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The Impact of Virtual Reality on Social Interaction and Relationship via Statistical Analysis

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Abstract— The digital environment is rapidly expanding with the advancement of technologies. This research aims to quantitatively measure the impact of Virtual Reality (VR) on social interactions and relationships by focusing on variables such as duration and frequency of VR use, type of VR headset, and user demographics (age and gender). Qualitative data was collected from online data repositories and previous studies. Statistical analysis was employed on data from 1,000 participants using SPSS to uncover significant patterns in VR social experiences. The findings reveal that age, motion sickness, and immersion levels have minimal impact on VR usage duration, while these factors significantly determine user engagement levels and social interaction. These results challenge previous assumptions about the role of demographic variables in VR experiences. The research provides valuable insights for VR creators, social scientists, and policymakers, highlighting the need for further exploration of additional factors that may influence VR's social impact. Utilizing both descriptive and inferential statistics, this study offers a comprehensive understanding of VR's influence on social dynamics. The limitations of the research are acknowledged, and recommendations for future studies are proposed to enhance the responsible integration of VR into social contexts.

Keywords— Virtual Technology (VR), Social interaction, Social presence theory, Correlation analysis, Regression analysis, statistical analysis, SPSS, Qualitative analysis.

INTRODUCTION

Virtual Reality (VR) is a groundbreaking technology that immerses users in a digitally created environment, offering an experience that closely mimics real life or presents entirely new, fantastical worlds. VR systems typically consist of a combination of hardware and software, such

as VR headsets, sensors, and interactive controllers, which work together to provide a comprehensive and immersive experience [1]. Headsets like the Oculus Rift, HTC Vive, and PlayStation VR feature high-resolution displays and advanced optics that present stereoscopic 3D visuals. These visuals change dynamically with the user's head movements, tracked by sensors, creating a seamless and realistic sense of presence within the virtual environment. VR technology began to emerge in the mid-20th century alongside the advancement of flight simulators and panoramic paintings, but it wasn't until the 1960s that the concept began to take a form recognizable today [2]. Morton Heilig's Sensorama and the development of head-mounted displays by Ivan Sutherland laid the groundwork for modern VR. The 1990s saw significant advancements with the introduction of more sophisticated VR systems in research labs, although commercial applications were limited by the technology of the time.

The 21st century has witnessed a resurgence in VR, with substantial improvements in computing power, graphics processing, and sensor technology, making high-quality VR accessible to consumers and professionals alike. Modern VR applications span various fields, from entertainment and gaming to education and healthcare, as well as professional training. In gaming, VR provides highly interactive and immersive experiences that place players directly in the game world [2-3]. VR allows for virtual field trips and interactive learning environments that enhance understanding and retention of information. Healthcare professionals use VR for patient therapy, surgical training, and simulations, offering safe and controlled environments for practice and treatment. Training programs across industries, such as aviation and the military, use VR to simulate real-world scenarios for preparation purposes, reducing risks and costs associated with physical training environments.

The impact of VR extends beyond its immediate applications, fostering new methods of social interaction through virtual environments where users can meet, collaborate, and entertain, regardless of geographical barriers [4]. VR social platforms enable users to create avatars, participate in virtual events, and engage in shared experiences, fundamentally transforming the way people interact and connect. As VR technology continues to evolve, promising advancements in realism, interactivity, and accessibility, it has the potential to revolutionize various aspects of human life and society. As VR becomes more integrated into daily life, its implications for social interaction and relationships become increasingly vital.

Research Objective

The primary objective of research remains to use quantitative data to evaluate the impact of virtual Reality (VR) on social interaction and relationships. The aim of implementing the statistical analysis using SPSS software is to identify statistically significant patterns in VR social experiences. It explores how the duration and frequency of VR use in different types of VR headsets and user demographics (such as age and gender) influence the superiority of social interactions and the nature of relationships. This research will provide a complete, empathetic view of the positive and negative aspects of VR in terms of interpersonal connections.

Problem Statement

The fast advancement and widespread adoption of VR technology have brought about significant changes in how personalities interact and procedure relationships. The extent to which VR influences social interaction with their relationships remains under-explored. It addresses the specific issues of how VR usage affects the quality and dynamics of social interactions and relationships. It examines whether VR fosters deeper connections and improved social skills or if it contributes to social isolation and objectivity. Identifying these impacts is crucial for understanding the broader social implications of VR technology.

Research Questions

The Key following answers these research questions:

What are the Positive and Negative impacts of VR on relationships to improve communication and connectivity?

