

ORIGINAL

VR Prior Experience and Total Intention: Virtual Reality Art Interventions for Mental Health

Experiencia previa en RV e intención total: intervenciones artísticas con realidad virtual para la salud mental

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ABSTRACT

Previous research on virtual reality interventions for mental health has largely used single-method designs, lacking comprehensive investigation into “total intention” and experiential variables. This original research examines the relationship between total intention and prior virtual reality (VR) experience among university students participating in VR art interventions for mental health support. Employing a dual-statistical approach—combining parametric (independent samples t-test) and non-parametric (Mann-Whitney U test) methods—the study analyzed data from 82 Chinese university students within a counseling context. Results revealed that participants with prior VR experience reported significantly higher usage intention ($Mdn = 3,89$) than those without experience ($Mdn = 3,67$; $p < 0,05$). These findings highlight the crucial role of prior VR experience in fostering acceptance and effective engagement with VR art interventions. The study suggests that integrating preliminary VR training may reduce psychological barriers and enhance intervention outcomes. This research advances understanding of key experiential factors influencing technology adoption in mental health contexts.

Keywords: Virtual Reality (VR); Total Intention; VR Experience; Parametric and Non-Parametric Analysis; Virtual Reality Art Intervention (VRAI); Mental Health.

RESUMEN

Las investigaciones previas sobre intervenciones de realidad virtual para la salud mental han utilizado en gran medida diseños de método único, careciendo de una investigación exhaustiva sobre la “intención total” y las variables experienciales. Esta investigación original examina la relación entre la intención total y la experiencia previa en realidad virtual (RV) en estudiantes universitarios que participan en intervenciones artísticas de RV para el apoyo a la salud mental. Empleando un enfoque estadístico dual —combinando métodos paramétricos (prueba t de muestras independientes) y no paramétricos (prueba U de Mann-Whitney)—, el estudio analizó datos de 82 estudiantes universitarios chinos en un contexto de asesoramiento psicológico. Los resultados revelaron que los participantes con experiencia previa en RV informaron una intención de uso significativamente mayor ($Mdn = 3,89$) que aquellos sin experiencia ($Mdn = 3,67$; $p < 0,05$). Estos hallazgos subrayan el papel fundamental de la experiencia previa con RV para fomentar la aceptación y el compromiso efectivo con las intervenciones artísticas en realidad virtual. El estudio sugiere que integrar una capacitación preliminar en RV podría reducir las barreras psicológicas y mejorar los resultados de la intervención.

Esta investigación amplía la comprensión de los factores experienciales clave que influyen en la adopción de tecnología en contextos de salud mental.

Palabras clave: Realidad Virtual (RV); Intención Total; Experiencia en RV; Análisis Paramétrico y No Paramétrico; Intervención Artística de Realidad Virtual (VRAI); Salud Mental.

INTRODUCTION

Recent evidence indicates that approximately 35 % of university students worldwide are affected by mental health disorders, with academic stress identified as a primary contributor.^(1,2) This trend highlights an urgent need for innovative and scalable interventions. Conventional counseling services have struggled to accommodate growing demand, prompting a shift toward digital modalities. The integration of virtual reality (VR) technology into mental health support—especially when combined with creative art therapy—has demonstrated considerable promise.⁽³⁾ Virtual Reality Art Interventions (VRAI) represent a significant evolution, merging immersive environments with expressive therapies to address the complex needs of student populations.

A review of the literature reveals that VR-based interventions have been proven effective in reducing stress and anxiety among university students, with art-oriented VR approaches showing particular efficacy.⁽⁴⁾ For instance, Kaimal et al.⁽⁵⁾ elucidated that virtual art-making led to increased prefrontal cortex activation, clarifying the neurophysiological basis for improved emotion regulation. Similarly, Yap et al. demonstrated that 50 % of participants achieved normalized stress levels after VRAI, compared to just 20 % before intervention.⁽⁶⁾ These findings clarify VRAI's dual potential to foster both creativity and emotional resilience. Nonetheless, a persistent gap remains between proven effectiveness and actual user engagement—a critical factor for real-world implementation.

