experiment was carried out to develop an iterative game development process involving the players in the design process. This article presents the importance of user-oriented design and its use in game design. The study examines immersion in terms of three different contexts: Challenge-based immersion, imaginative immersion, and sensory immersion. Players are individuals with subjective feelings, motivations, skills, and expectations. Therefore, within the scope of GEQ, players produce or experience highly subjective meanings because of their interaction with the games. This scale is criticized by M. J. Parnell for three reasons: First, questions arise about the audio-visual elements of the scale which measures high-quality digital games and in return excludes digital games that used 2D or low poly visual style. Second, the author emphasizes that there is a problem with the translation of the scale, which is originally in the Finnish language. Finally, the questions about the game character in the scale indicate that games without an avatar

- 
- 15 MURRAY, J.: *Hamlet on the Holodeck, Updated Edition: The Future of Narrative in Cyberspace*. Cambridge, MA : The MIT Press, 2017, p. 152.
  - 16 For more information, see: CHENG, M. T., SHE, H. C., ANNETTA, L. A.: Game Immersion Experience: Its Hierarchical Structure and Impact on Game-Based Science Learning. In *Journal of Computer Assisted Learning*, 2015, Vol. 31, No. 3, p. 232-253.; JENNETT, C. et al.: Measuring and Defining the Experience of Immersion in Games. In *International Journal of Human-Computer Studies*, 2008, Vol. 66, No. 9, p. 641-661.; QIN, H., RAU, P.-L. P., SALVENDY, G.: Measuring Player Immersion in the Computer Game Narrative. In *International Journal of Human-Computer Interaction*, 2009, Vol. 25, No. 2, p. 107-133.
  - 17 For example, see: BROWN, E., CAIRNS, P.: A Grounded Investigation of Game Immersion. In DYKSTRA-ERICKSON, E., TSCHELIGI, M. (eds.): *CHI EA '04: CHI '04 Extended Abstracts on Human Factors in Computing Systems*. New York, NY : ACM, 2004, p. 1297-1300. [online]. [2023-11-23]. Available at: <<https://dl.acm.org/doi/10.1145/985921.986048>>.
  - 18 ERMI, L., MÄYRÄ, F.: Fundamental Components of the Gameplay Experience. In DE CASTELL, S., JENSON, J. (eds.): *DiGRA '05 – Proceedings of the 2005 DiGRA International Conference: Changing Views: Worlds in Play*. Vancouver : DiGRA, 2005, p. 5. [online]. [2023-11-23]. Available at: <<http://www.digra.org/wp-content/uploads/digital-library/06276.41516.pdf>>.

representation are excluded from the sample.<sup>19</sup> The Gameplay Scale developed by M. J. Parnell, on the other hand, puts forward a different model to overcome these limitations. In this model, the factors that mediate the digital gaming experience are given as experience, challenge, playability, and usability.

The Game Experience Questionnaire (GEQIJ), developed by W. IJsselsteijn is another player experience measurement that includes immersion as one dimension of the consequence of gaming.<sup>20</sup> GEQIJ consists of seven constructs: competence, sensory and imaginative immersion, flow, tension/annoyance, challenge, negative affect, and positive affect. As in other scales, this study added dimensions related to concepts such as immersion and flow.<sup>21</sup> The Game Engagement Questionnaire (GEnQ) developed by J. H. Brockmeyer et al.,<sup>22</sup> similarly describes the player experience in terms of four components: psychological absorption, presence, flow, and immersion. The GEnQ scale mainly focuses on the effect of violent digital games and therefore emphasized the negative emotions that arise in players. The research has presented methods about the harms of violent games for the players and the precautions that can be taken. In their study on the digital game *Horizon Zero Dawn*<sup>23</sup>, B. Bostan and M. İ. Berkman determined that the GEnQ scale was not gathered under the expected factors in a study conducted in Turkey.<sup>24</sup>

Player experience questionnaires generally categorize immersion in different levels as A. K. Przybylski, C. S. Rigby and R. M. Ryan suggest: "Our research approach trifurcates the general immersion state into three subcomponents or subscales: *physical presence*, feeling as if one is actually in the world; *emotional presence*, feeling that game events have real emotional weight; and *narrative presence*, having a personal investment and engagement with the story".<sup>25</sup>

The meaning of the term immersion is categorized or defined rather differently by scholars. G. Calleja interprets this problem by differentiating the scientific fields: "Technologists, media psychologists, and human-computer interaction researchers, among others, refer to this experience as presence, while humanists and, later, social scientists adopted the metaphor immersion".<sup>26</sup>

G. Calleja proposes the Player Involvement Model in which micro-involvement and macro-involvement of player experience are defined through six dimensions. According to the author, kinesthetic involvement, spatial involvement, shared involvement, narrative involvement, affective involvement, and ludic involvement are described as shaping categories of the immersion and presence degree of players.

- 
- 19 PARNELL, M. J.: Playing with Scales: Creating a Measurement Scale to Assess the Experience of Video Games. [Master Thesis]. London : University College London, 2009, p. 27. [online]. [2023-11-23]. Available at: <<https://uclic.ucl.ac.uk/content/2-study/4-current-taught-course/1-distinction-projects/9-09/2009-parnell.pdf>>.
- 20 See also: IJSELSTEIJN, W. et al.: Measuring the Experience of Digital Game Enjoyment. In SPINK, A. J. et al. (eds.): *Proceedings of Measuring Behavior 2008: 6th International Conference on Methods and Techniques in Behavioral Research*. Wageningen : Noldus, 2008, p. 88-89.
- 21 For more information, see: BOSTAN, B.: *Dijital Oyunlar ve Interaktif Anlatı*. Istanbul : The Kitap, 2021.
- 22 BROCKMYER, J. H. et al.: The Development of the Game Engagement Questionnaire: A Measure of Engagement in Video Game-Playing. In *Journal of Experimental Social Psychology*, 2009, Vol. 45, No. 4, p. 626-630.
- 23 GUERRILLA GAMES: *Horizon Zero Dawn*. [digital game]. San Mateo, CA : Sony Interactive Entertainment, 2017.
- 24 For more information, see: BOSTAN, B., BERKMAN, M. İ.: Explorations in Game Experience: A Case Study of 'Horizon Zero Dawn'. In İŞLER, V. et al. (eds.): *Contemporary Topics in Computer Graphics and Games*. New York, NY : Peter Lang, 2020, p. 119-138.
- 25 PRZYBYLSKI, A. K., RIGBY, C. S., RYAN, R. M.: A Motivational Model of Video Game Engagement. In *Review of General Psychology*, 2010, Vol. 14, No. 2, p. 161-162.; RYAN, R. M., RIGBY, C. S., PRZYBYLSKI, A.: The Motivational Pull of Video Games: A Self-Determination Theory Approach. In *Motivation and Emotion*, 2006, Vol. 30, No. 4, p. 351.
- 26 CALLEJA, G.: *In-Game: From Immersion to Incorporation*. Cambridge, MA : The MIT Press, 2011, p. 33.