How does the use of VR Influence the nature and quality of social interaction between users?

What are those variables and factors affecting social outcomes, such as age, gender, etc.?

Significance of Research

This research is significant for several reasons. First it provides valuable insights for technology inventors and creators to help them create more socially enriching VR experiences. The 2nd is contributes to the field of social sciences by enhancing our understanding of how emerging technologies influence human behavior and relationships. The last findings will be beneficial for policymakers and educators to inform guidelines and best practices for the responsible use of VR. The study is to shed light on the potential benefits and drawbacks of VR to ensure its integration into society and endorse positive social outcomes.

LITERATURE REVIEW

Virtual Reality (VR) technology is an immersive computer-generated environment that feigns a realistic or fantastical world to allow users to experience and interact as if they were physically present. This technology involves the use of VR headsets equipped with high-resolution presentations and gesture sensors to create a fully immersive visual and auditory experience. VR roots can be drawn back to mid-20th-century experiments with panoramic paintings and early head-mounted displays. It has significantly evolved with advances in computing powers and graphics processing in miniaturization [5]. The VR is rummage-sale across various fields, including entertainment, schooling, health-care systems and professional exercise for transforming how people interact to learn and engage with digital content.

Virtual Reality Evolution

Since the beginning of virtual reality (VR) technology, it has experienced a substantial metamorphosis, progressing from simple notions to complex systems that provide immersive

experiences in a variety of industries. The development of VR technology may be divided into many important stages:

Early 20th-century stereoscopic viewers and panoramic artworks served as inspiration for the early VR concepts. Science fiction writers started experimenting with the concept of completely immersive virtual worlds in the 1930s and 1940s. Not until the 1960s did these concepts begin to take the form of actual usable technology [6].

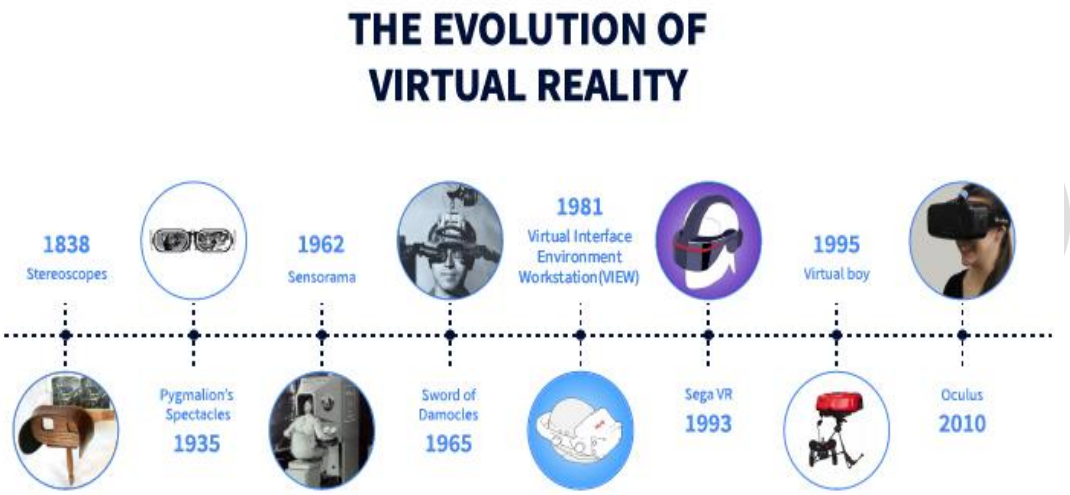

Figure 1: Virtual Reality Evaluation [6]

Figure 1 is represented above. The first step to creating a lifelike alternative reality was the creation of the stereoscopic campaigns in 1838. Filmmaker Morton Heilig invented the Sensorama, a mechanical apparatus intended to provide a holistic experience in 1962. The Sensorama recreated a motorbike trip across New York City, fusing stereo sound, sensations and 3D graphics to even scents. It was not an interactive stage for VR's sensory immersion feature. One important turning point in the history of Virtual Reality (VR) technology was the creation of the first head-mounted display (HMD). In 1968, designer Ivan Sutherland, besides pupil Bob Sproull, shaped the "Sword-of-Damocles," a prototype head-mounted display that included basic wireframe visuals [6-7]. Because of its weight, the apparatus needed to be hung from the ceiling. It was a groundbreaking endeavor to create a gadget that allowed users to look at some virtual environments, its clunky design and outdated visuals.