Notably, the literature indicates that prior VR experience is an essential, yet underexplored, determinant of technology adoption in therapeutic settings. The Technology Acceptance Model (TAM), initially proposed by Davis, defined perceived usefulness and ease of use as primary drivers of acceptance.⁽⁷⁾ Later extensions of the TAM emphasized the moderating effect of previous experience.⁽⁸⁾ Makransky that VR novices exhibited substantially higher technology anxiety,⁽⁹⁾ which hindered their engagement. Fussell et al. clarified that first-time VR users displayed 60 % lower sustained use intention compared to experienced users.⁽¹⁰⁾ Initial VR encounters, therefore, play a pivotal role in shaping long-term adoption trajectories, and overlooking this dimension may impede intervention success.

Moreover, most existing research has relied on single statistical methodologies,⁽¹¹⁾ which may obscure nuanced behavioral patterns. The literature predominantly addresses immediate user responses rather than long-term commitment or multidimensional adoption. To address this gap, the present study introduces the concept of “Total Intention”, which is defined as a comprehensive construct encompassing perceived usefulness (PU), perceived ease of use (PEOU), perceived enjoyment (PE), and sustained use intention toward VRAI. Unlike traditional use intention, total intention captures both initial willingness and long-term adoption, offering a more robust framework for assessing VRAI acceptance.⁽¹²⁾

This study examined the relationship between prior VR experience and total intention to use VRAI among Chinese university students, utilizing both parametric and non-parametric statistical methods to ensure analytical rigor. The findings are expected to elucidate how experiential variables shape comprehensive adoption, providing evidence for designing onboarding strategies that can enhance intervention acceptance and therapeutic effectiveness in university counseling settings.

Research Question

The research question focused on if VR prior experience in VRAI interventions for mental health affects “total intentions”: How does VR use experience influence “Total Intention”?

METHOD

Study Design

This study employed a quasi-experimental cross-sectional design with pre-test and post-test measurements to assess the relationship between prior virtual reality (VR) experience and total intention to use virtual reality art interventions (VRAI) for mental health support.

Participants and Procedure

A total of 82 university students from Jiangxi Province, China, participated voluntarily after providing informed consent. All participants completed a baseline (pre-test) online questionnaire covering demographics, prior VR experience, and total intention. Each student then engaged in a standardized 30-45 minute VRAI

session using the PICO 4 Pro headset, followed by a post-intervention (post-test) assessment of total intention.

Variables

Prior VR Experience (Independent Variable): Measured with a dichotomous item (“Do you have experience with VR equipment?” Yes/No).

Total Intention (Dependent Variable): Assessed using an adapted Technology Acceptance Model for Virtual Reality (TAM-VR) scale, encompassing perceived usefulness, perceived ease of use, and perceived enjoyment. Each dimension included three items (5-point Likert scale). The overall score was the mean of all items (Cronbach’s $\alpha = 0,89$; KMO = 0,83).⁽¹³⁾

Data Processing and Statistical Analysis

Data were screened for completeness and accuracy. Descriptive statistics summarized participant characteristics and main variables. Group differences in total intention were examined using both parametric (two-tailed independent samples t-test) and non-parametric (Mann-Whitney U test) methods, as appropriate. Effect sizes were calculated to assess practical significance. All analyses were conducted using SPSS PRO, with significance set at $p < 0,05$.

Ethics Statement

The study protocol was approved by the Human Ethics Committee of Universiti Sains Malaysia (JEPeM Code: USM/JEPeM/22,120,811). All procedures conformed to institutional and national ethical standards.

RESULTS

Descriptive Statistics

Descriptive analysis showed that the mean total intention score among all participants was 3,71 (SD = 0,58, N = 82). Participants with prior VR experience exhibited a higher median total intention (Mdn = 3,89) compared to those without experience (Mdn = 3,67). Detailed summary statistics are provided in table 1.

Table 1. Descriptive statistics of total intention scores by VR experience group.

Group	Mean(SD)	Median	N
No VR Experience	3,59(0,50)	3,67	55
With VR Experience	3,99(0,63)	3,89	26
All Participants	3,71(0,58)	3,78	82

Two-Tailed Independent Samples t-Test

A two-tailed independent samples t-test was conducted to examine whether the mean of total intention was significantly different between the 0 (No Used) used 1 (Used) categories of have experience with VR virtual reality equipment.