As presented above immersion is a main concept for understanding player experience. The player's feelings towards the game can change through their engagement potential in the gaming world. On the other hand, developers of both serious, educational, and even commercial games can use immersive techniques to persuasively educate players or society in general.

## **b) Autonomy**

The Swiss philosopher J. Piaget studied the cognitive development of children and concluded that children's maturation process develops through two phases: heteronomy and autonomy. J. Piaget extensively studied the play element in children, according to him children accept game rules as if the rules are given by a divine right (heteronomy) or they see the rules as changeable and have a choice to take action (autonomy).<sup>27</sup> In play studies, J. Piaget's research on child's play can be the first study that looked at play state through the context of autonomy.

A psychological attainment framework self-determination theory (SDT) applied to digital gaming in several studies where autonomy as a player experience aspect was used by several scholars. One of the most cited works was where the theory was adapted to the theory of pleasure of gaming. Autonomy and competence levels of players while gaming was understood in terms of immersion and presence. The Physical, Emotional, Narrative, Presence Scale (PENS) was developed by the authors and applied to multiple studies, which research several hypotheses grounded in SDT.<sup>28</sup> According to A. K. Przybylski, C. S. Rigby and R. M. Ryan, feelings of autonomy involve "a sense of volition or willingness when doing a task".<sup>29</sup> At the macro level the volition to entering a game world is defined as autonomy, on the other hand on the micro level in-game choices or character customizations are referred to as player autonomy. In player experience studies, Player Experience of Need Satisfaction (PENS) by R. M. Ryan, C. S. Rigby and A. K. Przybylski specifically measures in-game autonomy of digital game players.<sup>30</sup>

Another questionnaire developed through self-determination theory is called the Ubisoft Perceived Experience Questionnaire (UPEQ), a self-determination evaluation tool for digital games that analyses player experience in terms of autonomy, competence, and relatedness.<sup>31</sup> According to SDT, these three basic psychological needs of players are satisfied which affects the well-being of digital game players. Autonomy can be defined as; people seeking freedom in everyday life and when intrinsically motivated, feeling more autonomous toward their actions. Competence is defined as people seeking mastery in experiences in daily life, when these experiences occur the well-being of a person increases. Relatedness is the social part of the theory, and when people feel connected to society again the well-being of players increases. As scholars who work on games from the perspective of SDT add that "self-determination theory (SDT) accounts for game

---

27 SUGARMAN, S.: *Piaget's Construction of the Child's Reality*. Cambridge : Cambridge University Press, 1987, p. 84.

28 See: PRZYBYLSKI, A. K., RIGBY, C. S., RYAN, R. M.: A Motivational Model of Video Game Engagement. In *Review of General Psychology*, 2010, Vol. 14, No. 2, p. 154-166.; RYAN, R. M., RIGBY, C. S., PRZYBYLSKI, A.: The Motivational Pull of Video Games: A Self-Determination Theory Approach. In *Motivation and Emotion*, 2006, Vol. 30, No. 4, p. 344-360.; KIM, K. et al.: Is it a Sense of Autonomy, Control, or Attachment? Exploring the Effects of In-Game Customization on Game Enjoyment. In *Computers in Human Behavior*, 2015, Vol. 48, No. 1, p. 695-705.

29 RYAN, R. M., RIGBY, C. S., PRZYBYLSKI, A.: The Motivational Pull of Video Games: A Self-Determination Theory Approach. In *Motivation and Emotion*, 2006, Vol. 30, No. 4, p. 349.

30 Ibidem, p. 351-362.

31 For more information, see: AZADVAR, A., CANOSSA, A.: UPEQ: Ubisoft Perceived Experience Questionnaire: A Self-Determination Evaluation Tool for Video Games. In DAHLKOG, S. et al. (eds.): *FDG '18: Proceedings of the 13th International Conference on the Foundations of Digital Games*. New York, NY : ACM, 2018, p. 1-7. [online]. [2023-11-23]. Available at: <<https://dl.acm.org/doi/10.1145/3235765.3235780>>.

experiences in terms of their ability to satisfy players' intrinsic motivations – autonomy, competence, and relatedness needs – this ultimately enhances the perceived enjoyment of gameplay".<sup>32</sup>

In psychology, intrinsic motivation towards an activity is defined as autotelic. If the activities are performed for their own sake, and not for an external need it is defined as intrinsically motivated. Digital games by their nature can be considered intrinsically motivated activities.<sup>33</sup> In this way, games are considered autotelic activities, which are done only for themselves. Motivation for play is generally intrinsic rather than extrinsic.

Autonomy also refers to the agency of the player, in-game character development and customization, and selecting preferred quests affects the player's sense of control throughout the gameplay. In-game design terms autonomy occur through goals, strategies, and actions. If the game provides flexibility such as multiple game elements in which players have the options to choose, in conclusion players feel in control over the system.

The adaptation of self-determination theory has been problematized as some research papers define autonomy differently. For example, some research papers consider a player's volition to play as an autonomous activity, on the other hand, other papers considered autonomy as in-game options that the game offers.<sup>34</sup> At the same time, autonomy is one aspect of gaming, whether considered as in-game choice elements or player volition towards play activity.

### c) Audio-Visual Appeal of Gaming

Audio-visual aesthetics of games can be defined as the music, sound effects and graphics, and animation that are used in digital games. In player experience studies audio-visual appeal of gaming as heavily affecting the gaming experience, on the other hand, game developers improve gameplay to keep players interested in the gaming environment. In this way, the appeal also can be understood in terms of immersion, according to: "The interaction with such possible audiovisual worlds provides the player with an experience of being immersed in a 'virtual reality,' because our experience of reality is linked not only to the possible salience of what we see and hear but is also centrally linked to whether we are able to interact with such perceptions".<sup>35</sup>

Positive player experience can be enhanced through the audio-visual aesthetics of games, in literature the enjoyment gained by audio-visual feedback is defined as 'juicy' game design.<sup>36</sup> Similar to their definition J. Juul defines this term as positive feedback provided by the digital environment that affects the players.<sup>37</sup> The interaction that digital games present to the players create a feedback loop that can be both positive and negative. However, the game industry's main goal is to engage players in the environment and make them feel good in return while gaming.

---

32 KIM, K. et al.: Is it a Sense of Autonomy, Control, or Attachment? Exploring the Effects of In-Game Customization on Game Enjoyment. In *Computers in Human Behavior*, 2015, Vol. 48, No. 1, p. 695.

33 Remark by the author: This argument can exclude eSports players because they play games for external gain such as gaining money or fame.

34 TYACK, A., MEKLER, E. D.: Self-Determination Theory in HCI Games Research: Current Uses and Open Questions. In BERNHAUPT, R. et al. (eds.): *CHI '20: Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems*. New York, NY : ACM, 2020, p. 5. [online]. [2023-11-23]. Available at: <<https://dl.acm.org/doi/10.1145/3313831.3376723>>.

35 GRODAL, T.: Video Games and the Pleasures of Control. In ZILLMANN, D., VORDERER, P. (eds.): *Media Entertainment: The Psychology of Its Appeal*. Mahwah, NJ : Lawrence Erlbaum Associates, 2020, p. 197.