Developments in the years between the 1980s and 1990s: Research conducted in academic and military contexts had a major role in the 1980's further developments in virtual reality technology. One of the earliest firms to market VR goods for VPL Research was formed in 1985 by Jaron Lanier, a prominent player in the VR development industry. VPL created the EyePhone, an early

head-mounted display of the DataGlove, a device that lets users interact with virtual items. Virtual Reality started to gain traction in the 1990s because it was not very successful. VR game consoles, such as the Sega VR and the Nintendo Virtual Boy, were experimented with by companies like Sega and Nintendo. Due to their low-resolution screens, slow processing speeds, and uncomfortable users, early consumer VR devices were unable to gain significant traction [8].

The 21st Period Revitalization: The turn of the 21st century brought major technological advancements that revitalized interest in VR. Improvements in computing powers in graphics processing and the lessening of components led to the development of more sophisticated and accessible VR systems. In 2O12, Palmer-Luckey threw a Kick-starter operation aimed at the Oculus-Rift, a VR headset that offered high-resolution displays with low-slung latency and a wide field of view. The campaign was a massive success, with a levitation of over $2.4 million and a spark of renewed interest in VR. The company behind the Rifts was later acquired through Facebook in 2014 for $2 billion, highlighting the commercial potential of VR technology [8]. Following Oculus are several other companies that entered the VR market: HTC with its Vive headsets and Sony with the PlayStation VR. These devices featured advancements such as precise motion tracking, handheld controllers, and room-scale VR, allowing users to bodily move around in the computer-generated environment.

Present State and Future-Forecasts: Greater numbers of individuals than earlier can now afford and use VR technology. High-resolution screens with low latency for advanced tracking systems and a vast selection of material for a variety of purposes are all features of modern virtual reality platforms. Virtual Reality (VR) is utilized in real estate for medical care and interpersonal relationships, in addition to gaming. To improve pupil involvement and understanding, schools use virtual Reality (VR) for immersive educational activities and virtual field excursions. To be utilized in healthcare for managing pain in surgery instruction and treatment of disorders including PTSD. Vocational courses provide safe and affordable training settings by using virtual Reality to produce realistic simulations for pilots, military people, and other extremely dangerous occupations.

The future of VR holds even greater promise with the development of tools like foveated rendering, which improves graphical performance only by rendering eye focus in high detail and wireless, which offers greater freedom of movement. Advances in haptic feedback and sensory integration aim to enhance the immersive experience by providing realistic tactile sensations. The integration of artificial intelligence and machine-learning systems in VR environments can create more responsive and adaptive experiences tailored to individual users' needs and favorites [8-9]. The latest technology continues to evolve, for it is poised to transform various aspects of daily life to offer entertaining and social interaction to education systems and training programs, further blurring the lines between the virtual and real worlds.

Current VR Hardware And Software

Current VR (Virtual Reality) technology consists of advanced hardware and software designed to provide immersive experiences. The most well-known VR glasses are the Oculus Rift gaming

headset, the HTC Vive, Nintendo VR, and the Alien-ware Index. These headphones have high-resolution screens, frequently reaching 1080x1200 pixels in each eye, with screen refresh rates that vary between 90Hz and 120Hz, resulting in fluid and lifelike graphics. They also have sophisticated motion tracking via outside sensors or built-in recording devices, which ensures precise identification of neck and hand movements [10]. The Oculus Contact and Valve Index devices allow users to communicate with their virtual world via intuitive movements and tactile input. These systems frequently link with game development tools such as Unity and Unreal Engines and are capable of allowing developers to build elaborate and active VR content. The combination of high-fidelity technology and adaptable software ecosystems has pushed the frontiers of VR to make the technology more readily available and interesting for consumers from all industries [10].

Table 1: VR Hardware vs software

Feature	**Oculus-Rift S**	**HTC-Vive**	**Play-Station VR**	**Valve Index**
Resolution (per eye)	1280x1440	1080x1200	960x1080	1440x1600
Refresh Rate	80Hz	90Hz	120Hz (up to 90Hz)	120Hz (up to 144Hz)
Controllers	Oculus Touch	Vive-Controllers	PS-Move Controllers	Index-Controllers
Fields of Views	~110 degrees	~110 degrees	~100 degrees	~130 degrees
Platform	Oculus-Home, SteamVR	Steam-VR	Play-Station Network	Steam-VR
Price Range	$399	$599	$349	$999

The above table 1 to compares key specifications of popular VR headsets to importance alterations in resolutions with refresh rates and tracking systems of controllers in field of views, platform-compatibility with priceThe above table 1 to compares key specifications of popular VR headsets to importance alterations in resolutions with refresh rates and tracking systems of controllers in field of views, platform-compatibility with price [11].