Assumptions

Normality. Shapiro-Wilk tests were conducted to determine whether total intention could have been produced by a normal distribution for each category of have experience with VR virtual reality equipment.

⁽¹⁴⁾ The result of the Shapiro-Wilk test for total intention in the 0 category was significant based on an alpha value of 0,05, $W = 0,94$, $p = 0,009$. This result suggests that total intention in the 0 category is unlikely to have been produced by a normal distribution. The result of the Shapiro-Wilk test total intention in the 1 category was not significant based on an alpha value of 0,05, $W = 0,94$, $p = 0,136$. This result suggests that a normal distribution cannot be ruled out as the underlying distribution for total intention in the 1 category. The Shapiro-Wilk test was significant for the 0 category of have experience with VR virtual reality equipment, indicating the normality assumption is violated.

Homogeneity of Variance. Levene’s test was conducted to assess whether the variance of total intention was equal between the categories of have experience with VR virtual reality equipment. The result of Levene’s test for total intention was not significant based on an alpha value of 0,05, $F(1,79)=2,37$, $p=0,128$. This result suggests it is possible that the variance of have experience with VR virtual reality equipment is equal for each category of have experience with VR virtual reality equipment, indicating the assumption of homogeneity of variance was met.

The result of the two-tailed independent samples t-test was significant based on an alpha value of 0,05, $t(79) = -3,02$, $p=0,003$, indicating the null hypothesis can be rejected. This finding suggests the mean of total intention was significantly different between the 0 and 1 categories of have experience with VR virtual reality equipment. The results are presented in table 2. A bar plot of the means is presented in figure 1.

Table 2. Two-Tailed Independent Samples t-Test for total intention by have experience with VR virtual reality equipment

Variable	0 (No Used)			1 (Used)			t	p	d
	M	SD	n	M	SD	n			
Total intention	3,59	0,50	55	3,99	0,63	26	-3,02	0,003	0,69

Note. N = 81. Degrees of Freedom for the t-statistic = 79. d represents Cohen's d.

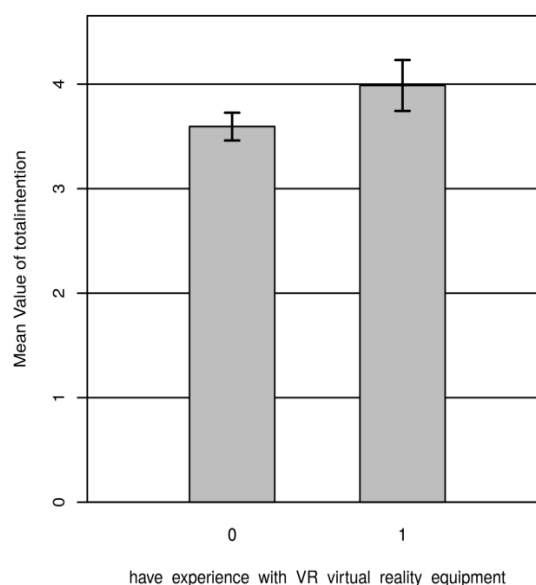


Figure 1. The mean of total intention by levels of have experience with VR virtual reality equipment with 95 % CI Error Bars

Reasons for Using Independent Samples t-Test

The independent samples t-test is a classic parametric statistical method used to determine whether the mean differences between two groups are statistically significant. The rationale for selecting the t-test includes the following:

Low Sample Size Requirement

The t-test is suitable for smaller sample sizes, provided that the variances of the two groups are equal or approximately equal. Additionally, if the sample size is sufficiently large, minor deviations from normality will not significantly affect the robustness of the t-test results.

Applicability to Normally Distributed Data

The t-test is ideal for datasets that approximate a normal distribution. When descriptive statistics or distribution tests indicate near-normality (e.g., skewness and kurtosis values close to 0), the t-test is appropriate for examining significant differences between group means. For instance, in this study, the skewness (-0,33) and kurtosis (-0,12) values of the PANAS Positive Post variable are close to 0, meeting the t-test's normality assumption.

