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The Moderating Effects of Social Support and Gender on the Relationship between Environmental Justice Perceptions, Environmental Engagement, and Well-Being among Residents of Ota

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Abstract

Background: In urban areas where environmental challenges and socio-economic disparities are prevalent, such as Ota, Nigeria, the complex interplay between environmental justice perceptions, environmental engagement, and well-being presents significant challenges. These issues are exacerbated by inadequate social support systems and gender disparities, making it difficult to address environmental injustices effectively and improve the overall well-being of residents. **Methods:** This study employed a cross-sectional survey design, involving a total of 324 participants, aged 18 - 65 years (mean age = 43; SD = 16.79) that were recruited using a stratified random sampling technique. Data were collected using the Scales of Psychological Well-Being (SPWB); Environmental Justice Perception Scale (EJPS); Olabisi Onabanjo University Attitude Toward Environmental Engagement Scale (OOUATEES); and the multidimensional scale of perceived social support (MSPSS) descriptive and Pearson correlation matrix and analysed using hierarchical regression models. **Results:** The findings indicated that better perceptions of environmental justice are associated with higher levels of general well-being [$\beta = 0.25$, $t = 4.66$, $p < 0.00$]. Engagement in pro-environmental behaviours was also positively linked to improved well-being [$\beta = 0.16$, $t = 2.99$, $p < 0.00$]. Environmental engagement

significantly moderated the relationship between environmental justice perceptions and general well-being, amplifying the positive effects (β = 0.25, t = 4.66, $p < 0.01$). However, social support and gender did not significantly moderate these relationships, suggesting that the primary influences of environmental justice (β = 0.26, t = 4.83, $p < 0.01$) and environmental engagement (β = 0.19, t = 3.82, $p < 0.01$) are robust enough to overshadow the moderating roles of these variables. **Conclusion:** The study highlights the critical role of environmental justice perceptions and pro-environmental engagement in enhancing general well-being among residents of Ota. While social support and gender are important factors in well-being, their moderating effects may be less pronounced in environments with strong predictors like environmental justice and engagement. These findings underscore the need for targeted interventions that promote environmental fairness and active engagement in environmental activities to improve overall well-being.

Keywords

Environmental Engagement, Environmental Justice, Gender, Nigeria, Ogun State, Social Support, Well-Being

1. Introduction

Environmental issues have become a critical concern in contemporary society, impacting both the health of our planet and the well-being of its inhabitants. In urban areas like Ota in Ogun State, Nigeria, the perception of environmental justice—how fairly environmental benefits and burdens are distributed—significantly influences residents' engagement in environmental activities and overall well-being. However, these relationships are complex and can be influenced by social support and gender. Ota faces challenges related to pollution, waste management, and unequal access to green spaces, which degrade the environment and affect residents' physical and mental health. Addressing these issues aligns with several United Nations Sustainable Development Goals (SDGs), including SDG 3 (Good Health and Well-being), SDG 11 (Sustainable Cities and Communities), and SDG 13 (Climate Action). This study aims to explore how perceptions of environmental justice influence environmental engagement and well-being, moderated by social support and gender, to identify key leverage points for policy interventions and community programs that can enhance sustainable development and improve the quality of life for residents.

General well-being is a multidimensional concept that encompasses various aspects of an individual's life, including physical, mental, and social health (Skevington & Böhnke, 2018). According to Diener (2000), general well-being is defined as "the subjective evaluation of one's life as a whole, encompassing emotional reactions and cognitive judgments of life satisfaction". Similarly, Ryff (1989) describes general well-being as "an individual's overall assessment of their life, characterised by dimensions such as self-acceptance, personal growth, purpose

in life, environmental mastery, autonomy, and positive relations with others". In countries with high economic stability and robust social welfare systems, such as the Nordic countries (Denmark, Finland, Norway, Sweden, and Iceland), the prevalence rate of general well-being is notably high (Martela et al., 2020). According to the World Happiness Report (2021), these countries consistently rank at the top of global well-being indices, attributed to factors like strong social support, high levels of trust in government and fellow citizens, and comprehensive healthcare systems.

Although, the prevalence of general well-being is likely to be lower in places with problems with the economy, political unrest, or insufficient healthcare facilities. For example, in regions experiencing prolonged conflicts or economic crises, such as parts of the Middle East and Africa South of the Sahara, well-being scores are often significantly lower (Lanchovichina et al., 2015). These disparities highlight the critical impact of socio-economic and political contexts on individuals' overall life satisfaction and health. In Nigeria, the prevalence rate of general well-being is influenced by a mix of socio-economic factors, regional disparities, and environmental challenges (Rigon, 2018). World Happiness Report (2021) places Nigeria relatively low in global well-being rankings. According to Aladejare et al. (2022), factors contributing to this include high levels of poverty, political instability, and significant public health challenges. Environmental issues such as pollution and inadequate waste management further exacerbate these conditions, particularly in urban areas like Lagos and Ota (Oyebode et al., 2023). The general well-being of people in similar conditions worldwide, such as those living in urban areas facing environmental challenges, often reflects the interplay between environmental factors and individual perceptions of justice and support.

Environmental justice, which seeks the fair treatment and meaningful involvement of all individuals in environmental policies and practices, has become crucial in addressing disparities experienced by marginalised communities (Foreman, 2011). Studies have shown that in regions where environmental benefits and burdens are perceived as unfairly distributed, individuals report lower levels of well-being and higher levels of stress and dissatisfaction (Hartig et al., 2014). This is particularly evident in cities like Ota, where issues of pollution, waste management, and limited access to green spaces prevail. In such settings, residents' well-being can be significantly impacted by their perceptions of environmental justice. Understanding these relationships is essential in regions like Ota, where environmental challenges and socio-economic disparities are prevalent.