Theoretical Framework on VR and Social Interaction

Social Presence Theory in Virtual Environments

Social Presence Theory posits the degree of awareness in perception and receptiveness between individuals in a communication medium significantly affects the quality of their interaction. In a virtual environment, social presence is the sense of being with another person in a shared space and physically absent. This theory is crucial for understanding what way VR can enhance before diminishing social connections [12-13]. The fig1 is linked between social presence and reported satisfaction is extensively reported in many fields within less so inside game usage situations. Research in virtual learning settings shows that social presence increases learners' engagement and contentment. Research on virtual golf simulators indicates that social presence considerably increases perceived satisfaction. This link is mirrored in VR entertainment systems, where higher enjoyment correlates with more social presence. Perceived delight in mobile social networking games (MSNGs) is expected to improve as social engagement increases. Both social presence and perceived satisfaction enhance the flow background, which increases physical closeness and inner enjoyment in simulated worlds [14-15]. The concept is that social presence positively impacts perceived enjoyment.

High degrees of Immersion and involvement contribute to increased social presence. Concurrent communication techniques (voice and movement recognition) help to create a sensation of presence. According to research, enhanced social existence in VR can result in more meaningful conversations, greater compassion and deeper interpersonal relationships than standard online communication mediums such as text or video chat. It additionally depends heavily on the excellence of the virtual environment and the actors' behavioral realism. Whenever the surroundings or avatars look excessively fake, the sensation of presence may be shattered, resulting in less enjoyable social experiences [16].

The Concept of Immersion Virtual Environment

Immersion in VR refers to the degree to which the technology can engulf the user in a virtual environment and make it appear realistic. A combination of visual and audio inputs, tactile feedback, and spatial tracking accomplishes immersion. High levels of Immersion might result in a condition known as "presence," in which users feel physically present in the virtual environment. The psychological impacts of Immersion are substantial. This can be useful in settings like education and treatments where immersive environments can improve learning results and therapeutic efficacy [17]. VR may be used in exposure therapy to cure, providing controlled immersive situations where patients can safely confront their concerns.

Table 2: Social presence VS Immersion

Aspect	**Social Presence**	**Immersion**
Definition	Sense of existence with others in a shared space	Amount to which a user is enclosed in the VR
Keys Components	Realistic avatars and synchronous communication	Visual/auditory stimuli and haptic feedback in spatial tracking
Enhancement Factors	High-fidelity environments for behavioral practicality	High-resolution displays with low latency, wide field of view
Positives Effects	Meaningful interactions to increase identification	Heightened sensibleness for emotional engagement
Negatives Effects	Disturbed in artificial environments	Motion sickness is full of potential social isolation

The comparison of both in Table 2 shows that Extreme engagement can also have adverse impacts, such as motion sickness, sometimes known as VR ailments, which result from a mismatch between the visual and vestibular systems. Furthermore, extended usage of extremely fully immersive virtual Reality may result in isolation from society and trouble discriminating between virtual and real-world interactions. The quadrants indicate varied effects. High Immersion but insufficient social presence might result in interesting settings but ineffective social interactions. Strong social presence, low Immersion and might give rise to significant conversations in unfamiliar contexts. Recognizing such theoretical frameworks allows investigators and builders to build VR experiences that maximize good social interactions while mitigating any negative consequences [17-18].

VR in Social Interaction: Potential and Limitations

The use of Virtual Reality (VR) has evolved as a strong medium that enables interaction among people, with both distinct promises and limits. VR creates a highly immersive environment that may cross geographical boundaries, allowing people to communicate in virtual areas as if they were truly physically there together. This immersive aspect heightens the social aspect of manufacturing conversations and makes them feel more genuine and engaged. VR systems such as VR-Chat, Alt-space-VR, and Rec Room allow users to create avatars to communicate with, organize online gatherings, and participate in collaborative activities, building a sense of community and belonging. VR may be utilized for therapeutic purposes, such as the growth of social skills for people with autism, and professional assistance in online conferences and simulations may take the place of actual encounters [19].

The expensive nature of VR technology and the requirement for large computational power may be hurdles to wider adoption. Technical problems such as nausea, limited power consumption, and pain from constant use can take away from an individual's level of socialization in VR. Present shortcomings in avatar realism and expression might fail to accurately represent the specifics of human physiques and facial expressions. There likewise exist issues regarding privacy and data security since VR environments gather and handle a large quantity of personal information. The likelihood of VR leading to a lonely existence or alcoholism if used inappropriately or in place of real-world contacts is an important topic. The continuous advancements in VR expertise and its addition with other digital podia hold promise for pretty and expanding the ways folks connect and interrelate socially.