36 See: HICKS, K. et al.: Juicy Game Design: Understanding the Impact of Visual Embellishments on Player Experience. In ARNEDO, J. et al. (eds.): *CHI PLAY '19: Proceedings of the Annual Symposium on Computer-Human Interaction in Play*. New York, NY : ACM, 2019, p. 185-197. [online]. [2023-11-23]. Available at: <<https://dl.acm.org/doi/10.1145/3311350.3347171>>.

37 JUUL, J.: *Half-Real: Video Games Between Real Rules and Fictional Worlds*. Cambridge, MA : The MIT Press, 2011, p. 161.



In this way, different genres create different player experiences in terms of audio-visual aesthetics. A. Järvinen categorizes the audio-visual style of digital games into three categories: photorealism, caricaturism, and abstractionism.<sup>38</sup> The definition made by the author primarily focuses on the graphical elements of digital games. But sound effects are also an important part of the gaming experience. As a functional consequence of gaming, PXI defines audio-visual appeal as the degree to which “a player appreciates the audio-visual styling of the game”.<sup>39</sup> As the theoretical model of PXI suggests, the audio-visual appeal of gaming affects the general game enjoyment.

Lastly the audio-visual aspect of a game shapes the player experience and influences the overall enjoyment of the player. As described above audio is defined as the sound effects, music or voice acting of a game and visual appeal is defined as the graphics, colours or any visual element of a game. The audio-visuals of a game generally enhance the immersion and engagement of the players where the player’s perception throughout the game is shaped by these elements. When these elements align with the gameplay, the player’s enjoyment can be enhanced. However, it is important to consider that individual preferences of gamers may vary, in this way it’s not safe to say that high quality graphics ensure game enjoyment. However, in general, a high-quality audio-visual presentation that effectively supports the game’s themes, mechanics, and narrative has a strong potential to positively influence the player’s enjoyment of the gaming experience.

Literature on digital game studies shows that audio-visual aspects of games are a predictor of level of immersion. Graphics and sounds presented in games create an atmosphere that engages players to the gamified system. According to J. Y. Douglas and A. Hargadon, the aesthetic pleasures of gaming are understood in terms of immersion and engagement.<sup>40</sup> However, the flow experience of games is also an important aspect of engagement to the digital game. The flow experiences can also be achieved through the sound design of digital games. M. N. Grimshaw-Aagaard states that sound design directly affects the player immersion where engagement is increased throughout gameplay.<sup>41</sup>

## Research: Adaptation of the PXI Items

Player experience research – as a field – emerges from the human-computer interaction field where the interaction of both product and user is researched to make the product more feasible. Briefly, user experience is defined as the interaction between the product and the user, where the main goal is to present safe and easy-to-use products. In this way, player experience studies differ from user experience research. C. Hodent defines the player experience as an ecosystem where interacting with a game system allows people to experience different

---

38 JÄRVINEN, A.: Gran Stylissimo: The Audiovisual Elements and Styles in Computer and Video Games. In MÄYRÄ, F. (ed.): *Proceedings of Computer Games and Digital Cultures Conference*. Tampere : Tampere University Press, 2002, p. 120-124.

39 For example, see: ABEELE, V. V. et al.: Development and Validation of the Player Experience Inventory: A Scale to Measure Player Experiences at the Level of Functional and Psychosocial Consequences. In *International Journal of Human-Computer Studies*, 2020, Vol. 135, No. 1, p. 1-47. [online]. [2023-11-22]. Available at: <<https://doi.org/10.1016/j.ijhcs.2019.102370>>.

40 DOUGLAS, J. Y., HARGADON, A.: The Pleasures of Immersion and Engagement: Schemas, Scripts and the Fifth Business. In *Digital Creativity*, 2001, Vol. 12, No. 3, p. 153.

41 For more information, see: GRIMSHAW-AAGAARD, M. N.: Sound and Player Immersion in Digital Games. In PINCH, T., BIJSTERVELD, K. (eds): *The Oxford Handbook of Sound Studies*. Oxford : Oxford University Press, 2011, p. 347-366.

emotions and engagement depending on the design system.<sup>42</sup> Literature on game design suggests that before starting to develop a game, the first thing to consider is the possible experiences of players, and game developers have to determine which emotions he/she wants to evoke in players while they interact with the game system.<sup>43</sup> Although game metrics analyses are gaining interest in understanding the player experience, newly developed player experience questionnaires also provide a great way to analyse the player experience. In this way, data obtained from game companies have to be analysed with subjective player evaluations, and studies such as PXI allows scholars to understand the different game genre's impact on players.

The validity and reliability study was designed with the permission of the scale developers to adapt the Player Experience Inventory (PXI)<sup>44</sup> scale to Turkish. The scale's theoretical infrastructure was created by using the Means-End Theory, which is discussed under the discipline of consumer behaviour. The current scale, developed by Computer-Human Interaction scholars and Game Designers, is considered a different approach in the literature that measures the player experience under two main headings – functional results and psychosocial results of gaming. While functional results are expressed as the instantaneous effects of various decisions taken in game design on the player (for example, ease of use, goals, and rules), psychosocial results measure the emotional experiences of the players in the second degree (factors such as mastery, immersion, and meaning can be given as examples). Five factors measure functional outcomes (ease of use, progress feedback, audio-visual appeal, goals and rules, challenge), psychosocial outcomes (meaning, curiosity, immersion, autonomy, mastery), and three questions measuring general satisfaction and enjoyment were added to the scale. The model presented has also been validated through the Mechanics, Dynamics, and Aesthetics (MDA) system, a model unique to digital games. The research questions of the study had been given above:

- RQ1: Does the audio-visual appeal of gaming have an effect on game enjoyment?
- RQ2: If the audiovisual appeal of gaming affects game enjoyment is this mediated by immersion and autonomy?
- RQ3: Does the audio-visual appeal of gaming and the autonomy of players vary between digital game genres?

To answer the research questions audio-visual appeal, immersion, autonomy, and fun items were chosen from PXI. First, the survey questions were adapted to Turkish by the authors and checked by a native English speaker; then, the questions were translated back into English. In the first phase of the research, authors implemented back-and-forth translation for linguistic matching of the PXI items. Various changes were made to the translations at this stage to achieve an accurate version of the items in Turkish, at this stage feedback from gamers, developers, and user experience scholars was obtained for the adaption process and the questionnaire was finalized. In addition, questions were added to the scale in which the participants would evaluate their own gaming experience as a beginner or an expert; demographic questions were also added: gender, age, educational status, working status, and questions on playing habits such as years of playing, weekly hours spent on games, money spent on the game, preferred game playing style.

---

42 See: HODENT, C.: *The Gamer's Brain: How Neuroscience and UX Can Impact Video Game Design*. London : CRC Press, 2017.

43 See also: HUNICKE, R., LEBLANC, M., ZUBEK, R.: MDA: A Formal Approach to Game Design and Game Research. In FU, D. et al. (eds.): *AAAI Workshop Papers 2004: Challenges in Game AI*. San Jose, CA : AAAI, 2004, p. 1-5. [online]. [2023-11-23]. Available at: <<https://cdn.aaai.org/Workshops/2004/WS-04-04/WS04-04-001.pdf>>.

