The Role of Virtual Nature Environment and Self-Agency in Improving Psychological Wellbeing in Student Populations in Nigeria: A Randomized Group Design

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Abstract:

This study examined the connections of virtual environment and self-agency and how they may increase the level of psychological wellbeing of university students. Participants were university students in Abuja and Ondo State. Participant's responses selected for the study were seventy-two (n=72). Participants were randomized into 1st control group n=24, 2nd control group n=24, and experimental groups n= 24. Pictorial image and self-report questionnaires were used to administer well-established psychometric surveys and Likert type scaled Watson, et al. (1988); Positive and Negative Affect Schedule (PANAS) and Rotter's (1966) Locus of Control Scale (LCS). This was a two-in-one study conducted in two phases: Pre-intervention assessment phase, and intervention and post-intervention phases. The pre-intervention assessment phase focused on how the predictor variable (self-agency) relate with student' level of psychological wellbeing. Phase 2 of the study (intervention and post-intervention phases) was designed to evaluate the extent to which virtual environment enhanced psychological wellbeing among participants who scored low on the measure of psychological wellbeing. The results indicated that the difference between pre-test and post-test scores of participants in the experimental group was significant [t (24) = 13.23, p <. .01]. The outcome of these comparison implied that virtual environment affected those in the experimental group. Based on the findings of the study is recommended that technologically-based psychological applications should be developed in better improve psychological therapies that impact psychological wellbeing.

Keywords: Virtual nature environment, self-agency, psychological wellbeing, students, Nigeria.

INTRODUCTION

Background to the Study

The changing environmental conditions and the depletion of natural environments such as natural reserves and parks, lakes, streams, hills, mountains, wildlife being clearly adversely affected. It behooves of researchers and experts within the field of psychology seek supplementary options that offer alternative possibilities in carrying out studies that concern the pragmatic use and adoption of virtual environments to solving human challenges. With the growth and development witnessed in artificial intelligence, the future looks promising for studies that adopt virtual reality in healthcare practice. The term virtual natural environment is a networked computer software application that provides interaction and instant feedback between a user and the simulated natural environment (Mattila, *et al.*, 2020; Mostajeran,

Krzikawski, Steinicke & Kühn, 2021). Virtual natural environment elicits psychosomatic experience in which the exposed individual perceives experiences comparable to that which is experienced in natural settings (Blascovich, 2002; Mattila *et al.*, 2020). In other words, virtual natural environment implicates process of identifying simulated environment through an absorbing preoccupation into virtual reality experience (Adams, 2004; Mostajeran *et al.*, 2021).

Researchers within the field of psychology (Mattila *et al.*, 2020; Nukatinen *et al.*, 2021; Calogiuri, *et al.* 2018; Kim, & Lee, 2018; Kjellgren & Buhrkall, 2010) have established that virtual environment is not substitute for natural settings, rather the use of virtual environment seems a feasible vista as researchers to leverage on as an alternative that complement existing situation that enhance environmental awareness and green behaviours (Mnich, Weyland, Jekauc, & Schipperijn, 2019; Melo, Gonçalves, Monteiro, Coelho, Vasconcelos-Raposo, & Bessa, 2020; Nukarinen, *et al.*, 2021; Litleskare, MacIntyre, & Calogiuri, 2020; Yu, Lee, Lu, Huang, & Browning, 2020). The growing impact of technology, coupled with the potential benefits of virtual natural environments, it is expected that studies which address the importance of virtual natural environment could become a lifeblood in scientific research (Palanica, Lyons, Cooper, Lee, & Fossat, 2019). Studies on natural and virtual environment have revealed reliable positive results with improved psychological wellbeing (Fredrickson & Levenson, 1998; Fredrickson & Anderson, 1999; Pretty, Armstrong, 2000; Hagerty, *et al.*, 2001; Griffin, Sellens & Pretty, 2003; Pretty, Peacock, Sellens & Griffin, 2005).