Environmental engagement involves the actions individuals take to address environmental issues, such as participating in environmental activities, advocating for sustainable practices, and adopting eco-friendly behaviours (Smith & Pangsapa, 2008). Individuals' perceptions of fairness and justice in environmental policies often drive these actions. When people perceive environmental injustices, such as unequal distribution of environmental benefits and burdens, they are more likely to engage in activities that address these inequities (Schlosberg, 2004). Moreover,

positive perceptions of environmental justice can enhance individuals' sense of control and contribute to their overall well-being (Agyeman, 2005). This study aims to explore how environmental engagement impacts the well-being of residents of Ota in Ogun State, Nigeria.

Social support could play a critical role in shaping how individuals respond to environmental challenges. Taylor (2011) defined social support as the perception or experience that one is loved, cared for, esteemed, valued, and part of a social network involving mutual assistance and obligations. According to Macke et al. (2019), when social support systems are strong, and there is a collective effort towards environmental engagement and improvement, residents tend to experience better overall well-being, demonstrating the critical role of community and policy interventions in fostering sustainable urban living conditions. It provides emotional, informational, and practical assistance that can buffer the negative effects of perceived injustices and promote greater environmental engagement and well-being (Cohen & Wills, 1985; Enssle & Kabisch, 2020). Additionally, demographic factors like gender could influence individuals' perceptions and behavioural patterns related to the environment. The World Health Organisation (WHO, 2022) defined gender as the roles, behavioural patterns, activities, expectations, and societal norms that cultures and societies consider appropriate for men, women, and non-binary people. However, older adults may have different environmental concerns and levels of engagement compared to younger individuals, and gender differences can shape both the perception of environmental issues and the likelihood of taking environmental action (Davidson & Freudenburg, 1996; Muttarak & Chankrajang, 2015).

The choice of Ota as the study location for examining the moderating effects of social support and gender on the relationship between environmental justice perceptions, environmental engagement, and well-being- is justified by its unique socio-environmental background. Ota, a rapidly urbanising area in Nigeria, faces significant environmental challenges such as pollution, inadequate waste management, and limited access to green spaces, compounded by socio-economic disparities. These issues provide a critical backdrop for investigating how residents perceive environmental justice and how these perceptions influence their engagement and well-being. Furthermore, the diverse demographic composition of Ota, including variations in social support networks and gender dynamics, offers a rich framework for exploring the moderating effects of these factors.

This study examines the moderating effects of social support and gender on the relationship between environmental justice perceptions, environmental engagement, and well-being among residents of Ota. Grounded in the Stress-Buffering Model, which posits that social support mitigates the negative effects of stress on well-being, the research explores how perceptions of environmental justice impact individuals' engagement with environmental issues and their overall well-being. Social support is hypothesised to enhance resilience by buffering the adverse effects of perceived environmental injustices. At the same time, gender differences

may influence both perceptions and engagement levels, informed by Gender Role Theory, which suggests that societal gender roles shape individuals' behaviours and attitudes. By investigating these complex interactions, the study aims to provide insights for targeted interventions and policies that enhance environmental engagement and well-being in urban settings. This research will contribute to a deeper understanding of environmental justice dynamics in Nigeria and inform global discussions on sustainable urban development and community health.

The following hypotheses were tested:

1) There will be no significant impact of environmental justice perceptions on general wellbeing among residents of Ota.

2) There will be a significant relationship between engagement in pro-environmental behaviours and general wellbeing.

3) There will be a significant influence on how environmental engagement moderates the relationship between perceptions of environmental justice and general wellbeing.

4) There will be a significant influence on how social support and gender moderate the relationships between environmental justice perceptions, environmental engagement, and general wellbeing.

Design: This study employed a cross-sectional survey design to explore the moderating effects of social support and gender on the relationship between environmental justice perceptions, environmental engagement, and well-being among residents of Ota, Nigeria. Primary data were collected through the administration of a structured questionnaire. The independent variables for the study are social support and gender, while the dependent variables are environmental justice perceptions, environmental engagement, and well-being.

Study Population: The population consisted of adults residing in the Ota metropolis. A total of 380 questionnaires were distributed, with 324 completed questionnaires returned, resulting in a response rate of 85.26%. This high response rate is considered excellent in survey research, indicating strong engagement and minimal nonresponse bias. It enhances the study's findings' reliability, validity, and generalisability. The sample was retrieved from various study locations, including Sango, Osi, Iganmode, Ayetoro, and Agbara. A stratified random sampling technique was employed to capture the socio-economic diversity of Ota. This method ensured representation across key demographic groups, including gender, age, income levels, and residential areas. The sample size was determined using Araoye's (2004) sample size calculator:

$$n = \frac{Z^2 * P(1-P)}{d^2}$$

From the formula given,

n = sample size.

Z = the standard normal deviation set as 1.96, which is 95% confidence level.

P = The prevalence of general well-being among nurses was 62.6%, as used by Tamuno-opubo et al. (2024) in Southwestern Nigeria.

d = Degree of accuracy = 0.05.

Hence, calculated thus:

$$n = \frac{1.96^2 \times 62.6\%(1-62.6\%)}{0.05^2} = \frac{0.9005}{0.0025} = 360.21 \sim 360$$

Attrition rate: (calculate 5% of 360) and add to 360.

5% of 3600 = 18.

Sample size = 360 + 18 = 378 Respondents.