44 Remark by the author: Player Experience Research, a sub-field of User Experience Research, has been developing in recent years as an interdisciplinary field that measures and analyzes player experiences to optimize game design. V. V. Abeele, one of the developers of the scale, was contacted via e-mail, and permission was obtained to adapt the scale into Turkish.

Three hundred and eleven participants took part in the study. It was determined that there were one hundred and ninety-seven valid participants in the analysis process, and the remaining participants were not included in the analysis due to reasons such as missing answers and choosing more than one game for analysis. Data were processed into the SPSS 23.0 program for further analysis – AMOS 23.0 and PROCESS v4.1 were used.

## Results

The structures generally examined in social science research consist of the factors that make up the structure and sub-items representing the existing factors.<sup>45</sup> Factor analysis is used to find a consistent but smaller number of factors by bringing together a large number of related items to discover the pattern formed by the items. Within the scope of the research, it was necessary to examine the factors and structures created by the variables of the Turkish adaptation of studies of the scale. For this purpose, studies on the adapted scale were followed and exploratory factor analysis was applied to determine whether the data were suitable for analysis. Principal Axis Factoring is used to know the number of factors in the selection of the variance used in the factor analysis and the factors being related to each other. Both the Kaiser-Meyer-Olkin Measure (KMO) and Barlett Sphericity Test were applied. A KMO value of 0.60 and above indicates that the data are sufficient for factor analysis.<sup>46</sup> All of the factors were performed using Principal Axis Factoring in the same manner as the adapted scale. The result of the KMO test of the data was 0.809, and it was seen that the data containing audio-visual appeal, immersion, autonomy, and enjoyment were suitable for confirmatory factor analysis (Table 1).

After finding the results of the EFA, to analyse the factor structures of the scale items a Confirmatory Factor Analysis (CFA) was applied by the authors. In Table 2 acceptable and perfect values for fit indexes are given.<sup>47</sup> In Table 3 CFA results of the Turkish adaptation of PXI items are given. Results show that the scale structures are acceptable and compatible with the analysis's test results.

Goodness-of-fit-indices were shown above for three items from the scale. However, when all of the items of the PXI scale were examined the overall questions did not show credible factor structure. The authors contacted the scale developers however the factor structure of the original scale could not be obtained. In this way the Turkish variant for the PXI could not be developed.

---

45 GÜRBÜZ, S., ŞAHİN, F.: *Sosyal Bilimlerde Araştırma Yöntemleri*. Ankara : Seçkin Yayıncılık, 2014, p. 271.

46 Ibidem.

47 See: MacCALLUM, R. C., BROWNE, M. W., SUGAWARA, H. M.: Power Analysis and Determination of Sample Size for Covariance Structure Modeling. In *Psychological Methods*, 1996, Vol. 1, No. 2, p. 130-149.; SHEVLIN, M., MILES, J.: Effects of Sample Size, Model Specification and Factor Loadings on the GFI in Confirmatory Factor Analysis. In *Personality and Individual Differences*, 1998, Vol. 5, No. 1, p. 85-90.; HOOPER, D., COUGHLAN, J. P., MULLEN, M. R.: Evaluating Model Fit: A Synthesis of the Structural Equation Modelling Literature. In BROWN, A. (ed.): *7th European Conference on Research Methodology for Business and Management Studies*. Reading : ACI, 2008, p. 195-200.; BENTLER, P. M., BONETT, D. G.: Significance Tests and Goodness of Fit in the Analysis of Covariance Structures. In *Psychological Bulletin*, 1980, Vol. 88, No. 3, p. 588-606.; HU, L., BENTLER, P. M.: Cutoff Criteria for Fit Indexes in Covariance Structure Analysis: Conventional Criteria Versus New Alternatives. In *Structural Equation Modeling*, 1999, Vol. 6, No. 1, p. 1-55.

Table 1: Adaptation of the PXI items and explanatory factor analysis (EFA) results

Appeal	Items	EFA
Audio-visual	"I enjoyed the way the game was styled." [Oyunun görsel stilini beğendim.]	.760
	"I liked the look and feel of the game." [Oyunun görselleri ve oyunun bende uyandırdığı his hoşuma gitti.]	.855
	"I appreciated the aesthetics of the game." [Oyunun estetiğini takdir ettim.]	.880
Immersion	"I was no longer aware of my surroundings while I was playing." [Oyunu oynarken artık çevremi farkında değildim.]	.818
	"I was immersed in the game." [Oyuna kendimi kaptırdım.]	.952
	"I was fully focused on the game." [Oyuna tamamen odaklanmışım.]	1.001
Autonomy	"I felt a sense of freedom about how I wanted to play this game." [Bu oyunu nasıl oynamak istediğim hakkında özgürlük duygusu hissettim.]	.949
	"I felt free to play the game in my own way." [Oyunu kendi istediğim gibi oynamak konusunda özgür hissettim.]	.717
	"I felt like I had choices regarding how I wanted to play this game." [Bu oyunu nasıl oynamak istediğime dair seçeneklerim olduğunu düşündüm.]	.666
Fun	"I liked playing the game." [Oyunu oynamayı sevdim]	.855
	"The game was entertaining." [Oyunu oynamak eğlenceliydi]	.760
	"I had a good time playing the game." [Oyunu oynarken iyi vakit geçirdim]	.880

Source: own processing

Table 2: Confirmatory factor analysis parameters

	Acceptable	Perfect
GFI	.90 <	> .95
AGFI	.85 <	> .90
CFI	.95 <	> .95
NNFI	.90 <	> .97
NFI	.90 <	> .90
RMSEA	.08 – .10	< .08
CMIN/SD.	2 <	< 2

Source: own processing

Table 3: Confirmatory factor analysis of the scale (model fit)

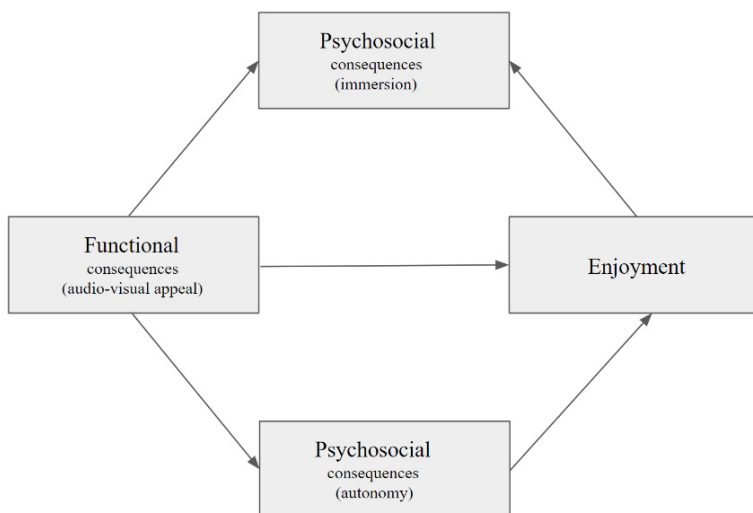
	GFI	AGFI	CFI	NNFI	NFI	RMSEA	CMIN/SD.
PX	.956	.928	.997	.995	.971	.025	54.063

Source: own processing

# Immersion and Autonomy Items as a Mediator to the Audio-Visual Appeal of Gaming

As the final step in the research, mediation analysis was conducted by the authors. We anticipated that the audio-visual appeal of gaming as a functional consequence of gaming positively predicts Enjoyment (RQ1). Secondly, the authors also expected that this relationship is mediated by psychosocial consequences of gaming, such as immersion and autonomy (RQ2).