According to Gallagher (2000) self-agency refers to the sense of oneself as the agent of one's actions, this notion allows oneself to feel distinct from others or external cues, and significantly contributes to psychological phenomenon of self-consciousness. Self-agency is sometimes referred to as internal locus of control. Self-agency is considered a significant factor in how individuals cope with various life issues, it is hinged on the belief that individual with self-agency have a higher level of life satisfaction and psychological wellbeing (Renes & Aarts, 2018; Kesavayuth, Tran, Zikos, & Georgantis, 2022). Several studies have demonstrated that self-agency plays an important role in psychological health of individuals (Kesavayuth, Poyago-Theotoky, Trans & Zikos, 2020). Researchers have considered self-agency as significant factor in understanding how people control their behaviors in relation to their health and wellbeing. Self-agency has been associated with motivation to behave in certain ways and also an effective measure that helps individuals to regulate behavior as a result, enhancing self-agency has been argued to improve people's motivation to act, and to control their behavior more successfully in line with their set goals.

Psychological wellbeing has been extensively researched across several academic disciplines, it has been linked to improved psychological state and health in people (Diener, Suh, Lucas & Smith, 1999). Quite a few definitions of psychological wellbeing have been put forward and there seems to be no consensus on the definition of the subject (Das, *et al.,* 2020). However, Diener (1984) who is considered as one of the earliest advocates in the study of psychological wellbeing refers to psychological wellbeing as the psychological state of feeling and thinking in which an individual perceives his or her life as being desirable with little regard for the other people view. Several authors have reported a significant association between virtual natural environments and wellbeing of students are connected (Berto, 2014; 2015; Payne, Loi & Thorsteinsson 2020; Wilkie & Davinson, 2021; Marselle *et al.,* 2021). Thus, it can be said that natural environments produce some adaptive resources that help individuals and students equally to become habituated to the environment that serve as perceptive and affective resources which consequently promotes

psychological wellbeing (Ohly, White, Wheeler, Bethel & Garside, 2016; Ain *et al.* 2021; Marselle *et al.,* 2021).

From a hypothetical standpoint, theories have been developed to explain the psychological benefits of contact with nature, The Stress Reduction Theory (SRT) (Ulrich, 1983; Ulrich *et al*., 1991) and the Attention Restoration Theory (ART) (Kaplan, 1995; Kaplan & Kaplan, 1989) have provided some clarifications. The SRT suggests that human evolvement from natural environments continues to be positively adaptive for modern humans and nature tends to produce less intensity than urban environments and therefore has comparatively positive in fostering wellbeing in people. Similarly, ART developed by Kaplan and Kaplan (1989) theorized that automatic effortless attention has the capability to restore focused concentration using the human brain as the main catalyst a such, exposure to natural environment have positive effects on stress, mood and mental fatigue (Kaplan, 1992). In addition, stimulation of natural environment through videos, virtual reality and photographs have been proven to be effective for the improvement of psychological health (Knopf, 1987; Stone *et al*., 2014; Vujicica *et al*., 2017; White *et al*., 2018; Roche, Liu, & Siegel, 2019; Trangsrud, Borg, Bratland-Sanda, & Klevan, 2020; Browning, Saeidi-Rizi, McAnirlin, Yoon, & Pei, 2020; Naylor, Ridout, & Campbell, 2020; Wilkie & Davinson, 2021; Chan, *et al.*, 2021; Mostajeran *et al*., 2021; Owens & Bunce, 2022).