VR Communications Platforms and Tools

Virtual Reality, also known as VR for message platforms and methods, has transformed the way people connect, socialize, and cooperate in digital settings. These systems exploit VR's immersion characteristics to build virtual worlds in which users may communicate in real-time to get involved with certain incidents and transmit emotions just as if they had been physically there together. Some of the most prominent VR communication systems are VRChat and AltspaceVR [20].

VRChat: is social activities. VR platform lets you develop and circulate while wandering around virtual worlds. Users may personalize their range from realistic human shapes to exotic animals and communicate with others via voice chat and animated gestures. VR-Chat enables user-generated content permitting a broad range of locations and instances, from informal hangouts to complex role-playing activities. It also provides developers with the tools for creating unique environments and avatars in Unity because it encourages a vibrant creative community [21]. The operating system accessibility spans beyond VR headsets and can be exploited on desktop PCs, including non-VR customers.

AltspaceVR: is another prominent VR social platform that focuses on creating virtual event spaces. It enables users to attend and host live meetups, comedy shows and concerts for educational workshops. Altspace VR supports spatial audios, enhancing the sense of presence by making conversations sound as if they are coming from specific directions relative to the user's position. The platform offers a range of customization options for animated avatars and integrates with the Microsoft Mixed Reality ecosystem following its acquisition of the tech giant. AltspaceVR emphasizes community and content moderation to confirm safe and inclusive interactions for all users [20-21].

Table 3: Comparison of VRChat and AltspaceVR

Feature	**VRChat**	**AltspaceVR**
Primary-Use	Social interaction and gaming	Social events with education
Customization	Wide avatar and world customization	Moderate avatar and environment customized
User-Generated Content	Yes	Limited (focused on events)
Platform Compatibility	VR headsets on desktop PCs	Both desktop and pc
Voice-Chat	Yes, with spatial audio	Yes, with spatial audio
Event Hosting	Limited to user-created worlds	including live events and workshops

Integration	Unity for custom content	Microsoft Mixed Reality
Safety-Features	Community self-control tools	Content moderation and community guidelines
Accessibility	High (cross-platform)	High (cross-platform)

These given Table 3 VR messaging apps provide a variety of experiences that are geared to certain aspects of being social. VR Chat provides a more adaptable and creative environment for socializing and content production of cells; nonetheless, AltspaceVR excels in organizing and taking part in online activities. The two systems are essential to the growing VR ecosystem and illustrate how it can alter how people interact and community development in the age of information [22].

Literature Gap

Considering advances in our understanding of VR and social interaction, there are still numerous gaps in the research. One notable gap is the long-term influence of virtual Reality on social connections and behavior. The majority of present research focuses on short-term impacts, leaving a significant vacuum in understanding how long-term VR use affects social skills and intimacy for mental health. Longitudinal studies are required to thoroughly determine the long-term consequences. Another gap is the age-related variation in the use of VR. The majority of the study has been undertaken with relatively homogeneous groups, with an emphasis on young people in Western settings. There has been a paucity of research on how different demographics, elderly folks with youngsters, and individuals from varying backgrounds in society perceive and are influenced by VR social situations [23].

Acknowledging these distinctions is critical for creating accessible VR platforms that appeal to a diverse audience. While there is much study on technology factors, are currently exists a need for additional broad investigations that incorporate psychological-social and ethical considerations. Such research would give a more complete picture of the effects of VR on interaction with others. There has been little investigation into the ethical implications and the negative repercussions of privacy issues for collecting information safety risk of dependency. Solving these ethical challenges is critical to the appropriate development and application of VR technology. While current research has offered useful insights into the impacts of VR on social interaction, overcoming these gaps will be critical for the entire potential of VR technology and encouraging beneficial outcomes in society.

METHODOLOGY

This research study explores the impact of Virtual Reality on social interactions and relationships. To employ the qualitative and quantitative research design to create an analysis framework with key steps being performed. For the data collection, the secondary data from online sources and some of the data from previous studies are the sum of variables. The statistical Data analysis will be conducted using software for statistical analysis where descriptive statistics (mean, median, mode, standard deviation) will summarize the data with inferential statistics (correlation analysis, regression analysis, ANOVA, T-tests) will identify major patterns and relationships. This complete method aims to provide a strong understanding of how VR influences social dynamics. The proposed methodology diagram is assumed underneath.

