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Climate Change Risk Perception, Response Efficacy, and Environmentalism among University Undergraduates

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Abstract

Climate change is a threat to human societies and natural ecosystems and there is a growing interest in studies concerning the environment and particularly actions or advocacy to limit negative human impacts on the environment. This paper provides insights into the roles climate change risk perception and response efficacy of undergraduates play in holding environmentalist tendencies. Adopting a cross sectional survey design and using convenience sampling technique, 326 Undergraduate students (152 males) of Caritas University and Enugu State University of Science and Technology aging between 18 and 27 years ($M_{= 22.23,}$ $SD_{=2.08}$) were sampled for the study. Results of the hierarchical multiple regression showed that, climate risk perception was a significant predictor of Utilization/Preservation dimensions of Environmentalism, ($\beta = .90$, $t = 33.43$, at $P < .01$; $\beta = .90$, $t = 34.67$, at $P < .01$) respectively. The contribution of climate risk perception in explaining the variance in Environmentalism (utilization 76%, ($\Delta R^2 = .76$); preservation 77%, ($\Delta R^2 = .77$). In another step, response efficacy was found a significant predictor of Utilization/Preservation dimensions of Environmentalism ($\beta = -.08$, $t = -2.16$, $P<.01$; $\beta = -.09$, $t = -2.70$, $P<.01$) respectively. The contribution of response efficacy in explaining the variance in Utilization/Preservation Environmentalism was 72% ($\Delta R^2 = .72$) and 71% ($\Delta R^2 = .71$) respectively. The study suggests that improving basic education, climate literacy, and public understanding of the local dimensions of climate change are vital to public engagement and support for climate action.

Keywords: ***climate change, flooding, ozone layer depletion, risk perception, self efficacy***

Introduction

Climate change is one of the greatest threats facing human civilization, yet less is being done to tackle it than recommended by most experts (Rogelj et al. 2018).Understanding Environmental Attitudes (EAs) has been viewed as prerequisite to changing environmental behaviour and is a particularly salient topic in the context of higher educational institutions which play an important role in shaping students' worldviews.

Environmental Education generally is a key factor in developing knowledge and awareness about issues that affect the future of nation and, subsequently, the world. Education for sustainable development as proposed by the US has come to mean education to enable sustainable development (Esa, 2010). Several scholars pointed out that Environmental Education should begin in primary schools, before prejudices upon misconceptions being shaped (Michael et al., 2007; Francis et al., 1993; Summers et al., 2000). In this sense, education is the most important part of environmental knowledge, however, not only primary schools, but also university education. Professors, lecturers and instructors do not forget that

planners mainly use their professional knowledge, which they obtained from formal education (Fenster & Yacobi, 2005).Furthermore, the misconception that environmental organizations and governments are mainly responsible for environmental education and change is being challenged and replaced with the notion that society as a whole should be accountable for environmental protection (Kent, 2009).

One way to achieve this is to start at institutions of higher education, where the success of environmental education and sustainability programmes often depend on the environmental attitude of its students (Zilahy & Huisingh, 2009). Investigating students' environmental attitude is important because students are highly susceptible to new attitudes and worldviews and will carry these new environmental attitudes with them into their prospective communities and workplaces (Lozano et al., 2013), and also as they will become the guardians, planners, policymakers and future educators related to environmental issues (Shafiei & Maleksaeidi, 2020). Universities have recognized this, and many now try to use this opportunity to instil positive attitudes towards the natural environment as attributes among their students (Was et al., 2010). Although some research has shown that no significant relationship exists between environmental attitudes, knowledge and pro-environmental behaviour and socio-demographic characteristics, a number of recent studies have shown significant evidence that environmental attitudes and pro-environmental behaviour are mediated and/or moderated by socio-demographic characteristics, especially in a developing country context (Witek, & Kuźniar, 2021; Okumah, Ankomah-Hackman, & Yeboah, 2020; Amoah & Addoah, 2020).

It is therefore also of value to better understand how students' environmental attitudes might vary socio-demographically, as universities are in a good position to facilitate change in their students' attitudes towards the natural environment through education, innovation and research (Zilahy & Huisingh, 2009), and could thus be empowered to develop more representative and inclusive environmental educational strategies. Environmentalism is used to describe actions and policies which show a concern with protecting and preserving the natural environment, for example by preventing pollution. Environmental risk perception is an individual's understanding of the importance and urgency of environmental protection and the relationship between people and the environment. Individuals' propensities to protect the environment can be dependent on their perceived environmental risk. Response efficacy is a person's belief that the recommended behaviors will be effective in reducing or eliminating the perceived threat.