Demographic characteristics of participants showed that their age ranges from 18 to 65 years (M = 43 years, SD = 16.79), indicating a broad age range. Their gender distribution comprised 181 males (55.90%) and 143 females (44.10%). Regarding marital status, 183 (56.48%) of the respondents were married, 81 (25.00%) were single, 31 (9.57%) were divorced, 17 (5.25%) were separated, and 11 (3.40%) were widowed. In terms of religion, 178 (54.94%) were Christians, 59 (18.21%) were Muslims, 24 (7.41%) practiced traditional beliefs, and 5 (1.54%) followed other religions. Education levels varied, with 187 (43.20%) having tertiary education, 116 (35.80%) with secondary education, 24 (7.40%) with primary education, 17 (5.20%) with postgraduate education, and 27 (8.30%) with no formal education. Employment status revealed that 181 (55.86%) were employed full-time, 96 (29.63%) were self-employed, 74 (22.84%) were unemployed, 9 (2.78%) were students, and 18 (5.56%) were retired. Household income distribution showed that most respondents earned between 20,000 - 50,000 (45.7%), followed by less than 20,000 (20.7%), 50,001 - 100,000 (17.3%), 100,001 - 200,000 (10.5%), 200,001 - 500,000 (4.6%), and more than 500,000 (1.2%).

Regarding how long participants have been residing in the town varied, with 124 (38.3%) having lived in their current residence for 1 - 5 years, 97 (29.9%) for less than 1 year, 65 (20.1%) for 6-10 years, and 38 (11.7%) for more than 10 years. Household sizes also varied, with 114 (35.19%) consisting of 3 - 4 members, 96 (29.6%) with 5 - 6 members, 91 (28.1%) with 1 - 2 members, and 23 (7.10%) with 7 or more members. Access to recycling facilities was available to 68 (20.99%) of respondents, while 256 (79.01%) did not have access. Clean drinking water access was limited, with 31.79% having access, while 68.21% did not. Participation in environmental activities in the past year was low, with 99 (30.6%) having participated, while 225 (69.4%) had not. Also, Health status varied, with 130 (40.1%) reporting excellent health, 89 (27.5%) good health, 54 (16.7%) fair health, and 51 (15.7%) poor health. Residential areas, 136 (41.98%) of respondents resided in Sango, 60 (18.52%) in Iganmode, 45 (13.89%) in Ayetoro, 43 (13.27%) in Osi, and 40 (12.35%) in Agbara.

2. Instruments

General well-being was assessed using the Scales of Psychological Well-Being (SPWB), developed by Ryff (1995). The SPWB is a well-structured self-report instrument based on the six dimensions of psychological well-being. The scale includes three items for each of the six aspects of well-being: self-acceptance,

autonomy, environmental mastery, purpose in life, positive relations with others, and personal growth. Some items on the scale are: "I tend to be influenced by people with strong opinions" and "I am quite good at managing the many responsibilities of my daily life". Each item is responded to on a 7-point Like-type scale ranging from "1 = strongly agree; 2 = somewhat agree; 3 = a little agree; 4 = neither agree nor disagree; 5 = a little disagree; 6 = somewhat disagree; 7 = strongly disagree".

In this instance, a total is obtained by summarising the item ratings across all 18 items. The study used this scoring scheme: the higher the respondent's overall scores, the better their psychological well-being. According to Ryff, the six dimensions have psychometric qualities ranging from 0.86 to 0.93. Mefoh, Odo, and Ezeh (2016) employed 71 inmates from the Nigerian prison Nsukka to revalidate this scale. The pilot study's reliability analysis yielded Cronbach's alpha values of 0.72 for self-acceptance, 0.50 for positive relations, 0.46 for autonomy, 0.60 for environmental mastery, 0.62 for purpose in life, and 0.57 for personal growth. Additionally, in the range of 0.72 (personal progress) to 0.81 (autonomy, self-acceptance, and life purpose). According to Ryff (1989), the six sub-scales' internal consistency reliability coefficients range from 0.86 to 0.93. In Nigeria, Nurses had a reliability coefficient of 0.68 for the whole scale, according to Tamuno-opubo et al. (2024). The current study found a reliability coefficient of 0.76 among residents of Ota.

Environmental Justice was measured using Environmental Justice Perceptions Scale (EJPS), developed by the researchers. The EJPS is a 25-item instrument, divided into five domains: Distributional Equity (5-items); Procedural Equity (5-items); Recognition Equity (5-items); Intergenerational Equity (5-items); and Outcome Equity (5-items). The EJPS measures participants' perceptions of the fairness in the distribution of environmental benefits and burdens in their community. Sample questions for each domain include, "environmental resources such as clean air and water are equally available to all residents in my community", "local government decisions on environmental issues include input from a diverse range of community members", "the unique cultural and social needs of all community groups are considered in environmental planning", "current environmental policies consider the long-term impact on future generations", and "the outcomes of environmental policies are beneficial for all residents, regardless of their socio-economic status".

Each item is scored on a scale from 1 to 5 based on how much an individual perceives each item in the last 6-months, including the day the respondent filled in the scale. Thus, each item carried the 5-point Likert-type response of "1 = Strongly Disagree (SD); 2 = Disagree (D); 3 = Neutral (N); 4 = Agree (A); and 5 = Strongly Agree (SA)". The five sections' overall values are further added to obtain the overall environmental justice perception score. Thus, total scores can range from 25 to 125. Before administering the newly developed Environmental Justice Perception Scale (EJPS), it underwent refinement through expert review and pilot

testing to ensure clarity and cultural relevance. This process involved 130 psychology students from Olabisi Onabanjo University, Ago-Iwoye, Ogun State. Experts validated the content and face aspects of the scale, while potential respondents evaluated its appropriateness. From the pilot study, reliability testing yielded a Cronbach's alpha of 0.62, indicating initial internal consistency. A test-retest reliability analysis was conducted two weeks later to assess stability. Subsequently, the EJPS was adapted to align with similar contexts, achieving a higher internal consistency (Cronbach's alpha of 0.82) during reliability analysis. These steps ensured the scale's coherence and applicability in the Nigerian socio-environmental context. The current study found a reliability coefficient of 0.75 among residents of Ota.