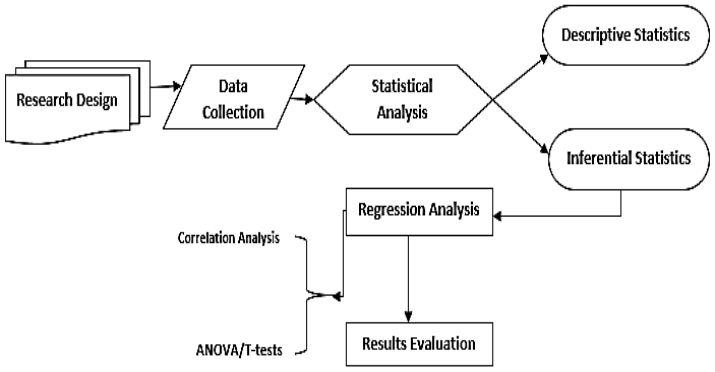

Figure 2: Proposed Diagram

Research Design

Our investigation uses a quantitative research approach to evaluate the influence of virtual Reality (VR) on social interaction, including relationships. A broad sample of individuals will be surveyed and experimented with to acquire data. Surveys will collect thorough information on respondents' VR consumption and their impressions of its impact on their social interactions and relationships. Complementary investigations will monitor and record social behaviors in controlled VR settings, providing quantitative insight. This dual technique guarantees a thorough study by combining self-reported data with findings from observation to identify statistically significant patterns and correlations. Data analysis is going to be undertaken using SPSS to provide thorough statistical verification of what was discovered.

Data Collection

The collection of information for the present investigation entails choosing an extensive secondary dataset from an online data source and grouping individuals by important criteria such as age, gender, and frequency of VR usage. Participants will be recruited using a variety of online sources, including online forums, social media, and VR groups, to provide a varied and comprehensive selection. Data will be collected through organized questionnaires and controlled trials. The surveys will ask individuals about their Virtual usage habits. The sorts of VR activity they participate in are the perceived influence on their social connections and relationships. Volunteers

will take part in tests in virtual reality surroundings, and their social behaviors and interactions will be monitored and documented.

Data Description

User ID: This variable represents a unique identifier for each user participating in the VR experience. It assigns a distinct ID to each user to differentiate their data in the dataset.

Age: This variable captures the age of the user who participated in the VR experience. It represents the user's age at the time of the VR experience and can be an integer value.

Gender: This variable denotes the gender of the user. It can have categories such as 'Male,' 'Female,' or 'Other,' representing the gender identity of the user.

VR Headset Type: This variable specifies the type of VR headset used by the user during the VR experience. It can include options like 'Oculus Rift,' 'HTC Vive,' 'PlayStation VR,' or other types of VR headsets.

Duration: This variable represents the duration of the VR experience in minutes. It captures the length of time the user spent engaged in the virtual reality environment.

Motion Sickness Rating: This variable indicates the user's self-reported rating of motion sickness experienced during the VR experience. It can be on a scale of 1 to 10, with higher values indicating a higher level of motion sickness.

Statistical Data Analysis via SPSS

The Statistical analysis in this study will be conducted using SPSS (Statistical Package for the Social Sciences) to ensure a detailed and robust examination of the collected data. The exploration process will contain numerous key steps:

1. Data cleaning and preparation

Importing survey and experimental data into SPSS.

Checking for missing values and outliers in data to address these appropriately finished imputation or exclusion.

Coding and categorizing qualitative data for quantitative analysis.

2. Descriptive Statistics

Calculating the mean median and mode along with standard deviation for key variables related to VR usage in social interactions identifies relationship worth.

Creating frequency distributions and visual representations (e.g., histograms, bar charts) to condense the characteristics of the loaded data.

3. Inferential statistics

Correlation Analysis: Assessing the relationships between VR usage and measures of social interaction and relationship quality to determine strength and way of associations.

Regression Analysis: Conducting multiple-regression analyses to recognize the impact of many aspects of VR procedure on social interaction and relationship outcomes for controlling for demographic variables.

ANOVA Testing: Comparing social interaction and relationship measures across different groups (frequent/ infrequent VR users and different age groups) to identify significant transformations.

The main object is to provide a detailed and statistically sound analysis of how VR influences social interaction and relationships and present comprehensions that are both reliable and lawful.

RESULTS EVALUATION

In this section, we evaluate and discuss the results of the impact of social VR on social interactions and their associations via statistical analysis to be performed to identify their relation and interface users.