Review of Related Literature

Climate is an average weather condition of a place over a long period of time; while weather is an atmospheric condition of any given place and time. The climate determining period could be as long as 35 years. The conditions are determined based on weather elements including temperature, wind, humidity, atmospheric pressure, cloudiness and precipitation (Futurelearn, 2021).

Weather is always changing due to instabilities in the atmosphere and invariably so does the climate. Therefore, climate is considered as the mean state and variability of these features. In real sense, the climate variation is always observed at all levels. Thus, climate is always changing. No two years are exactly alike, nor are any two decades, any two centuries, or any two millennia (Jackson, 2018). There is no doubt any longer about the existence of climate change. In fact, climate change is real and its impacts are felt all over the regions of the world. This phenomenon has been defined in various ways by different authorities. According to International Panel on Climate Change (IPCC), it was defined as a statistically significant

variation in either the mean state of the climate or in its variability, persisting for an extended period of decades or more which may be due to natural internal processes or external forces or to persistent anthropogenic changes in composition of the atmosphere or in land use (IPCC, 2007).

Climate change is equally considered as a periodic modification of Earth's climate brought about as a result of changes in the atmosphere as well as interactions between the atmosphere and various other geologic, chemical, biological, and geographic factors within the earth system. It involves a long-term shift in global or regional climate patterns. Often, climate change is considered with special emphasis on the rise in global temperatures **(**www.nationalgeographic.org/cli...; www.britnnica.com/science/evi **).**

Causes of Climate Change

There are evidences that climate change is caused by natural phenomena; while some other authorities strongly believe that global warming and the resultant climate effects being frequently witnessed are results of human activities (Kozicharow & Born, 2018). Climate change is principally a major problem caused by increase in human activities of mismanagement of the earth resulting to several direct and indirect impacts on the environment, people's health/welfare, and economy. Human activities add a number of greenhouse gases to the atmosphere. These include CO2 (Carbon dioxide), CH4 (Methane), N2O (Nitrogen oxide), and NCFCs (Chlorofluorocarbons). This growing concern has been attributed to increased use of fossil fuel at this current industrial and other urban activity.

Impacts of Climate Change

It is clear that the world we live in is full of complicated and interconnected conditions, on continents experiencing considerable economic, social and environmental challenges as a result of climate change. In Nigeria and indeed all over Africa, climate change threatens to derail the significant development gains that have been in place over the past decade; and also threatens future growth and development. Climate change has resulted in desertification, flooding and drought which in turn have impact on agricultural system. These detailed negative impacts of climate change include increasing heat related mortality, dehydration/drought, spread of infectious diseases/pollution, damage to public health and other infrastructure, destruction of farmland/reduction of crops yield/general soil degradation, and migration of both man/animals in search of better opportunities for survival. Mitigation becomes necessary to ensure reduction of greenhouse gas emission. To complement this requires adaptation which entails taking the right measure to reduce the negative effects of climate changes or exploit the positive ones by effect appropriate adjustments. Adaptation has there definite objectives: to reduce the risk of exposure to damage; to develop the capacity to cope with unavoidable damage; and to take advantages of new opportunities (IPCC, 2007). Unfortunately, in February 2022 report, the Intergovernmental Panel on Climate Change (IPCC) described adaptation action to date as small in scale, incremental, and fragmented with little evidence of transformational adaptation. What's more, adaptation actions typically address longer-term climate impacts, which may reinforce existing vulnerabilities and make it more difficult and costly to course-correct in the future.

The knowledge of the foregoing is very important in growth of environmentalism among undergraduates and their climate change risk perception for better propensities to protect the environment. The environmental protection starts from generating awareness among the

societies so that it grows into part of their lifestyles (Singh, et al, 2014). No wonder, people respond to threatening environmental problems based on their levels of perception (Anilan, 2014). Continuing, he maintains that raising individuals with environmental awareness and sensitivity is only possible through proper environmental education.

Among various definitions of environmental education, one of the most accepted was given in the Tbilisi Declaration which was developed at the International Conference of Environmental Educators, sponsored by United Nations Educational, Scientific and Cultural Organization (Blackburn, 1983). Environmental education was then defined as learning process that that increases people's knowledge and awareness about the environment and associated challenges, develops the necessary skills and expertise to address the challenges, and foster attitude, motivations, and commitment to make informed decisions and take responsible action (Blackburn, 1983). Thus, environmental awareness can as well be expressed as an art of imparting knowledge to people so as to acquire new and better environmental perception. This is very important in understanding commonly confusing terminologies in both developing and even developed nations. Hence, it was asserted that climate change jargons can really be confusing. In fact, a 2021 study found that most U.S. residents struggled to understand several of the most common climate terms (Toth & del Rio, 2023).