Environmental Engagement was measured using the Olabisi Onabanjo University Attitude Toward Environmental Engagement Scale (OOUATEES). The OOUATEES is a 21-item instrument that was developed based on the Theory of Planned Behaviour, to measure the predictors of environmental engagement. The instrument is further divided into five domains, to assess attitudes (6-items), subjective norms (6-items), perceived behavioural control (6-items), and ultimately predicting the likelihood of engaging in pro-environmental behaviours - Behavioural intentions (3-items). Sample questions from the instrument includes, "Recycling helps reduce pollution", "My family believes that I should engage in environmentally friendly practices", "I have access to recycling facilities", and "I intend to recycle regularly next month".

Each item is scored on a scale from zero "0" to 4 based on the frequency and intensity of participants' involvement in environmental activities and advocacy in recent times, including the day the respondent filled in the scale. Thus, each item carried the 5-point Likert-type response of "0 = Strongly Disagree (SD); 1 = Disagree (D); 2 = Neutral (N); 3 = Agree (A); and 4 = Strongly Agree (SA)". The five sections' overall values are further added to obtain the overall involvement in environmental activities score. Thus, total scores can range from zero '0' to 84. Before administering the newly developed the Olabisi Onabanjo University Attitude Toward Environmental Engagement Scale (OOUATEES), it was crucial to review and refine it through expert feedback and pilot testing to ensure clarity and relevance. This process was conducted among 130 students in the Department of Psychology at Olabisi Onabanjo University, Ago-Iwoye, Ogun State. Additionally, experts were involved in establishing content and face validity, and potential respondents assessed the scale's appropriateness. From the pilot study, reliability testing provided an internal consistency (Cronbach's alpha 0.74), and two weeks later, a test-retest reliability was conducted to ensure the scale's stability and coherence. Developed specifically for this study, the OOUATEES showed high reliability (Cronbach's alpha = 0.90). The validation process included expert feedback and pilot testing with a local sample, ensuring its suitability for measuring pro-environmental engagement in Ota.

Social Support was measured using the multidimensional scale of perceived

social support (MSPSS) developed by Zimet at al. (1988). The MPSS is a 12-item questionnaire which measures the amount of social support one receives from Three (3) sources: family (FAM), friends (FRE) and significant other/personal person (SO). Participants rate the amount of SS received on a 7-point Likert scale, which ranges from very strongly disagree (1) to very strongly agree (7). In this study, the scores are interpreted as the higher the score, the greater the amount of perceived SS; thus the total score can range from 12 to 84. The MSPSS was originally developed to measure social support in adolescents and has since been validated in both clinical and non-clinical samples. Due to its brevity and psychometric robustness, the MSPSS has been extensively translated and validated into several languages. Bello et al. (2022) used the scale in Nigeria among female undergraduates. The authors reported that the scale's internal consistency among the Nigerian sample reveals positively significant reliability coefficients. The current study found a reliability coefficient of 0.60 among residents of Ota.

Procedure: Participants were recruited through community centres, local organisations, and social media platforms. Both paper-based and online formats of the structured questionnaire were provided to accommodate participants' preferences. Data collection spanned four weeks to ensure a robust response rate. Ethical approval was obtained from the relevant review board before data collection, and all procedures complied with institutional and national research standards, as well as the 1964 Helsinki Declaration and its amendments. Participation was entirely voluntary, with informed consent secured from each participant. Confidentiality and anonymity of responses were guaranteed, and participants were informed of their right to withdraw from the study at any time without repercussions.

Data Analysis: Data were analysed using SPSS (Statistical Package for the Social Sciences) software. Descriptive statistics were calculated to summarise the demographic characteristics of the sample. Hierarchical multiple regression analysis was conducted to examine the main effects of environmental justice perceptions on environmental engagement and well-being. Moderation analyses were performed using hierarchical multiple regression analysis to explore the moderating effects of social support and gender on these relationships. Statistical significance was set at $p < 0.05$ for all tests.

3. Results

To ensure the validity of the regression analysis, key statistical assumptions were tested and confirmed. Normality was verified through residual plots and Kolmogorov-Smirnov tests; Multicollinearity was assessed using Variance Inflation Factors (VIF); and scatterplots of residuals versus predicted values confirmed linear relationships and consistent variance.

Table 1 summarises the results of the Kolmogorov-Smirnov test conducted to evaluate the normality of residuals for the predictor variables. The p-values for all variables are greater than 0.05, confirming that the residuals follow a normal distribution and meet the assumption for regression analysis.

Table 1. Kolmogorov-Smirnov test for normality of residuals.

Variable	Kolmogorov-Smirnov Statistics	*p*-value	Conclusion
Environmental Justice Perceptions	0.056	0.200*	Normal Distribution
Environmental Engagement	0.048	0.200*	Normal Distribution
General Well-Being	0.052	0.200*	Normal Distribution

*Note: $p > 0.05$ indicates that the residuals follow a normal distribution.

Table 2. Variance inflation factors (VIF) for multicollinearity.