To be able to understand the mediation effects scale items, average means were computed as a variable. To be able to answer RQ1, regression analysis was conducted through ANOVA and fun construct as an independent variable implemented in the SPSS program. It was seen that the audio-visual appeal of gaming is a significant predictor of game enjoyment. In this way, the direct effect of the functional consequence of gaming on game enjoyment was measured in the sample. After presenting the relationship between the audio-visual appeal of gaming and overall game enjoyment, the mediation analysis of psychosocial consequences was further analysed in the SPSS program by PROCESS v.4.1. The initial finding is presented in Picture 1.



Picture 1: Mediation Analysis and Model

Source: own processing

The proposed model indicates that the audio-visual appeal of gaming is a predictor of game enjoyment and according to the model, this relationship is mediated by immersion and autonomy as a psychosocial consequence of gaming. In this way, RQ2 is also supported. As per the adapted scale the effect of functional consequence of gaming predicted game enjoyment, and immersion and autonomy constructs mediated this process. In this way adapted scales were significantly valid in the Turkish gaming community.

Genre classifications in game studies are relatively hard compared to literature and films because game genre typologies also differ according to game mechanics.<sup>48</sup> In this way, games can be classified through theme, style, and mechanics. According to J. Juul classifying games is difficult because technological advancements in game systems develop at an untraceable speed, therefore games change and mutate according to these advancements.<sup>49</sup> Secondly, compared to film genres, game genres are background components, design patterns, and mechanics of the games are generally prioritized while defining certain games. Chosen game genres<sup>50</sup> are classified according to the PXI article. As for this research, the sample size is relatively small, because the real-time strategy genre for example referred and changed to the strategy genre.

To understand if there any variety between items in terms of genre, the authors looked at the mean of immersion, autonomy, and audio-visual appeal (RQ3). Autonomy and audio-visual appeal were suitable for further analysis. It was determined that players who chose the action-adventure genre for the study felt more audio-visual appeal while gaming compared to first person shooter players. Secondly, action role playing digital game players felt more autonomy during their experience compared to first person shooter players. Lastly action-adventure players felt more autonomy compared to action-adventure gamers. In conclusion the player experience items vary between game genres.

## Demographic Findings

According to the 2020 'Turkish Game Industry' research by Gaming in Turkey, Turkey Gaming and Esports agency, the gaming industry was the industry that received the most investment in Turkey in 2020. The increase in the number of players in our country every year has caused important companies such as Riot Games to open offices in Turkey. The opening of digital game undergraduate and graduate programs in universities has led to increased academic publications related to the field. In the 2020 report, the total number of players living in Turkey is given as 36.000.000+. In addition, the distribution of the players in the Turkey report by age is as follows; 18-24 years 24.7%, 25-34 years 33.4%, 35-44 years 27.4%, 45-54 years 10.8%, 55-64 years 3.7%. When the estimated platforms used by the players for the game are listed; mobile platforms took first place with 35 million players, PC (computer) users with 22 million players, and finally console platforms with 17 million players.<sup>51</sup>

Gaming in Turkey's report states that internet cafes in Turkey are still used by various eSports teams or daily users, which still exist in the gaming ecosystem, to play a

---

48 Remark by the author: Game mechanics are generally defined as the rules of the game system. According to B. Brathwaite and I. Schreiber, game mechanics includes: the starting rules of the game (setup), game-ending (victory conditions), general gameplay (progression of play), player abilities (player actions), and information presented on the play area (definition of game views).; For more information, see: BRATHWAITE, B., SCHREIBER, I.: *Challenges for Game Designers*. Boston, MA : Charles River Media, 2009.

49 JUUL, J.: *Genre in Video Games (and Why We don't Talk [more] about It)*. Released on 22nd December 2014. [online]. [2023-12-05]. Available at: <<https://www.jesperjuul.net/ludologist/2014/12/22/genre-in-video-games-and-why-we-dont-talk-about-it/>>.

50 Remark by the author: According to PXI by V. V. Abeele, game genre classification is presented as: first-person shooters, sport simulation games, multiplayer online battle arenas, massively multiplayer online role-playing games, social simulation games, action role-playing games, real-time strategy, massively multiplayer online role-playing games, puzzle games, action-adventure games.; See: ABEELE, V. V. et. al.: Development and Validation of the Player Experience Inventory: A Scale to Measure Player Experiences at the Level of Functional and Psychosocial Consequences. In *International Journal of Human-Computer Studies*, 2020, Vol. 135, No. 1, p. 1-47. [online]. [2023-11-22]. Available at: <<https://doi.org/10.1016/j.ijhcs.2019.102370>>.

51 GIT: *Turkey Game Market 2020 Report*. 2021. [online]. [2023-11-23]. Available at: <<https://www.gaminginturkey.com/files/pdf/turkey-game-market-report-2020.pdf>>.

game. Besides playing games, these areas are places where various game communities can exchange information.<sup>52</sup> Internet cafe users generally consist of young men between 18 and 25 who continue their high school or university education.<sup>53</sup> According to the ethnographic study of M. Binark, G., Bayraktutan-Sütçü and F. Buçakci, the most preferred games in Internet cafes are multiplayer and first-person shooter games.<sup>54</sup> Therefore, it can be seen that there is no change in terms of game preferences in Turkey. In this context, Gaming in Turkey's 2020 report and M. Binark, G., Bayraktutan-Sütçü and F. Buçakci's research was found appropriate.

One hundred and ninety-seven participants filled out the survey, and genre preferences and demographic findings were presented. In the study, various questions were asked about the demographic information and game-playing habits of 197 participants. Most of the participants were called from the gaming communities on social media, and some of them were personal acquaintances found through the snowball method. 70.5% male, 25% female, 2% non-binary, and 2.5% unwilling to disclose participants were also part in the study. Most of the participants were between the ages of 23-29, with an average of 40%, 29.5% were identified in the 18-22 age range. 21% of the participants in the study were within the 30-39 age range, 8.0% of the participants were aged 40-49, 1% were in the 12-17 age range, and finally, one participant was aged 50 and over. The highest level of education completed by the participants appears to be undergraduate. Then, with 29.2%, high school was the second-highest level of education completed. Twenty-four participants who had completed their master's education and seven participants who had completed their doctorate education took part in the study. Finally, two participants marked their education level as primary education. When the working status of the participants was examined, full-time workers and full-time students constituted an important part of the sample. Four part-time students and six part-time students participated in the study. In addition to these, one participant, a homemaker, who retired and was not able to work, participated in the research. Finally, there are sixteen people defined as unemployed.