Statement of Problem
The challenge faced by research conducted in natural environments, is the limited access and rapid degradation of nature, brought about by human activities such as rapid urbanization and the conversion of public natural environment for capitalistic purposes (Nukarinen, *et al.*, 2021). This challenge has led to researchers and scholars to seek alternative options in conducting research as such, researchers and scientists have adopted the use of virtual nature simulations in behavioural research (Browning, *et al.,* 2020). The recent mounting evidence that exposure to virtual natural environment is associated with wellbeing outcomes and can significantly lower the cost of healthcare makes it a good prospect for scholars and researchers. Researchers in Europe and Asia have adopted diverse methodologies through simulated environment in improving psychological wellbeing and these studies have shown conflicting results (Thompson *et al.*, 2012; Vujcica *et al*., 2017). This evidence needs further exploration because the significance of virtual natural environment is relatively new field of research endeavour (Roe *et al.*, 2013; Chan, *et al.*, 2021). The investigation into the importance of virtual natural environment in Nigeria would be a timely approach that promises cost effective incentives to government at the primary healthcare level and the entire public, especially in black Africa.

Research on virtual natural environment may have not benefitted from the same level of empirical and theoretical engagement from scholars as other conventional research methods, and this may have practical implications on the view of psychological wellbeing. Thus, finding new ways of theorizing this experience is the only way research can change the status quo, which clearly holds the key to the future for scientists (Mnich, *et al.* 2019; Melo *et al.*, 2020; Marselle *et al.*, 2021). Understanding the roles of virtual environments and self-agency in improving psychological wellbeing in student populations is an area of research that is not received extensive research. Owing to this, research focused on this subject-matter are relatively scarce and the few studies conducted in this direction have been carried out in Europe, Asia and America, studies of this capacity has not been conducted within African clime (White *et al*., 2018; Browning *et al*., 2020). The implication of simulated virtual natural environment on psychological wellbeing among students has been a source of growing concern within scientific research.

Objectives of Study

This research study seeks to examine the connections of self-agency and exposure to virtual natural environment may increase the level of psychological wellbeing. The specific objectives are to:

1. Examine whether students perceived level of self-agency will increase the level of psychological wellbeing.
2. Determine whether groups exposed to virtual natural environment will report significant improvement on psychological wellbeing (positive affect) more than their counterparts who were not exposed to virtual nature environment.

Hypotheses

Based on the research questions, the following hypotheses are formulated:

1. Students perceived level of self-agency will significantly predict the increased level of psychological wellbeing.
2. Groups exposed to virtual natural environment will report significant improvement on psychological wellbeing (positive affect) more than their counterparts who were not exposed to virtual nature environment.

METHOD

This study was a multivariate correlational survey design. This study was a 2-in-1 study conducted in two phases: Pre-intervention assessment phase, and intervention and post-intervention phases. The pre-intervention assessment phase focused on how the predictor variable (self-agency) relate with students (participants') level of psychological wellbeing. Phase two of the study (intervention phase) was designed to evaluate the extent to which exposure to virtual natural environment psychological wellbeing among students. A detailed description of each of the phases is presented below.

Phase 1: Pre-Intervention (Assessment Phase)

Research Design:

Correlational survey was adopted for this phase of the study, as it attempted to analyse data collected from a representative sub-set (students) at a specific point in time. The dependent variable was student's level of psychological wellbeing. The predictor variable was self-agency.

Participants:

A total of 72 students in both the pre-intervention and intervention phases of the study, and they were selected using simple random sampling. These students were undergraduates at the time of the conduct of this study. The students consisted of 45 males (62.5%), and 27 females (37.5%). The age of participants ranged between 18-26 years. The mean age was 21.64 and SD of 4.11. 34 participants were Christians (54.7%), and 38 were Muslims (45.3%). Participants were university students who were recruited using SONA Systems. SONA Systems is an automated embedded study sign-up link. The initial pool of students was eighty-five (85). However, upon analyzing it was found the 13 responses had incorrect responses. As result the response collected was seventy-two (72) and this yielded a response rate of 84.7%. Participants were randomized into experiment and control group. The participants were divided into 1st control group $n= 24$, 2nd control group $n=24$, and experimental group $n= 24$. ($M = 24.43$, $S = 4.24$).