There is no doubt that climate change poses a significant threat to humanity, with widespread and severe consequences for people, the natural environment, and the global economy that needs to be properly understood. In fact, the impacts of climate change are being felt across the globe, threatening ecosystems, human settlements, and infrastructure. Indeed, there is growing evidence that climate change is exacerbating conflict, driving human displacement, and worsening vulnerability. Much importantly, those who contribute least to climate change tend to be disproportionately at risk from its impacts. Creating the awareness is important but requires functional for implementation. In Nigeria, reasonable environmental laws are formulated and their functions should be well understood for effective and efficient enforcement; bearing in mind that environmental laws are worthless except are effectively enforced (Nwafor, 2006; Landan, 2009). So, through awareness of increasing and intensifying weather extremes that have reduced food and water security and already adversely affected human health and livelihoods as well as infrastructure, people will be consciousness of taking proactive decisions and actions against environmental risk. Environmentalism is used to describe actions and policies which show a concern with protecting and preserving the natural environment, for example by preventing pollution.

Hypotheses

The following hypotheses were tested;

1. Participants gender and age will significantly predict utilization/preservation environmentalism among students.

2. Climate risk perception will significantly predict utilization/preservation environmentalism among students.

3. Response efficacy will significantly predict utilization/preservation environmentalism among students.

Method

Participants

A total of 326 undergraduate students from the population of undergraduate students in the faculty of Management and Social Sciences, Caritas University Amorji-Nike, Enugu, participated in the study. The following participants were drawn using purposive sampling method. Collins et al. (2007) opined that purposive sampling is a technique in which the population under study is a typical case that provides characteristic requisite data or information for a specific population of interest to the researcher. They were drawn from the departments; Economics (40), Political Science (35), Sociology (28), Psychology (50), International Relations and Personnel Management (25), Accountancy (25), Banking and Finance (5), Marketing (10), English (25), Mass communication (35), Public Administration (30) and Business Administration (30). Their age ranged between 17 and 29 years with a mean age of 23.56 and a standard deviation of 2.28.

Instruments

Climate Risk Perception

This was measured using the Climate Change Perceptions Scale developed by Valkengoed and Perlaviciute (2021). It is a 25 item scale that measures individual's perception of climate change and its risk factors. Sample items include "The world's climate is changing'; "Human activities are a major cause of climate change" and "Climate change will bring about serious negative consequences." The authors recorded a reliability coefficient of 0.87 while the value of 0.79 was obtained during pilot study by the researchers.

Utilization/Preservation Environmentalism

The Two Major Environmental Values (2-MEV) Scale developed by Johnson and Manoli (2011) which measured the environmental attitude of individuals was used in the study. It has two sub-scales measuring ***Utilization environmentalism*** (7-Items samples include: People have the right to change the environment (nature); I like a grass lawn more than a place where flowers grow on their own; To feed people, nature must be cleared to grow food; Building new roads is so important that trees should be cut down and ***Preservation environmentalism*** (9-items, samples include: If I ever have extra money, I will give some to help protect nature; I would help raise money to protect nature; I try to tell others that nature is important and To save energy in the winter, I make sure the heat in my room is not on too high). The scale has reliability coefficients of 0.77 and 0.81 respectively. The composite reliability score is 0.82.

Response Efficacy

The response efficacy was measured using a three-item scale, which was revised by the authors from the Perceived Response Efficacy Scale (Siponen, Pahnila & Mahmood, 2010). All items were measured on a seven-point Likert scale, ranging from "1 = strongly disagree" to "7 = strongly agree". These three items were "All levels of government and departments of health and epidemiology can effectively enhance environmentalism", "Preventive and control measures implemented by all levels of government can promote environmentalism", and "Preventive and control measures implemented by all levels of government and departments

can reduce the impact of climate change". The Cronbach's alpha coefficient of the scale in this sample was 0.97

Procedures

The participants were sampled from the population of undergraduate students in the Faculty of Management and Social Sciences, Caritas University Enugu. A total of 350 copies of the instruments were distributed within a period of one week to the target population. The researchers administered the instruments in their classrooms immediately after lectures. Only students who were present in the class and were willing to participate served as samples for the study. The instruments were administered to the participants and were collected immediately. There is no time limit in responding to the items of the instruments. Hence, 326 copies of each of the instruments administered were correctly filled when collected and were scored and used for analysis.