Effectiveness in Mean Difference Analysis

The t-test is a powerful statistical method for directly examining mean differences between two groups. It is particularly sensitive to variations in central tendency, making it an effective tool for assessing whether VR experience significantly influences "total intention."

Two-Tailed Mann-Whitney U Test

A two-tailed Mann-Whitney two-sample rank-sum test was conducted to examine whether there were significant differences in total intention between the levels of have experience with VR virtual reality equipment. The two-tailed Mann-Whitney two-sample rank-sum test is an alternative to the independent samples t-test but does not share the same assumptions.⁽¹⁵⁾ There were 55 observations in group 0 and 26 observations in group 1.

The result of the two-tailed Mann-Whitney U test was significant based on an alpha value of 0,05, $U = 446,5$,

$z = -2,73$, $p = 0,006$. The mean rank for group 0 was 36,12 and the mean rank for group 1 was 51,33. This suggests that the distribution of total intention for group 0 was significantly different from the distribution of total intention for the 1 category. The median for 0 ($Mdn = 3,67$) was significantly lower than the median for 1 ($Mdn = 3,89$). Table 3 presents the result of the two-tailed Mann-Whitney U test. Figure 2 presents a boxplot of the ranks of total intention by have experience with VR virtual reality equipment

Table 3. Two-Tailed Mann-Whitney Test for total intention by have experience with VR virtual reality equipment							
Variable	Mean Rank	n	Mean Rank	n	U	z	p
Total intention	36,12	55	51,33	26	446,50	-2,73	0,006

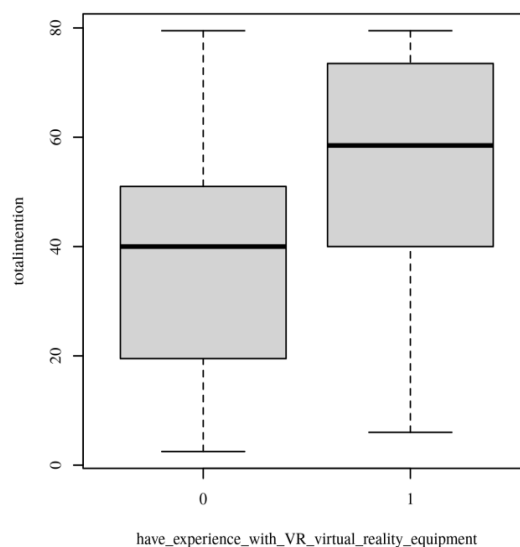


Figure 2. Ranks of total intention by have experience with VR virtual reality equipment

Reasons for Using the Mann-Whitney U Test

The Mann-Whitney U test is a non-parametric method used to compare the rank distributions of two groups and determine if they differ significantly. It is particularly suitable for data that deviate from normality or contain extreme values. The reasons for selecting the Mann-Whitney U test include the following:

Handling Non-Normal Distributions

The Mann-Whitney U test is appropriate for data that deviate from a normal distribution. For example, the PANAS Negative Post variable exhibits slight non-normality, with skewness of 0,20 and kurtosis of -0,42, making the Mann-Whitney U test more suitable for assessing group differences.

Insensitivity to Means

Unlike parametric methods, the Mann-Whitney U test does not rely on mean values but instead compares the rank distributions of the two groups. This feature makes it more sensitive to non-normal distributions and extreme values.

Robustness to Outliers and Skewed Data

The test is robust against outliers and skewed distributions, ensuring reliable results even in the presence of data irregularities.

Comprehensive Results Reporting

The Mann-Whitney U test provides U values, z-scores, and p-values, offering clear evidence of group differences and enhancing the interpretability of the results.

Dual-Pathway Analysis: Verifying Consistency

The descriptive statistical analysis revealed that the data might deviate from the assumptions of normal distribution. To address this, a Dual-Pathway Analysis was conducted, incorporating both parametric and

non-parametric methods to account for varying distribution characteristics. This approach allowed for a comprehensive evaluation of the significant impact of VR usage experience on “Total Intention.”