Predictor Variable	VIF	Conclusion
Environmental Justice Perceptions	1.23	No Multicollinearity
Environmental Engagement	1.45	No Multicollinearity
Social Support	1.35	No Multicollinearity
Gender	1.10	No Multicollinearity

*Note: VIF < 10 indicates no significant multicollinearity.

Table 2 presents the Variance Inflation Factors (VIF) for each predictor variable to assess multicollinearity. All VIF values are below 10, indicating no significant multicollinearity among the predictors. This confirms that the regression coefficients are reliable and not overly influenced by correlations between predictors.

Table 3. Linearity and homoscedasticity checks.

Test	Observation	Conclusion
Scatterplot of Residuals	Residuals evenly distributed around zero	Linearity confirmed
Homoscedasticity	Variance constant across predictions	Homoscedasticity confirmed

Table 3 highlights the tests performed to check for linearity and homoscedasticity. The scatterplot of residuals versus predicted values shows residuals evenly distributed around zero, confirming linear relationships. Additionally, the constant variance of residuals across predicted values indicates that the homoscedasticity assumption is satisfied.

Visualisations for statistical assumptions:

1) Normality:

- The **Histogram of Residuals** shows a near-normal distribution, supported by the overlaid normal curve.

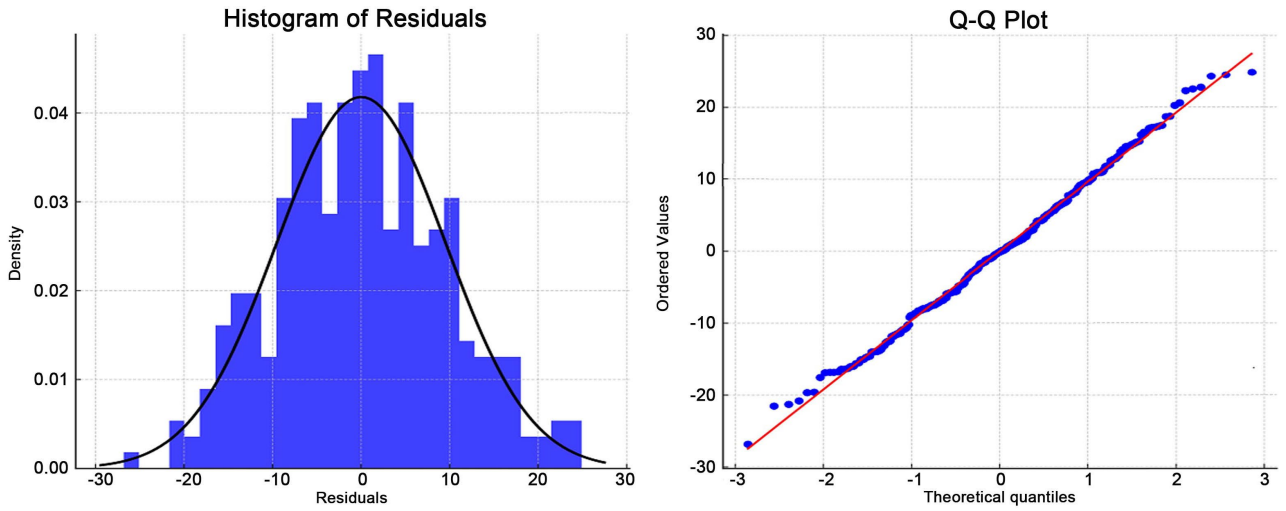

Figure 1. Histogram of residuals and Q-Q plot.

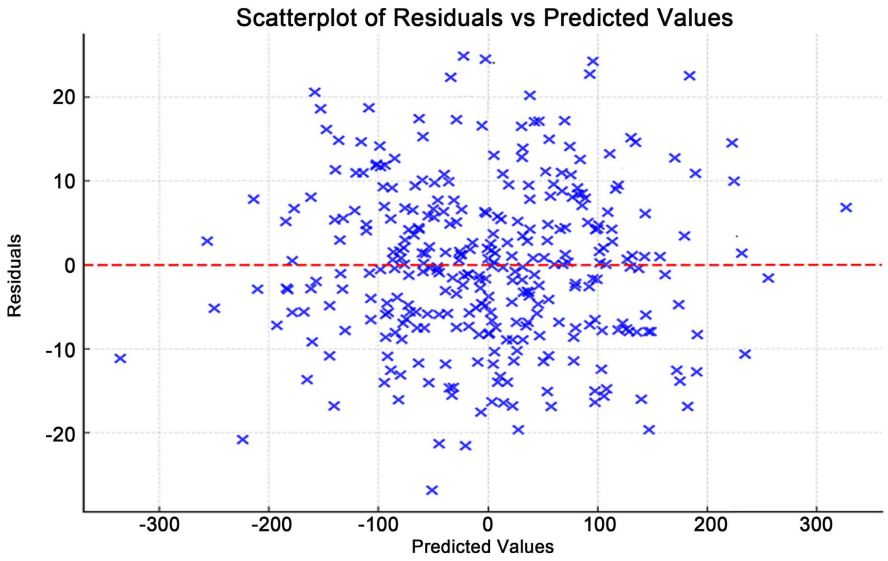

Figure 2. Scatterplot of residuals vs predicted values.

- The **Q-Q Plot** confirms that the residuals align closely with the theoretical quantiles, indicating normal distribution (Figure 1).

2) Linearity and Homoscedasticity:

- The **Scatterplot of Residuals vs. Predicted Values** shows no clear pattern, with residuals evenly spread around zero. This confirms the assumptions of linearity and homoscedasticity (Figure 2).