The details of the weekly time spent by the participants playing games were measured. Playing less than 10 hours represented 36.8%, and the closest to this percentage was 29.4% of respondents playing 10-19 hours per week. 13.9% of the participants who played games between 20-29 hours and 10% of participants who played games between 30-39 hours took part in the study. In addition, 5.5% of participants played games between 40-49 hours. Finally, in terms of time spent on gaming with the lowest number of participants, the lowest levels were between 50-59 hours: 5 people and 4 participants who played 60 or more hours a week. Participants who spend 10-49 TL on the games constitute the highest percentage; a total of 39 participants are in this segment. Following that, 38 participants spent between 50-99 TL for games. An equal number of participants who did not spend any money and participants who spent 100-149 TL were reached, and it was determined that there were thirty-seven people for each topic. Finally, fourteen people who spent between 150-299 TL and twelve participants who spent more than 300 TL per month were reached.

The last question posed about the participants' gaming habits is whether they play alone or with other people. The answers to this question differ from various studies conducted in the past. While 62.1% of the participants preferred to play alone, 37.9% preferred to play with other players. When the demographic findings in the study are compared with the focus group interviews and survey findings of M. Binark,

---

52 BINARK, M., BAYRAKTUTAN-SÜTCÜ, G., BUÇAKCI, F.: Türkiye'de İnternet Kafelerde Dijital Oyuncular Yeni Medya Okuryazarlığı: Neden Gerekli?. In BINARK, M., BAYRAKTUTAN-SÜTCÜ, G., FIDANER, I. B. (eds): *Dijital Oyun Rehberi: Oyun Tasarımı, Türler ve Oyuncu*. İstanbul : Kalkedon Yayınları, 2009, p. 207.

53 Ibidem, p. 197.

54 Ibidem, p. 214.

G. Bayraktutan-Sütcü and F. Buçakci's titled as "Digital Players in Internet Cafes in Turkey Why New Media Literacy is Necessary?", no significant difference was observed in the age of the players.<sup>55</sup> When the gender distribution was examined, it was seen that there were more female participants in the current study, but the fact that M. Binark, G. Bayraktutan-Sütcü and F. Buçakci's research is specific to Internet cafes may be the reason for this difference. On the other hand, demographic findings differ from the Gaming in Turkey 2020 report. The current study asked participants to rate a game they remember well or played recently. In this context, most of the participants analysed computer-based games, but Gaming in Turkey's report showed an estimated age range and gender distribution that includes all platforms. Accordingly, it was determined that male players were in the majority, and there was a 10% difference between female and male players. In addition, similarities were determined in the age ranges of the players. 18-24 year olds and the age range of 25-34 constitute an important part of the players living in Turkey.

According to Entertainment Software Association (ESA), ages between 18-34 years is the largest group of U.S. gamers.<sup>56</sup> In this way Turkish and international players age ranges are same. Another aspect that gained attention through the research is that the sample showed Turkish players preferred playing single player games. However, international research shows that multiplayer games are gaining much attention than single player games. Although the sample of this research did not show similarities in terms of playing habits, the player experience of games is highly different. Playing alone or with others effects the consequences of player experience items such as autonomy or immersion.<sup>57</sup>

## Discussion

The digital games industry in Turkey is growing rapidly and consequently the gaming population has increased. As digital games is a transnational phenomenon it is important to understand regional player experience. This study aimed at adapting a player experience questionnaire to Turkish, however several items from the scale did not prove linguistically equivalent. The adaptation study asked participants to fill out the forms according to a digital game that they played recently or a game that they play frequently, because it was important for the study that gamers gameplay experience was still salient. It is believed that participants chose their favourite games, in this way the satisfaction scales showed high scores. This could be the reason that several items could not pass factor analysis. For future player experience studies, it might be better to use adapted scales on specific games and under laboratory conditions.

Secondly, as digital game terminology among gamers is generally in English, genres and gameplay experience when discussed contain another languages wording such as; mechanic, ease of control, immersion etc. In this way there is no commonly used digital game terminology in Turkey. This also might be the reason that several items cannot be translated. Turkish scholars should create a common terminology for digital game components.

---

55 BINARK, M., BAYRAKTUTAN-SÜTCÜ, G., BUÇAKCI, F.: Türkiye'de İnternet Kafelerde Dijital Oyuncular Yeni Medya Okuryazarlığı Neden Gerekli?. In BINARK, M., BAYRAKTUTAN-SÜTCÜ, G., FIDANER, I. B. (eds): *Dijital Oyun Rehberi: Oyun Tasarımı, Türler ve Oyuncu*. İstanbul : Kalkedon Yayınları, 2009, p. 197.

56 ESA: *2022 Essential Facts About the Video Game Industry*. 2022. [online]. [2023-12-05]. Available at: <<https://www.theesa.com/wp-content/uploads/2022/06/2022-Essential-Facts-About-the-Video-Game-Industry.pdf>>.

57 For example, see: VELLA, K., JOHNSON, D., HIDES, L.: Playing Alone, Playing with Others: Differences in Player Experience and Indicators of Wellbeing. In COX, A. L., CAIRNS, P. (eds.): *CHI PLAY '15: Proceedings of the 2015 Annual Symposium on Computer-Human Interaction in Play*. New York, NY : ACM, 2015, p. 3-12. [online]. [2023-11-23]. Available at: <<https://dl.acm.org/doi/10.1145/2793107.2793118>>.



The study aimed to develop a Turkish variant of PXI, however there was only one item for functional consequence of gaming: audio-visual appeal and two items for psychosocial consequence of gaming: autonomy/immersion. As a psychosocial after-effect of gaming, the suggested model suggests that the audio-visual appeal of games is a predictor of game enjoyment. This relationship is mediated by immersion and autonomy. We believe that game developers can benefit from this model to understand the impact of the digital games that they develop.

## Conclusion

Quantitative studies that measure player experience have been developed by scholars from diverse fields. As a result, the consequences of digital gaming and its potential impacts have been studied extensively via surveys. This study gives a summary of these scales from psychology to human-computer interaction. The impact of games is generally studied from a negative perspective. Although several surveys depend on a negative/positive dichotomy, the general assumption is that studying game-related subjects such as mechanics, engagement, immersion, and challenge is more suitable for studying digital games. Player experience surveys allow us to understand how game design decisions affect player behaviours during their interaction with digital games, as well as how they form subjective emotional responses toward players.

Additionally, the Turkish game industry has developed in recent years, as important companies such as Riot Games have opened new branches in the country. However, there are no player experience surveys that measure the experience of players in Turkish. There is only one study that successfully adapts a survey to Turkish, conducted by M. İ. Berkman, B. Bostan and S. Şenyar.<sup>58</sup> In this way, both the Turkish gaming industry and scholars who work on player experience need a tool in order to measure player behaviours. The research conducted by the authors suggests that the audio-visual appeal of gaming creates enjoyment in the player's experience. This model also shows that the relationship between audio-visual appeal and enjoyment is mediated by immersion and autonomy. In this way, the adapted scale can be used by game companies to better understand the gaming experience.