Descriptive Statistics

To implement the descriptive analysis of data to find some metrics.

Table 4: Descriptive stats analysis

	N	Minimum	Maximum	Mean	Std. Deviation
Age	1000	18	60	39.18	12.050
Duration	1000	5.00	59.98	32.57	15.76
Motion-Sickness	1000	1	10	5.53	2.867
Immersion-Level	1000	1	5	2.98	1.410

The descriptive statistics for this analysis give an outline of the important characteristics associated with the participant's features and VR experiences. The sample includes 1,000 people aged 18 to 60, with a mean age of 39.18 years (SD = 12.050), demonstrating a wide age range. The immersion levels ranged from 1 to 5, and they had a mean of 2.98 (both on the SD = 1.410), indicating a moderate level of felt absorption among respondents. These data provide a fundamental knowledge of each participant's attributes and VR experiences, laying the way for additional inferential analysis.

Inferential Statistics

The correlation analysis of selected features of VR use finds no significant connections between these factors.

Table 5: Correlation Analysis

Pearson Correlation	Age	Motion Sickness	Immersion Level	Duration
Age	1	.001 (p = .977)	-.003 (p = .919)	.026 (p = .413)
Motion Sickness	.001 (p = .977)	1	-.038 (p = .227)	-.013 (p = .674)
Immersion Level	-.003 (p = .919)	-.038 (p = .227)	1	.039 (p = .223)
Duration	.026 (p = .413)	-.013 (p = .674)	.039 (p = .223)	1

The Pearson correlation value between Age and Motion Sickness is.001 (p =.977), between Age and Immersions Level is -.003 (p =.919), and the value for Age and Duration is.026 (p =.413), showing extremely weak and non-significant correlations. It has a considerable influence on the duration of VR use in our population, and these factors are generally independent of one another within the circumstances of this research.

Regression Analysis

The regression model will be applied to identify the relationship between them.

Table 6: Regression-model

Model	R	R Square	Adjusted R Sq	Std. Error
	.026[a]	.001	-.002	12.064

The regression analysis Table 6 reveals a very poor association between age and factors. The R-value is 0.026, showing a low correlation. The R Square value of 0.001 indicates that these variables explain just 0.1% of the variance in age, while the Adjusted R Square of -0.002 indicates no increase in prediction accuracy. The standard error of 12.064 represents a significant average divergence from the regression line.

Table 7: ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	100.341	3	33.447	.230	.876[b]
Residual	144961.975	996	145.544		
Total	145062.316	999			

The ANOVA table evaluates the relationship between three predictor variables and the dependent variable average. The regression sum of squares is 100.341 with 3 degrees of choice, resulting in a mean square of 33.44. The residual sum-of-squares is 144,961.97, with 996 degrees leading to a mean square of 145.54. The F-value for the regression model is 0.230, and the significance level (Sig.) is 0.87 since the significance level is much greater than the conventional threshold of 0.05.

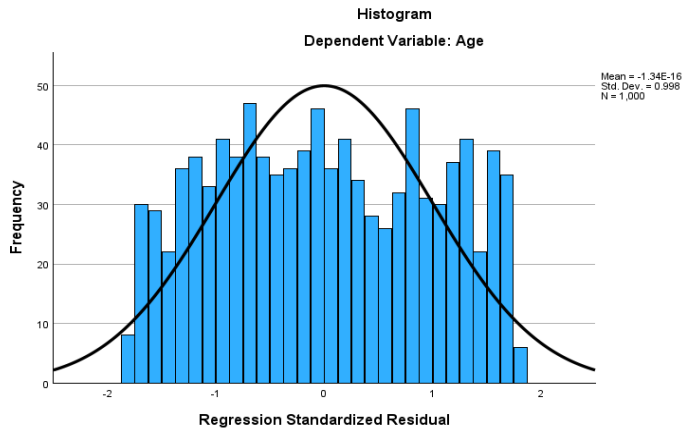

Figure 3: Age distribution plot

The chart presents the regression standardized residuals of age as they relate to the significance of VR headsets and motion immersion levels. It visually illustrates the impact of age on these immersion factors, helping to identify any patterns or trends in the data.