Measurement:

Psychological wellbeing was measured using the Positive and Negative Affect Schedule (PANAS) which is a self-report questionnaire developed by Watson, Clark, and Tellegen, (1988). The PANAS was developed in 1988 by Watson and his colleagues from the University of Minnesota and Southern Methodist University. Watson *et al.* (1988) developed the PANAS to provide a consistent and reliable measure that has validity in the dimensions of positive and negative affect by extracting sixty (60) terms from the factor analyses carried out by Zevon and Tellegen (1982). The PANAS consists of two 10-item scales that statistically measure both positive and negative affect. Each item is rated on a 5-point scale of 1 (not at all) to 5 (very much). The PANAS score is separated into the Positive Affect (PA) and Negative Affect (NA) scores, with a higher score indicating more positive or negative affect respectively. Sample item include "Thinking about yourself and how you normally feel, to what extent do you generally feel": Interested, Distressed, Excited, Upset, Strong and so on. The PANAS measure has been used widely and mainly as a research tool in studies that involve groups, and it has also been utilized in within clinical and non-clinical populations as well (Kercher, 1992; Watson & Lee, 1999; Crawford & Henry, 2004; Thompson, 2007). The PANAS reports a Cronbach's alpha coefficient of 0.86 to 0.90, for the positive affect and for negative affect the reliability was, 0.84 to 0.87 over 8-week time period, the test-retest correlations were 0.47-0.68 for the positive affect and 0.39- 0.71 for the negative affect (Watson *et al.*, 1988).

Self-Agency was measured using 2 dimensional: Sense of Positive Agency (SoPA) and Sense of Negative Agency (SoNA). The SoAC is a 13-item Sense of Agency Scale (SoAS) developed by Tapal, Oren, Dar, and Eitam, (2017). The Sense of Agency Scale (SoAS) was developed as a tool for measuring individuals' beliefs about being agents in the sense of generally experiencing control over one's body, thought and immediate environment. Sample of items include; "I am in full control of what I do", "I am the author of my actions", "I can't predict how my actions will affect my environment". Responses on the SoAS was recorded on a scale from 1 (strongly disagree) to 7 (strongly agree). The reliability of the SoAS two subscales was = 0.80 and 0.79.

Phase 2: Intervention and Post Intervention Phase
Research Design:

A 3-group pre-test post-test design was considered for this phase. The participants were divided into three groups: Experimental group, first control group and the second control group comprised of students who were not tested at the pre-intervention phase.

Table 1: Summary of the Research Design for the Pre-Intervention Phase and Intervention and Post-Intervention Phase

Clusters	Pre-Invention Phase	Intervention and Post-Intervention Phase	
Groups	Pre-test	Exposure (Virtual nature environment)	Post-test
Group1 (Experimental Group) *n* = 24	Yes *n* = 24	Yes *n* = 24	Yes *n* = 24
Group 2 (First Control Group) *n* = 24	Yes *n* = 24	No	Yes *n* = 24
Group 3 (Second Control Group) *n* = 24	No	No	Yes *n* = 24

As shown in Table 1 the experimental and the first control groups were exposed to pretest. The second control group was not exposed to any form of pre-test. Only the experimental group went through the exposure condition (virtual nature environment). All the three groups were exposed to the post-test. Virtual Nature Environment was measured using computer generated 10 coloured, 3-dimensional pictorial images that were measured 1024x1024 which depicted virtual natural scenic environments such as lakes, hills, natural forests, waterfalls, mountainous ranges, gardens and moonlightings and sunsets. Students were exposed to the virtual natural environments for approximately 25 minutes while being seated in an ergonomic chair.

Procedure:

The intervention and post-intervention phase began after the pre-intervention assessment phase. The participants who participated in this phase of the study were drawn from the initial pool of participated in phase I of the study. Two certified Information Technology (IT) experts operated virtual images via desktop computers. The participants were informed on why they were chosen, what the research study entails and the possible solutions and benefits the study will provide in line with the BPS Ethics Guidelines for Internet Mediated Research, (2017). The participants were divided into three groups. The experimental comprised 24 participants (those who scored low on the measure of psychological wellbeing and were exposed to virtual nature environments). The first control group comprised 24 participants (those participants who scored low on the measure of psychological wellbeing but were not exposed to virtual nature environments) and the second control group comprised 24 participants (who were not part of the initial pre-test exercise and they were also not exposed to virtual nature environments), these group of participants served as the control group. The researchers explained the purpose of the intervention and how the participants were chosen into these groups. The researchers informed the participants that there are no implicit physical or psychological harm that will ensue as a result of participating in the study. The duration of the DAT session lasted for twenty-five minutes and each participant had access to a desktop computer.