The results confirmed that the assumptions for regression analysis were met. Normality was validated using residual plots and Kolmogorov-Smirnov tests, which indicated that the residuals followed a normal distribution. Multicollinearity was assessed through Variance Inflation Factors (VIF), with all values below 10, confirming no significant multicollinearity among the predictors. Linearity and homoscedasticity were also supported by scatterplots of residuals versus

predicted values, showing a linear relationship and consistent variance across the data.

Test of Relationship

To test the extent and direction of the relationship existing among the study variables, Pearson Product Moment Correlation analysis was utilised to test the variables. The findings were summarised in a matrix table and presented in Table 1.

Table 4. Summary of correlation matrix among the variables in the study.

Variable	1	2	3
1) Environmental Justice		−0.09	0.25**
2) Engagement in Pro-Environmental Behaviour		1	0.16**
3) General Wellbeing			1

Note: $^{**}p < 0.01$, $^{*}p < 0.05$ N = 324.

The Pearson Product Moment Correlation analysis results, as presented in Table 4, highlight the extent and direction of the relationships among the study variables: Environmental Justice, Engagement in Pro-Environmental Behaviour, and General Well-Being. The analysis reveals that Environmental Justice has a negative but non-significant correlation with Engagement in Pro-Environmental Behaviour (r = −0.09), suggesting that higher perceptions of environmental justice are not necessarily associated with increased engagement in pro-environmental behaviour. A significant positive correlation exists between Environmental Justice and General Well-being (r = 0.25**), suggesting that better perceptions of environmental justice are associated with higher levels of general well-being. Engagement in Pro-Environmental Behaviour is positively and significantly correlated with General Well-being (r = 0.16**), indicating that individuals who engage more in pro-environmental behaviour tend to have higher general well-being.

Table 5. Prevalence rate of general well-being.

Variable category	Frequency	Percentage
Low	46	14.2%
Mild	89	27.5%
Moderate	111	34.3%
High	78	24.1%

Table 5 presents the prevalence rates of general well-being among the study participants categorised into four levels: low, mild, moderate, and high. The majority of the respondents, 111 individuals (34.3%), reported experiencing a moderate level of general well-being. This is followed by 89 participants (27.5%) who reported mild well-being. A smaller proportion of the respondents, 78 individuals

(24.1%), indicated a high level of well-being, while the lowest category, comprising 46 individuals (14.2%), reported a low level of general well-being. These results suggest that most participants experience moderate well-being, with fewer individuals at the extremes of low or high well-being.

4. Test of Hypotheses

Hypothesis 1: There will be a significant impact of environmental justice perceptions on general wellbeing among residents of Ota.

Table 6. Linear regression analysis showing the prediction of environmental justice and general wellbeing.

Variables	β	T	R	R^2	df	F
Environmental Justice	0.25	4.66	0.25	0.06	322	21.70**

Note: ** $p < 0.01$, * $p < 0.05$, N = 324.

The linear regression analysis in Table 6 demonstrates that perceptions of environmental justice significantly predict general well-being among residents of Ota. The results reveal a positive relationship, with a standardised coefficient of β = 0.25 and a t-value of 4.66 ($p < 0.01$). The model explains 6% of the variance in general well-being ($R^2 = 0.06$) and is statistically significant (F (1, 322) = 21.70, $p < 0.01$). These findings validate Hypothesis 1, establishing that stronger perceptions of environmental justice are linked to enhanced well-being. Beyond statistical significance, the practical implications are noteworthy. Improved perceptions of fairness in ecological practices can foster community trust and mental health. Encouraging environmental engagement activities like recycling and conservation promotes a sense of purpose and connection, which are crucial for emotional well-being. These insights highlight the need for targeted initiatives to enhance well-being in urban areas such as Ota, including community education and policies that prioritise environmental equity.

Hypothesis 2: There will be a significant relationship between engagement in pro-environmental behaviours and general wellbeing.

Table 7. Linear regression analysis showing the prediction of engagement in pro environmental behaviour and general wellbeing.

Variables	β	T	R	R^2	df	F
Engagement in Pro Environmental Behvaviour	0.16	2.99	0.16	0.03	322	8.94**

Note: ** $p < 0.01$, * $p < 0.05$, N = 324.

The linear regression analysis in Table 7 aimed to examine the relationship between engagement in pro-environmental behaviours and general well-being. The

findings indicate that engagement in pro-environmental behaviours significantly predicts general well-being, as shown by the standardised coefficient (β = 0.16) and the t-value (t = 2.99, $p < 0.01$). The regression model accounted for 3% of the variance in general well-being ($R^2 = 0.03$), with a significant F-value (F (1, 322) = 8.94, $p < 0.01$). These results suggest that higher engagement in pro-environmental behaviours is associated with better general well-being. Therefore, the hypothesis is accepted, confirming that there is a significant positive relationship between engagement in pro-environmental behaviours and general well-being.

Hypothesis 3: There will be a significant influence on how environmental engagement moderates the relationship between perceptions of environmental justice and general wellbeing.

Table 8. Hierarchical regression showing the environmental engagement moderating the relationship between environmental justice and general wellbeing.

Variables	β	T	P	R	R^2	ΔR^2	df	F	*p*
Step 1				0.25	0.06	-	1, 322	21.70	<0.01
Environmental Justice	0.25	4.66	<0.01						
Step 2				0.31	0.09	0.31	2, 321	16.71	<0.01
Environmental Justice	0.19	3.35	<0.01						
Environmental Engagement*Environmental Justice	0.19	3.32	<0.01						

Note: N = 324.