Lastly the authors aimed to develop a Turkish variant for the PXI survey, however validity and reliability tests for the factor structure showed that the items are not applicable. As the scales that developed for player experience studies uses special concepts for defining several experiences, general players do not know these notions. We believe that it is rather hard to translate gaming experiences questions appropriately for the Turkish gaming community. However, with the three items from the scale we believe that the model can be used to understand gaming experiences by scholars and developers. In conclusion, functional consequences of gaming, called audio-visual appeal, directly affected game enjoyment and this relationship is mediated by psychosocial consequences called immersion and autonomy. These items can be used by Turkish game developers to understand player experience. Also, it can help developers to understand functional aspects of their developed games and the psychosocial consequences of player experience.

---

58 See: BERKMAN, M. İ., BOSTAN, B., ŞENYER, S.: Turkish Adaptation Study of the Game User Experience Satisfaction Scale: GUESS-TR. In *International Journal of Human-Computer Interaction*, 2022, Vol. 38, No. 11, p. 1081-1093. [online]. [2023-11-22]. Available at: <<https://www.tandfonline.com/doi/full/10.1080/10447318.2021.1987679>>.

## BIBLIOGRAPHY

- ABEELE, V. V. et. al.: Development and Validation of the Player Experience Inventory: A Scale to Measure Player Experiences at the Level of Functional and Psychosocial Consequences. In *International Journal of Human-Computer Studies*, 2020, Vol. 135, No. 1, p. 1-47. ISSN 1095-9300. [online]. [2023-11-22]. Available at: <<https://doi.org/10.1016/j.ijhcs.2019.102370>>.
- AZADVAR, A., CANOSSA, A.: UPEQ: Ubisoft Perceived Experience Questionnaire: A Self-Determination Evaluation Tool for Video Games. In DAHLISKOG, S. et al. (eds.): *FDG '18: Proceedings of the 13th International Conference on the Foundations of Digital Games*. New York, NY : ACM, 2018, p. 1-7. [online]. [2023-11-23]. Available at: <<https://dl.acm.org/doi/10.1145/3235765.3235780>>.
- BENTLER, P. M., BONETT, D. G.: Significance Tests and Goodness of Fit in the Analysis of Covariance Structures. In *Psychological Bulletin*, 1980, Vol. 88, No. 3, p. 588-606. ISSN 0033-2909.
- BERKMAN, M. İ., BOSTAN, B., ŞENYER, S.: Turkish Adaptation Study of the Game User Experience Satisfaction Scale: GUESS-TR. In *International Journal of Human-Computer Interaction*, 2022, Vol. 38, No. 11, p. 1081-1093. ISSN 1532-7590. [online]. [2023-11-22]. Available at: <<https://www.tandfonline.com/doi/full/10.1080/10447318.2021.1987679>>.
- BINARK, M., BAYRAKTUTAN-SÜTCÜ, G., BUÇAKCI, F.: Türkiye'de İnternet Kafelerde Dijital Oyuncular Yeni Medya Okuryazarlığı Neden Gerekli?. In BINARK, M., BAYRAKTUTAN-SÜTCÜ, G., FIDANER, I. B. (eds): *Dijital Oyun Rehberi: Oyun Tasarımı, Türler ve Oyuncu*. İstanbul : Kalkedon Yayınları, 2009, p. 187-224.
- BOSTAN, B.: *Dijital Oyunlar ve İnteraktif Anlatı*. İstanbul : The Kitap, 2021.
- BOSTAN, B., BERKMAN, M. İ.: Explorations in Game Experience: A Case Study of 'Horizon Zero Dawn'. In İŞLER, V. et al. (eds.): *Contemporary Topics in Computer Graphics and Games*. New York, NY : Peter Lang, 2020, p. 119-138.
- BRATHWAITE, B., SCHREIBER, I.: *Challenges for Game Designers*. Boston, MA : Charles River Media, 2009.
- BROCKMYER, J. H. et al.: The Development of the Game Engagement Questionnaire: A Measure of Engagement in Video Game-Playing. In *Journal of Experimental Social Psychology*, 2009, Vol. 45, No. 4, p. 624-634. ISSN 0022-1031.
- BROWN, E., CAIRNS, P.: A Grounded Investigation of Game Immersion. In DYKSTRA-ERICKSON, E., TSHELIGI, M. (eds.): *CHI EA '04: CHI '04 Extended Abstracts on Human Factors in Computing Systems*. New York, NY : ACM, 2004, p. 1297-1300. [online]. [2023-11-23]. Available at: <<https://dl.acm.org/doi/10.1145/985921.986048>>.
- CALLEJA, G.: *In-Game: From Immersion to Incorporation*. Cambridge, MA : The MIT Press, 2011.
- CRONENBERG, D. (Director): *eXistenZ*. [DVD]. Toronto : Alliance Atlantis, Momentum Pictures, 1999.
- DOUGLAS, J. Y., HARGADON, A.: The Pleasures of Immersion and Engagement: Schemas, Scripts and the Fifth Business. In *Digital Creativity*, 2001, Vol. 12, No. 3, p. 153-166. ISSN 1462-6268.
- ERMI, L., MÄYRÄ, F.: Fundamental Components of the Gameplay Experience. In DE CASTELL, S., JENSON, J. (eds.): *DiGRA '05 – Proceedings of the 2005 DiGRA International Conference: Changing Views: Worlds in Play*. Vancouver : DiGRA, 2005, p. 1-14. [online]. [2023-11-23]. Available at: <<http://www.digra.org/wp-content/uploads/digital-library/06276.41516.pdf>>.
- ESA: *2022 Essential Facts About the Video Game Industry*. 2022. [online]. [2023-12-05]. Available at: <<https://www.thesa.com/wp-content/uploads/2022/06/2022-Essential-Facts-About-the-Video-Game-Industry.pdf>>.
- GIT: *Turkey Game Market 2020 Report*. 2021. [online]. [2023-11-23]. Available at: <<https://www.gaminginturkey.com/files/pdf/turkey-game-market-report-2020.pdf>>.
- GRIMSHAW-AAGAARD, M. N.: Sound and Player Immersion in Digital Games. In PINCH, T., BIJSTERVELD, K. (eds): *The Oxford Handbook of Sound Studies*. Oxford : Oxford University Press, 2011, p. 347-366.