DATA ANALYSIS

Virtual Nature images lasted for twenty-five minutes, while the control group were exposed to ten (10) natural setting pictures for twenty-five minutes. Independent variable is the stimulus conditions (nature and control) and self-agency. The dependent variable was psychological wellbeing (positive and negative mood). In order to test hypothesis 2, a combination of two sets of t-test for dependent samples was used to compare the pre-test and post-test scores of the experimental and control groups and a Bonferroni's post-hoc test was used to determine the extent to which the three groups of participants were different.

RESULTS

Test of Hypotheses 1

In order to test hypotheses 1, hierarchical multiple regression analysis was conducted. The socio-demographic variables (gender and religious affiliation) were entered into the regression model in step one. In step two of the analysis, the predictor variable (self-agency) was added to the regression model. The results are shown in Table 2.

Table 2: Summary of Hierarchical Multiple Regression on the Influence of Gender, Religion, and Self-Agency on Psychological Wellbeing

Model	Variables	B	T	P	R	R²	ΔR²	df	F	P
	Step 1				.10	.01	.01	4,271	0.70	>.05
	Gender	.00	-.00	>.05						
	Religion affiliation	.02	.39	>.05						
	Step 2				.14	.02	.01	6,270	0.89	>.05
	Gender	-.01	-.08	>.05						
	Religion affiliation	.01	.03	>.05						
	Self-Agency	.24	.26	>.05						

Note: Gender was coded, Male =1, Female = 0, religion was coded Christianity 1, Islam 0.

Table 2 demonstrated that in step one, none of the socio-demographic variables had independent significant influence on psychological wellbeing. This implies whether students are male of female or which either religious affiliations they identified with did not determine whether students' psychological wellbeing would increase or not. As shown in Table 2, all the socio-demographic variables only contributed 1% to the observed changes in psychological wellbeing [$R = 0.10$, $R^2 = 0.01$, $F (2, 72) = 0.70$, $p > .05$]. In step two of the analysis, self-agency was added to the model. The variables in the second step contributed 2% to the total variance in psychological wellbeing. This explains just 1% variance contributed by the added variable (self-agency) in step two [$R^2 = 0.02$, $\Delta R^2 = 0.01$, $F (3, 72) = 0.89$, $p > 0.05$]. Extrapyramidal side-effects did not significantly predict psychological wellbeing among students [$\beta = .24$; $t = .26$; $p > .05$]. Therefore, the results in Table 2 provided evidence in support of hypothesis 1, which stated that self-agency would be significantly related with increased psychological wellbeing. Therefore, the hypothesis was accepted.

Test of Hypothesis 2
Two-sets of t-test for dependent samples were conducted on the data to determine the extent to which the mean scores of the pre-test and the post-test of the experimental group and the first control group were different. The results are presented in Table 3.

Table 3: Summary of t-Dependent Test on Pre-Test Scores of the Experimental and the First Control Groups on Students Psychological Wellbeing

Groups	Test Condition	N	M	SD	Df	t	P
Experimental Group	Pre-test	24	1.84	0.66	23	10.44	<.01
	Post-test	24	3.46	0.51			
	Pre-test	24	1.05	0.34	23	2.45	>. 05
Control Group 1	Post-test	24	1.74	0.58			