As shown in Table 8, the hypothesis that environmental engagement moderates the relationship between perceptions of environmental justice and general well-being was tested using hierarchical regression analysis. The results showed that environmental engagement significantly moderated this relationship, with a standardised coefficient (β = 0.19) and a t-value (t = 3.32, $p < 0.01$). The inclusion of the interaction term (Environmental Engagement * Environmental Justice) increased the explained variance to 9% ($\Delta R^2 = 0.03$), with a significant F-value (F (2, 321) = 16.71, $p < 0.01$). Therefore, the hypothesis is accepted, confirming that environmental engagement significantly influences the relationship between perceptions of environmental justice and general well-being, enhancing the positive impact of environmental justice on general well-being.

Hypothesis 4: There will be a significant influence on how social support and gender moderate the relationships between environmental justice perceptions, environmental engagement, and general wellbeing.

The hypothesis that social support and gender moderate the relationships between environmental justice perceptions, environmental engagement, and general well-being was tested using hierarchical regression analysis. The results are presented in Table 9.

Table 9. Hierarchical regression showing the social support and gender moderating the relationship between environmental justice perceptions, environmental engagement, and general wellbeing.

Variables	β	T	*p*	R	R^2	ΔR^2	Df	F	*p*
Step1				0.31	0.098		2, 321	170.42	<0.01
Environmental Justice	0.26	40.83	<0.01						
Environmental Engagement	0.19	30.52	<0.01						
Step 2				0.19	0.11	0.01	2, 320	120.63	<0.01
Environmental Justice	0.26	40.83	<0.01						
Environmental Engagement	0.17	30.09	<0.01						
Social Support*Gender	0.09	10.69	>0.05						

Note: N = 324.

In the first step of the analysis, environmental justice and environmental engagement significantly predicted general well-being. Environmental justice had a standardised coefficient (β = 0.26) and a t-value (t = 4.83, $p < 0.01$), while environmental engagement had a standardised coefficient (β = 0.19) and a t-value (t = 3.52, $p < 0.01$). Together, these variables contributed a significant variance of 9.8% to general well-being ($R^2 = 0.098$), as indicated by the F-value (F (2, 321) = 17.42, $p < 0.01$).

In the second step, the moderating roles of social support and gender were assessed. The results indicated that social support and gender did not significantly moderate the relationship between environmental justice perceptions, environmental engagement, and general well-being, with a standardised coefficient (β = 0.09) and a t-value (t = 1.69, $p > 0.05$). However, the combined effect of the variables in the model was significant. Environmental justice, environmental engagement, and the moderating effect of gender and social support together contributed a variance of 11% to general well-being ($R^2 = 0.11$), as shown by the F-value (F (2, 320) = 12.63, $p < 0.01$). Therefore, the hypothesis that social support and gender moderate the relationships between environmental justice perceptions, environmental engagement, and general well-being is rejected. Although the combined effect of these variables is significant, the data does not support the specific moderating role of social support and gender.

Correlation analysis showed a moderate positive relationship between environmental engagement and well-being (r = 0.45, $p < 0.01$ r = 0.45, $p < 0.01$ r = 0.45, $p < 0.01$), suggesting that increased engagement in environmental activities is associated with higher well-being. However, the hierarchical regression analysis revealed that neither social support nor gender significantly moderated this relationship ($\Delta R^2 = 0.01$, $p > 0.05$; $\Delta R^2 = 0.01$, $p > 0.05$; $\Delta R^2 = 0.01$, $p > 0.05$).

5. Discussion

The aim of the study is to examine the moderating effects of social support and

gender on the relationships between environmental justice perceptions, environmental engagement, and general well-being among residents of Ota, Nigeria. Specifically, the study seeks to understand how these factors interact and influence general well-being in the context of environmental justice and environmental engagement. The prevalence analysis reveals that most participants (34.3%) experience moderate well-being, with smaller proportions reporting mild (27.5%), high (24.1%), or low (14.2%) levels. Additionally, the demographic analysis revealed variations in well-being based on factors such as income and education. For example, participants with tertiary education reported higher well-being, possibly due to better access to information and resources. Similarly, those in higher income brackets may experience fewer environmental stressors, indirectly enhancing their well-being. Future studies should explore these interactions further to uncover nuanced drivers of well-being in diverse populations.

The study's first goal was to investigate the significant impact of environmental justice perceptions on general well-being among residents of Ota. The result suggested that better perceptions of environmental justice are associated with higher levels of general well-being. This positive relationship implies that when individuals perceive their environment as fair and just, their overall sense of well-being improves. The positive association between environmental justice perceptions and well-being aligns with global findings but must be interpreted within the study's context. In Ota, where access to clean water and green spaces is limited, perceptions of fairness might provide a psychological buffer against environmental stressors. However, generalisations beyond this population should be made cautiously, as other socio-economic factors (for instance, income disparities) likely interact with these perceptions. In line with the result, several studies discovered that individuals who perceive higher levels of environmental fairness report better overall well-being (Iheanacho et al., 2018; Prilleltensky, 2024). Similarly, a study conducted in Nigeria by Okimiji et al. (2023) and Wang et al. (2023) conducted in Shanghai found that communities with strong environmental justice perceptions experienced lower stress levels and improved mental health outcomes. These studies highlight the importance of perceived environmental fairness in promoting general well-being. Conversely, some researchers argue that environmental justice perceptions and general well-being are more complex. For instance, Odong (2023) mentioned that while there is a correlation, other factors, such as economic stability and social cohesion, might play more significant roles in determining general well-being. Moreover, Lau et al. (2021) emphasised that environmental justice perceptions alone may not be sufficient to enhance well-being unless accompanied by tangible improvements in environmental conditions and community resources. The significant impact of environmental justice perceptions on general well-being can be explained by the sense of fairness and equity individuals experience when perceiving their environment as just. This perception likely reduces stress and enhances mental health, leading to higher overall well-being. Furthermore, living in an environment perceived as fair can increase

community trust and social support, which are crucial components of general well-being (Orji, 2024). Therefore, fostering positive perceptions of environmental justice can be a valuable strategy in enhancing the overall well-being of residents in Ota.