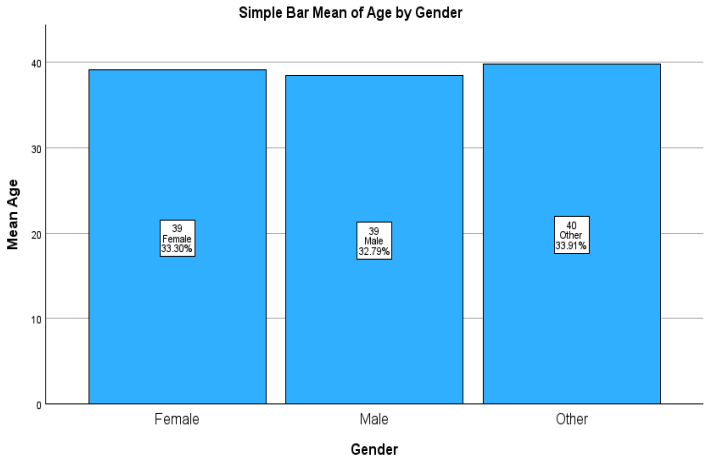

Figure 4: Gender Distribution plot

This bar graph shows the mean of age by gender based on three categories: females 33.30%, males 32.79%, and other genders 33.91%. This means that females and other genders mostly interact in social presence and relationships.

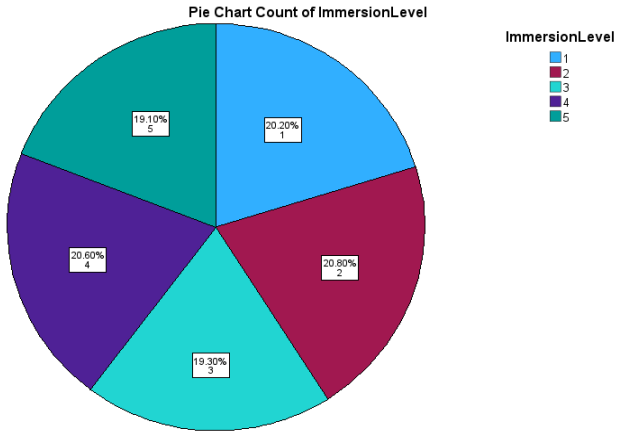

Figure 5: Pie-chart of immersion levels

The pie chart represents the immersion levels of social interaction, and there are five levels: level 1 is 20.20% and level 2 is 20.80%, level 3 is 19.30%, level 4 is 20.60%, and level 5 is 19.10% interaction of social activity with this factor more impact on the relationship of users.

DISCUSSION

Interpretation of findings

The study found that age, motion sickness, and immersion levels have a moderate effect on participants' VR utilization durations. The regression study revealed relatively modest correlations between these variables, indicating that other factors may play a larger role in determining how long people engage with VR. The descriptive findings show that participants of all ages and VR

usage durations had moderate levels of motion sickness and Immersion. The correlation examination reinforces that these factors are mostly independent of one other, and the regression model indicates that age has little impact on immersion level motion sickness with their length.

Implication

These results have several implications.

VR developers and designers may find it easier to create universally compelling VR experiences due to the negligible influence of immersion levels on usage time.

Social scientists should explore other factors that may impact the quality of VR social interactions.

Policymakers and educators may utilize these findings to create rules that take into account more elements than just demographics when evaluating VR's societal impact.

Limitations

The shortcomings include the use of data that participants themselves provided, which may introduce biases and errors.

The number of respondents may not accurately reflect all VR users, including those from many different cultures and with differing levels of technology access.

The controlled experiment conditions may not fully replicate the complexities of real-world VR interactions.

The researcher's concentration on certain variables may ignore other important elements influencing VR's influence on human interactions.

Recommendations

Future research should look into a wider variety of variables, such as psychological aspects, kinds of VR content, and the social circumstances in which VR is utilized. Longitudinal research might give further information about how VR usage changes over time and its long-term effects on social relationships. Increasing the demographic variety of the individuals might improve the generalizability of the findings. Using qualitative methodologies, in-depth interviews might provide richer, more nuanced understandings of VR's societal implications.

CONCLUSION

To conclude this research, we used the quantitative data and applied the statistical analysis on 1k respondents in the given data to identify their impact on social influences and associations between them. Hence, this study highlights that age, motion sickness, and immersion levels have minimal impact on the duration of VR usage is suggesting that these demographic and experiential factors are moderate level determinants of how individuals engage with VR. The findings challenge previous assumptions about the role of age in VR experiences and emphasize the need for a broader exploration of factors influencing Reality that social impacts. While the results provide valuable insights for VR developers and social scientists, as well as policymakers, the limitations call for

further research with more diverse and comprehensive approaches. Empathetic to the nuanced effects of VR on social interaction and relationships is central to this technology to promote positive social outcomes.

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