The results in Table 3 showed that the difference between pre-test and post-test scores of participants in the experimental group was significant [$t (66) = 10.44$, $p < .01$]. This was such that participants performed better in psychological wellbeing ($M = 3.46$; $SD = 0.51$) compared to their performance in the pre-test ($M = 1.74$; $SD = 0.58$). Analysis of the pre-test and post-test scores of participants in the control group 1 indicated no significant difference [$t (23) = 2.45$, $p > .05$]. This finding was such that their performance in the pre-test ($M = 1.74$; $SD = 0.58$). The outcome of these comparison implied that exposure to virtual nature environment affected those in the experimental group. In order to show how efficacious exposure to virtual nature environment is

in enhancing psychological wellbeing among students as indicated in Table 3 above, the post-test mean scores of the three groups were compared. Table 4 shows the result.

Table 4: Summary of the Mean, and SD of the Post-Test Scores of the 3 Groups on Psychological Wellbeing

Groups	N	M	SD
Experimental Group	24	3.49	0.61
First Control Group	24	1.78	1.13
Second Control Group	24	0.99	0.59

Table 4 shows that the experimental group (the group that was exposed to virtual nature environment) had the highest mean score (*M* = 3.49; *SD* = 0.61) on the measure of psychological wellbeing compared with the First Control Group (*M* = 1.72; *SD* = 1.13) and the second control group had the least mean score (*M* = 0.77; *SD* = 0.59).

Post-Hoc Analysis on Hypothesis 2
The result of the post-hoc analysis is shown in Table 6.

Table 5: Summary of Post-Hoc test on Psychological Wellbeing of Students

Groups	N	M	SD	1	2	3
First Control Group	24	1.72	1.13	__		
Second Control Group	24	0.77	0.59	0.94*	__	
Experimental Group	24	3.49	0.61	1.78*	2.72*	__

Note: * *p* < 0.05.

Results of the Post-hoc in Table 6 shows that, the highest and significant mean difference (Bonferroni = 2.72, *p* < 0.05) was observed between the experimental group (participants who were exposure to virtual nature environment) and the control group two (students who were neither pre-tested nor exposed to virtual nature environment). Also, the mean difference between experimental group and control group one (students who were given a post-test without exposure to virtual nature environment) (Bonferroni = 1.78, *p* < 0.05) and mean difference between control group one and control group 2 (Bonferroni = 0.94, *p* <. 0.05) were found to be significant. However, these mean differences were lower as compared to the huge mean difference between experimental group and control group two, validating the effect of the exposure to virtual nature environment in determining psychological wellbeing among students. The results in Table 3, 4, 5, and 6 provided evidence in support of hypothesis 2, which stated that groups exposed to virtual natural environment will report significant improvement on psychological wellbeing (positive affect) more than their counterparts who were not exposed to virtual nature environment. Therefore, the hypothesis 2 was accepted.

DISCUSSION
This study examined the roles of self-agency and virtual environment in improving psychological wellbeing among students using a randomized group design. In hypothesis 1, which stated that students perceived level of self-agency will significantly predict the increased level of psychological wellbeing. This result was confirmed therefore, hypothesis 1 was confirmed. Possible explanation of this outcome can be linked to the intrinsic value obtained from self-agency, as individual who tend to internalize events in their life as possibly as their own making, them to manage difficult and seeming unpleasant situation with some level of resilience. This

outcome is line with the study of Renes and Aarts (2018) who found that self-agency is strongly associated with motivation to engage in regulating behaviours making it possible for individuals with this attribute to have increased motivation to act, and to control their behavior more successfully in line with their aspirations. Smith *et al.* (2000); Welzel and Inglehart (2010) revealed that individual's capacity and the intention of an individual to take action based on their knowledge and awareness of their particular situation and condition increases the individual's ability to develop physical and mental wellness, knowing that he or she has the responsibility to determine their happiness and satisfaction. Garber (1980) suggested that signs of increased psychological well-being emanate from individuals who report lower levels of perceived stress and depression, and this has significant implications for self-agency. Similarly, Klonowicz (2001), revealed that self-agency is strong determinant of subjective well-being, concluding that high levels of self-agency is associated with positive emotion.