The dual application of both t-tests and Mann-Whitney U tests yielded consistent results, strongly supporting the conclusion of significant differences between groups. This methodological rigor enhances the robustness and academic credibility of the findings. Furthermore, the comparison of the results obtained from the two methods facilitates a discussion of their consistency or discrepancies, thereby reinforcing the reliability of the conclusions.

DISCUSSION

This study’s Two-Tailed Independent Samples t-Test results indicate a significant difference in “Total Intention” mean scores between participants with and without prior VR experience. Specifically, participants with VR experience exhibited higher overall usage intention. This finding underscores the significant influence of prior experience on technology acceptance. Experienced users are more likely to perceive VR technology as both useful and easy to use, fostering a more positive attitude toward the technology. The findings align with previous research, showing consistency across disciplines. Both education and mental health emphasize trust and familiarity as key factors in technology adoption. Margaryan found that familiarity boosts students’ confidence,⁽¹⁶⁾ while Bellei showed that trust reduces anxiety and enhances the effectiveness of virtual reality in mental health.⁽¹⁷⁾ These results suggest that prior experience are universal variables to consider in the acceptance of technology-based interventions. consequently, prior experience influence Virtual reality art intervention on mental health “Total Intention”.

The Two-Tailed Mann-Whitney U Test further supports these findings. Significant differences in mean ranks were observed between the no-experience group (Group 0) and the experience group (Group 1) ($U = 446,5$, $z = -2,73$, $p = 0,006$). The median score for the no-experience group ($Mdn = 3,67$) was significantly lower than that of the experience group ($Mdn = 3,89$). As a non-parametric test, the Mann-Whitney U Test is robust against violations of normality assumptions and effectively examines group differences in rank distributions. The results suggest that the impact of prior experience extends beyond mean differences, also affecting the fundamental distribution of “Total Intention.”

Much of the existing literature, such as Makransky, assumes users are familiar with VR, often overlooking psychological resistance or technology anxiety among first-time users.⁽¹⁸⁾ This study demonstrates that users without prior exposure may develop negative emotions, which hinder the formation of strong usage intentions.

Furthermore, this study elucidates prior experience for the application of Virtual Reality Art Interventions (VRAI) in the field of mental health by introducing “Total Intention” as a multidimensional evaluation metric. This enhances the practical value of technology acceptance models. The research emphasizes the critical role of prior experience in boosting VR technology acceptance, providing guidance for future similar virtual reality for mental health applications.

CONCLUSIONS

This study demonstrated that prior VR experience significantly increased university students’ total intention to use virtual reality art interventions for mental health. Students with previous VR exposure exhibited higher intention scores, as clarified by both t-test and Mann-Whitney U test results. This finding aligns with the Technology Acceptance Model and emphasizes that prior experience facilitates perceptions of usefulness and ease of use.^(7,8)

The results also revealed that trust and familiarity are critical factors. Margaryan indicated that familiarity enhances student confidence.⁽¹⁶⁾ Bellei et al. elucidated that trust reduces anxiety and supports engagement with VR interventions.⁽¹⁷⁾ These findings substantiated that prior experience is a universal predictor of technology acceptance across education and mental health.

Further analysis revealed that the impact of prior experience extended beyond mean differences, also affecting the distribution of total intention. Previous studies, such as Makransky et al. often assumed user familiarity with VR and did not account for resistance or technology anxiety among first-time users.⁽⁹⁾ The present findings, in line with Makransky et al. and Fussell et al., clarified that students without VR experience are more likely to develop negative emotions such as anxiety or discomfort, which can lower their continued intention to use VR.^(10,18)

This research contributed a new perspective by introducing “total intention” as a multidimensional metric. The results emphasized the importance of onboarding strategies for students new to VR. Such strategies are expected to increase acceptance and improve the effectiveness of VR-based mental health interventions.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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Formal analysis: Li Huang.

Research: Li Huang.

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Resources: Guoqing Wang.

Software: Guoqing Wang.

Supervision: Mohammad Kamal Bin Sabran.

Validation: Guoqing Wang.

Display: Li Huang, Dongxia Guan.

Drafting - original draft: Li Huang.

Writing - proofreading and editing: Li Huang.