- GRODAL, T.: Video Games and the Pleasures of Control. In ZILLMANN, D., VORDERER, P. (eds.): *Media Entertainment: The Psychology of Its Appeal*. Mahwah, NJ : Lawrence Erlbaum Associates, 2020, p. 197-213.
- GUERRILLA GAMES: *Horizon Zero Dawn*. [digital game]. San Mateo, CA : Sony Interactive Entertainment, 2017.
- GÜRBÜZ, S.: *Sosyal Bilimlerde Araştırma Yöntemleri*. Ankara : Seçkin Yayıncılık, 2014.
- HICKS, K. et al.: Juicy Game Design: Understanding the Impact of Visual Embellishments on Player Experience. In ARNEDO, J. et al. (eds.): *CHI PLAY '19: Proceedings of the Annual Symposium on Computer-Human Interaction in Play*. New York, NY : ACM, 2019, p. 185-197. [online]. [2023-11-23]. Available at: <<https://dl.acm.org/doi/10.1145/3311350.3347171>>.
- HILLMAN, S.: Diary Methods in AAA Games User Research. In KAYE, J. et al. (eds.): *CHI EA '16: Proceedings of the 2016 CHI Conference Extended Abstracts on Human Factors in Computing Systems*. New York, NY : ACM, 2016, p. 1879-1885.
- HODENT, C.: *The Gamer's Brain: How Neuroscience and UX Can Impact Video Game Design*. London : CRC Press, 2017.
- HOOPER, D., COUGHLAN, J. P., MULLEN, M. R.: Evaluating Model Fit: A Synthesis of the Structural Equation Modelling Literature. In BROWN, A. (ed.): *7th European Conference on Research Methodology for Business and Management Studies*. Reading : ACI, 2008, p. 195-200.
- HU, L., BENTLER, P. M.: Cutoff Criteria for Fit Indexes in Covariance Structure Analysis: Conventional Criteria Versus New Alternatives. In *Structural Equation Modeling*, 1999, Vol. 6, No. 1, p. 1-55. ISSN 1070-5511.
- HUIZINGA, J.: *Homo Ludens: Kültürün Oyun Unsuru Üzerine bir İnceleme*. İstanbul : Ayrıntı, 2023.
- HUNICKE, R., LEBLANC, M., ZUBEK, R.: MDA: A Formal Approach to Game Design and Game Research. In FU, D. et al. (eds.): *AAAI Workshop Papers 2004: Challenges in Game AI*. San Jose, CA : AAAI, 2004, p. 1-5. [online]. [2023-11-23]. Available at: <<https://cdn.aaai.org/Workshops/2004/WS-04-04/WS04-04-001.pdf>>.
- CHENG, M. T., SHE, H. C., ANNETTA, L. A.: Game Immersion Experience: Its Hierarchical Structure and Impact on Game-Based Science Learning. In *Journal of Computer Assisted Learning*, 2015, Vol. 31, No. 3, p. 232-253. ISSN 0266-4909.
- IJSSELSTEIJN, W. et al.: Measuring the Experience of Digital Game Enjoyment. In SPINK, A. J. et al. (eds.): *Proceedings of Measuring Behavior 2008: 6th International Conference on Methods and Techniques in Behavioral Research*. Wageningen : Noldus, 2008, p. 88-89.
- JÄRVINEN, A.: *Games without Frontiers: Theories and Methods for Game Studies and Design*. Saarbrücken : VDM Verlag, 2009.
- JÄRVINEN, A.: Gran Stylissimo: The Audiovisual Elements and Styles in Computer and Video Games. In MÄYRÄ, F. (ed.): *Proceedings of Computer Games and Digital Cultures Conference*. Tampere : Tampere University Press, 2002, p. 113-128.
- JENNETT, C. et al.: Measuring and Defining the Experience of Immersion in Games. In *International Journal of Human-Computer Studies*, 2008, Vol. 66, No. 9, p. 641-661. ISSN 1071-5819.
- JUUL, J.: *Genre in Video Games (and Why We don't Talk [more] about It)*. Released on 22<sup>nd</sup> December 2014. [online]. [2023-12-05]. Available at: <<https://www.jesperjuul.net/ludologist/2014/12/22/genre-in-video-games-and-why-we-dont-talk-about-it/>>.
- JUUL, J.: *Half-Real: Video Games Between Real Rules and Fictional Worlds*. Cambridge, MA : The MIT Press, 2011.
- KIM, K. et al.: Is it a Sense of Autonomy, Control, or Attachment? Exploring the Effects of In-Game Customization on Game Enjoyment. In *Computers in Human Behavior*, 2015, Vol. 48, No. 1, p. 695-705. ISSN 0747-5632.
- MacCALLUM, R. C., BROWNE, M. W., SUGAWARA, H. M.: Power Analysis and Determination of Sample Size for Covariance Structure Modeling. In *Psychological Methods*, 1996, Vol. 1, No. 2, p. 130-149. ISSN 1082-989X.

- MURRAY, J.: *Hamlet on the Holodeck, Updated Edition: The Future of Narrative in Cyberspace*. Cambridge, MA : The MIT Press, 2017.
- PARNELL, M. J.: *Playing with Scales: Creating a Measurement Scale to Assess the Experience of Video Games*. [Master Thesis]. London : University College London, 2009. [online]. [2023-11-23]. Available at: <<https://uclic.ucl.ac.uk/content/2-study/4-current-taught-course/1-distinction-projects/9-09/2009-parnell.pdf>>.
- PRZYBYLSKI, A. K., RIGBY, C. S., RYAN, R. M.: A Motivational Model of Video Game Engagement. In *Review of General Psychology*, 2010, Vol. 14, No. 2, p. 154-166. ISSN 1089-2680.
- QIN, H., RAU, P.-L. P., SALVENDY, G.: Measuring Player Immersion in the Computer Game Narrative. In *International Journal of Human-Computer Interaction*, 2009, Vol. 25, No. 2, p. 107-133. ISSN 1044-7318.
- RYAN, R. M., RIGBY, C. S., PRZYBYLSKI, A.: The Motivational Pull of Video Games: A Self-Determination Theory Approach. In *Motivation and Emotion*, 2006, Vol. 30, No. 4. p. 344-360. ISSN 0146-7239.
- SALEN, K., ZIMMERMAN, E.: *Rules of Play*. Cambridge, MA : The MIT Press, 2003.
- SHEVLIN, M., MILES, J.: Effects of Sample Size, Model Specification and Factor Loadings on the GFI in Confirmatory Factor Analysis. In *Personality and Individual Differences*, 1998, Vol. 5, No. 1, p. 85-90. ISSN 0191-8869.
- SLATER, M.: *A Note on Presence Terminology*. [online]. [2023-11-23]. Available at: <[http://www0.cs.ucl.ac.uk/research/vr/Projects/Presencia/ConsortiumPublications/ucl\\_cs\\_papers/presence-terminology.htm](http://www0.cs.ucl.ac.uk/research/vr/Projects/Presencia/ConsortiumPublications/ucl_cs_papers/presence-terminology.htm)>.
- SUGARMAN, S.: *Piaget's Construction of the Child's Reality*. Cambridge : Cambridge University Press, 1987.
- TYACK, A., MEKLER, E. D.: Self-Determination Theory in HCI Games Research: Current Uses and Open Questions. In BERNHAUPT, R. et al. (eds.): *CHI '20: Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems*. New York, NY : ACM, 2020, p. 1-22. [online]. [2023-11-23]. Available at: <<https://dl.acm.org/doi/10.1145/3313831.3376723>>.
- VELLA, K., JOHNSON, D., HIDES, L.: Playing Alone, Playing with Others: Differences in Player Experience and Indicators of Wellbeing. In COX, A. L., CAIRNS, P. (eds.): *CHI PLAY '15: Proceedings of the 2015 Annual Symposium on Computer-Human Interaction in Play*. New York, NY : ACM, 2015, p. 3-12. [online]. [2023-11-23]. Available at: <<https://dl.acm.org/doi/10.1145/2793107.2793118>>.