Design and statistics

Cross sectional design was adopted for the study. Hence, hierarchical regression statistics was applied to analyze the data in order to test the formulated hypotheses.

Results

Table I: Summary of Hierarchical Multiple Regression Analysis for Variables Predicting Utilization Environmentalism (N=326) *Note*$^{*}p<.05;$$^{**}p<.01$

	Step 1		**Step 2**		**Step 3**	
	B	***t***	**β**	***T***	**β**	***T***
Age	.13	2.33*				
Gender	.08	1.40				
Climate Risk Perception			.90	33.43**		
Response Efficacy					-.08	-2.16*
R	.15		.88		.89	
R^2	.02		.78		.78	
ΔR^2	.02		.76		.72	
F	3.70 (2, 323)		1117.45(1,322)		4.68 (1,321)	

Table II: Summary of Hierarchical Multiple Regression Analysis for Variables Predicting Preservation Environmentalism (N=326)*Note*$^{*}p<.05;^{**}p<.01$

	Step 1		Step 2		Step 3	
	B	***t***	**β**	***T***	**β**	***T***
Age	.15	2.65**				
Gender	.02	.36				
Climate Risk Perception			.90	34.67**		
Response Efficacy					-.09	-2.70**
R	.15		.89		.89	
R^2	.02		.79		.80	
ΔR^2	.02		.77		.71	
F	3.58 (2,323)		1202.06 (1, 322)		7.35(1,321)	

Results of the hierarchical multiple regression for the test of the first factors of psychological wellbeing index is shown in the Tables above. The variables were entered in stepwise models. The demographic variable (age) in the Step 1 of the regression analysis, significantly predicted Utilization/Preservation Environmentalism, Age, β = .13, t = 2.33, p<.05; β = .15, t = 2.65, p<.01. On the other hand the demographic variable (gender) gender did not significantly predict Utilization/Preservation Environmentalism. Gender, β = .08, t = 1.40, p<.01; β = .02, t = .36, p<.01 Hence, the demographic variable (age and gender) serves as control variables in the study and that is why they are keyed in step 1

In step 2, climate risk perception was entered; it was a significant predictor of Utilization/Preservation Environmentalism, β = .90, t = 33.43, at P < .01; β = .90, t = 34.67, at P < .01. The contribution of climate risk perception in explaining the variance in Utilization/Preservation Environmentalism was 76%, (ΔR^2 = .76); 77%, (ΔR^2 = .77) Therefore, climate risk perception is a significant predictor of Utilization/Preservation Environmentalism.

In step 3, response efficacy was entered, it was a significant (β = -.08, t = -2.16, P<.01; β = -.09, t = -2.70, P<.01) predictor of Utilization/Preservation Environmentalism. The contribution of response efficacy in explaining the variance in Utilization/Preservation Environmentalism was 72% (ΔR^2 = .72); 71% (ΔR^2 = .71)

Discussion

The study investigated climate change risk perception, response efficacy, and environmentalism among university undergraduates. The outcome indicated that age positively predicted utilization/preservation environmentalism while gender did not predict utilization/preservation environmentalism among university undergraduates. This can be discussed in the context of various studies that explore demographic influences on environmental attitudes and behaviours. Research has consistently shown that older students tend to exhibit higher levels of environmental awareness and engagement in pro-environmental behaviours. For instance, a study involving university students indicated that age is positively correlated with conservation behaviours, such as recycling and reduced meat consumption. Older students often have more life experience and exposure to environmental issues, which can translate into a stronger commitment to environmental preservation (Lieflaender & Bogner, 2014; Ofori et al., 2023). As individuals age, they typically develop more stable values and

beliefs regarding environmental issues. This maturation process can lead to a greater understanding of the long-term impacts of environmental degradation, motivating older students to engage in both utilization (responsible use of resources) and preservation (conservation efforts) behaviors (Bogner & Wiseman, 2006). Older university students often have had more exposure to environmental education and awareness campaigns, which can enhance their understanding of the importance of sustainable practices. This educational background contributes to their likelihood of adopting behaviours that reflect both utilization and preservation of environmental resources (Wise et al., 2020).

Contrary to age, gender did not significantly predict utilization/preservation environmentalism in the discussed studies. While some research has suggested that young women may demonstrate higher levels of preservation-oriented attitudes compared to men, this does not consistently translate into differences in overall pro-environmental behaviors among university students (Lieflaender & Bogner, 2014). The influence of gender on environmental behavior is complex and may be overshadowed by other factors such as age, education level, and socio-economic status. In many instances, both male and female students exhibit similar levels of engagement in pro-environmental behaviors when controlling for these additional variables (Ofori et al., 2023). Recent studies indicate that the gap between genders concerning environmental attitudes may be narrowing as societal norms evolve. This shift suggests that both genders are increasingly recognizing the importance of sustainability, leading to similar engagement levels in utilization/preservation environmentalism (Bogner & Wiseman, 2006; Wise et al., 2020).