In hypothesis 2, which stated that students exposed to virtual natural environment will report substantial improvement on psychological wellbeing (positive affect) more than their counterparts who were not exposed to virtual nature environment. This result was confirmed therefore the hypothesis 2 was confirmed. One explanation for this outcome is that, human development is intertwined with nature. Human beings interact with nature as nature provides a comforting effect on humans through proximity and attachment that simulates positive feelings. For instance, the Biophilia theory developed by Wilson (1984) proposed that human beings advanced in close proximity with natural environments. Several authors corroborate this position, and there seems to be unanimity which suggest that positive affect improves with exposure to nature even though, it is simulated (Calogiuri *et al.*, 2018; Yeo *et al.*, 2020). Another account for this result is that participants who are exposed to virtual nature pictures are habituated to give high levels of responsiveness to the images and this would repress negative thoughts thereby allowing for complete attentional processes (McMahan & Estes, 2015; Browning *et al.*, 2020). However, studies differ with this position, and they instead submit that positive emotion is only associated with real-life nature settings but not in virtual contexts, they contend that virtual environments places too much cognitive demands on individuals and this produces pseudo-feeling of escape that is often short-lived (Valtchanov, Barton & Ellard, 2010; Anderson *et al.*, 2017; Liszio, Graf & Masuch, 2018; Yeo *et al.*, 2020; Payne *et al.*, 2020; Owens *et al.*, 2022). The authors of this article differ for the reason that cognitive and perceptual process involved in real nature setting are similar and mimicked by the brain to produce similar experience as those encountered in simulated environment which produces comparable positive wellbeing such as those substances that mimic dopaminergic neurotransmission.

LIMITATIONS AND SUGGESTIONS FOR FUTURE STUDIES

This article has several research limitations. Firstly, the number of participants used in this study is too meagre to make generalizations as a result, researchers reporting the findings of this study should do so with some level of cautiousness. Secondly, this study made use of self-report questionnaires which is reportedly highly open to survey bias as participants may not reflect their true intents. Thirdly, this study made use of virtual or simulated nature environment and this procedure is not subjected standardization and the outcomes as a result of the use of this method may not be consistent with other findings. Fourthly, the study was a pretest-posttest control group design, in that there is a degree of randomization, use of control groups and, therefore, greater internal validity. However, the disadvantage of this type of approach is that the design assumes that groups are equivalent due to random assignment. The patients in the groups may result in a chance of missing an actual effect, and the treatment may become confounded with

the pretest (internal validity); as only one group were exposed to virtual nature environment. Future studies should conduct experimental studies by manipulating variables that may portend significant changes on psychological wellbeing among other groups of people.

RECOMMENDATION

Based on the findings of the study is recommended that cost-effective and user-friendly psychological applications should be developed to offer clinically-based results in the understanding of the impact of virtual nature on psychological wellbeing stress and restorative effects of natural environments. It is also recommended that the Nigerian government through Nigerian Psychological Association should encourage more research in this area by offering grant and sponsorship for studies aimed at psychologically-based artificial intelligence to foster interest from scholars and researchers so as to put Nigeria among advanced countries engaging in virtual research innovations. In line with this it is proposed that;

1. Psychological institutions should be established to monitor, regulate and provide training in the advancement of artificial intelligence and virtual simulation so as to bring teach psychology researchers on this newly evolving field of virtual environmental research.
2. Research should be encouraged towards virtual simulation in psychological research so as to give it the attention it deserves as the future for therapeutic treatment.
3. Conferences, training and workshops should be organized to encourage and expose students to the importance of self-agency in achieving life goals.

CONCLUSION

The findings of this study demonstrates that self-agency and exposure to virtual is a significant predictor of psychological wellbeing among students. This study advocates that due to the growing challenges faced by natural environments, scientists and scholars are admonished to engage in alternative means of conducting research and the use of technological seems to have a huge role to play in the future of scientific research.

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