The study also found that students who perceived higher risks associated with climate change were more likely to engage in utilization/preservation environmentalism**.** This type of environmentalism involves behaviours aimed at balancing the use of natural resources with their conservation to ensure long-term sustainability. The positive relationship indicates that heightened awareness of potential climate threats motivates individuals to adopt behaviours that mitigate environmental degradation. When individuals perceive climate change as a significant risk, they are more likely to feel a moral or social responsibility to act, which translates into pro-environmental behaviors (Alvi et al., 2020; Lo & Chow, 2015). Risk perception often triggers emotional responses such as concern or fear, which can drive individuals to take preventive actions to reduce perceived threats (Shershunovich, 2024). Similar studies have demonstrated that climate risk perception is a strong predictor of pro-environmental behaviour across different contexts, including urban residents in Belarus and university students in Ghana. These studies underscore how individuals' recognition of the severity and likelihood of climate impacts encourages sustainable practices (Ofori et al., 2023; Shershunovich, 2024).

Surprisingly, the study revealed that higher response efficacy defined as the belief in the effectiveness of one's actions to mitigate climate change negatively predicted utilization/preservation environmentalism. This suggests that students who felt confident in their ability to address climate issues were less likely to engage in behaviours aimed at resource preservation. High response efficacy might lead to complacency, where individuals assume their current efforts are sufficient and thus do not feel compelled to adopt additional preservation-oriented behaviours. Students with high response efficacy may prioritize direct mitigation strategies (e.g., adopting renewable energy or reducing emissions) over long-term conservation efforts like resource preservation. High response efficacy could reduce the perceived urgency of addressing broader systemic issues, as individuals may feel their actions already contribute significantly (Wang et al., 2021; Crawley et al., 2020). While response

efficacy is generally considered a motivator for pro-environmental behavior, this finding highlights the complexity of its role. It suggests that excessive confidence in personal or collective actions might inadvertently reduce engagement in specific types of environmentalism.

Implications for Climate change Education and Policy

Educational programmes should aim to balance risk perception with realistic assessments of response efficacy to avoid overconfidence while maintaining motivation for action. Emphasizing the interconnectedness of mitigation and preservation strategies could help bridge gaps in behavioural engagement. Policymakers should consider how public campaigns frame response efficacy to ensure it drives comprehensive pro-environmental behaviour rather than selective actions. Also, strategies that increase both perceived risks and actionable pathways could enhance overall environmental engagement.

Limitations of the Study

Studying only university undergraduates limits the generalizability of the findings to the broader population. Undergraduates are a specific demographic group that is more educated and likely more aware of climate change issues than the general population. Their perceptions, attitudes, and behaviours might not be representative of other age groups, educational backgrounds, or socioeconomic statuses.

Also, confining the study to a single university further restricts generalizability. The institution's specific characteristics (e.g., location, academic focus, campus culture, and sustainability initiatives) could influence students' views on climate change. In addition, the study population (university undergraduates) is predominantly from one ethnic group, the results may not reflect the diverse perspectives and experiences of individuals from different cultural backgrounds. Cultural values, norms, and beliefs can significantly shape environmental attitudes and behaviours.

Suggestion for Further Study

Further studies should explore the nuanced relationship between response efficacy and different types of environmentalism across diverse populations. In addition, investigating cultural or contextual factors that mediate these relationships could provide deeper insights into effective behavioural interventions.

Conclusion

The findings highlight the importance of age as a significant predictor of utilization/preservation environmentalism among university undergraduates, reflecting the accumulation of knowledge and experience over time. In contrast, gender appears not to significantly influence these behaviours, suggesting a convergence in attitudes towards environmental issues across genders in this demographic. Future research could further explore these dynamics by examining how other factors interact with age and gender to shape pro-environmental behaviours.

Higher climate change risk perception positively predict engagement in utilization/preservation environmentalism. Students who perceive climate change as a significant threat are more likely

to adopt pro-environmental behaviours. Also, the relationship between response efficacy and environmentalism is negative. While a positive relationship is often assumed, the study investigates the possibility of a more nuanced connection. High response efficacy might lead to complacency or a focus on specific mitigation efforts, potentially reducing engagement in broader preservation behaviours.

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