The second goal was to examine the relationship between engagement in pro-environmental behaviours and general well-being. These results suggested that higher engagement in pro-environmental behaviours is associated with better general well-being. Engaging in pro-environmental behaviours likely enhances an individuals' sense of purpose and fulfilment, contributing positively to their overall well-being. Participating in recycling, conservation, and sustainable living activities can foster a sense of accomplishment and community involvement, which are crucial elements of mental and emotional health. Chukwuorji et al. (2019) found that individuals actively participating in pro-environmental behaviours reported higher levels of life satisfaction and lower stress levels. Similarly, a study by Dipeolu et al. (2020) revealed that communities with strong environmental engagement had better mental health outcomes and greater social cohesion. These studies suggest that engaging in activities that benefit the environment can also enhance individual and community well-being. Conversely, some researchers argue that the relationship between pro-environmental behaviours and well-being is more intricate. For instance, Abdelwahed et al. (2022) noted that while there is a positive correlation, the benefits of pro-environmental behaviours on well-being might be influenced by other factors such as social support and economic stability. Additionally, Preston (2022) argued that the stress associated with maintaining sustainable practices could negate some of the positive effects on well-being if individuals perceive these behaviours as burdensome or overwhelming. According to Barszcz et al. (2023), the significant impact of engagement in pro-environmental behaviours on general well-being can be explained by the intrinsic and extrinsic rewards associated with such activities. Intrinsically, individuals may experience a sense of purpose and personal satisfaction from contributing to environmental sustainability. Extrinsically, these behaviours can foster social connections and community support, which are essential components of well-being. Therefore, promoting pro-environmental behaviours can be an effective strategy for enhancing the general well-being of residents in Ota.

The third goal was to determine how environmental engagement moderates the relationship between perceptions of environmental justice and general well-being. The results indicated that environmental engagement significantly moderates the relationship between environmental justice perceptions and general well-being. The study suggested that the positive effects of environmental justice perceptions on general well-being are amplified when individuals are also engaged in pro-environmental behaviours. Environmental engagement may enhance individuals' sense of empowerment and agency, thereby strengthening the beneficial impact of perceived environmental justice on their overall well-being. Research supports this finding, as studies have shown that environmental engagement can enhance

the positive effects of environmental justice on well-being. For instance, previous studies have found that individuals who are both environmentally engaged and perceive high levels of environmental justice report higher well-being (Gonzalez, 2015; Fayemi, 2016). Similarly, a study by Kruize et al. (2019) indicated that environmental engagement acts as a buffer against stress and improves mental health outcomes, particularly when individuals believe their environment is just and fair. On the other hand, literature suggested that the relationship may be more complex. Also, while environmental engagement can enhance well-being, its effects are contingent on other factors, such as personal values and community support (Ogiemwonyi et al., 2020; Hart, 2024). Moreover, Howell (2013) pointed out that environmental engagement might not always lead to positive outcomes if individuals do not perceive tangible improvements in their environment or if they feel their efforts are futile. The significant moderating effect of environmental engagement on the relationship between environmental justice perceptions and general well-being can be explained by the increased sense of purpose and community involvement that comes from active participation in environmental activities. Engaging in pro-environmental behaviours likely reinforces individuals' perceptions of justice in their environment, leading to greater satisfaction and well-being. This dual impact underscores the importance of fostering both environmental justice and engagement to enhance the overall well-being of residents in Ota.

The last goal of the study was to ascertain how social support and gender moderate the relationships between environmental justice perceptions, environmental engagement, and general well-being. The results indicate that social support and gender did not significantly moderate the relationship between environmental justice perceptions, environmental engagement, and general well-being. Several studies support the idea that social support and gender can play significant roles in moderating the relationship between environmental factors and well-being. For example, Enssle and Kabisch (2020) found that social support can buffer the negative effects of stress and improve overall well-being, suggesting that individuals with strong social networks might experience better outcomes in response to environmental justice and engagement. Similarly, Gentry et al. (2007) highlighted gender differences in coping strategies, with women typically benefitting more from social support in managing stress and enhancing well-being. Conversely, some literature contradicts these findings. A study by Macias and Williams (2016) argued that while social support is generally beneficial, its moderating effects might be less significant in contexts where other strong predictors, such as environmental justice and engagement, are already in play. Additionally, Machín-Rincón et al. (2020) suggested that the impact of gender on well-being might be mediated by other variables, such as socio-economic status and individual resilience, rather than directly moderating the relationship between environmental factors and well-being. The lack of significant moderating effects of social support and gender on the relationship between environmental justice perceptions, environmental engagement, and general well-being can be explained by the possibility

that the primary influences of environmental justice and engagement are robust enough to overshadow the moderating roles of these variables. It is also possible that the specific context of the study population in Ota, Nigeria, might have unique social dynamics that limit the moderating effects of social support and gender. These findings suggest that while social support and gender are important factors in general well-being, their moderating roles may be context-dependent and less pronounced in environments where strong predictors like environmental justice and engagement are already at play. The finding that social support and gender did not moderate the relationship between environmental justice perceptions and well-being is consistent with prior studies in diverse socio-cultural contexts. This result underscores the importance of direct environmental engagement rather than relying solely on external support structures to enhance well-being.

6. Conclusion

The aim of this study was to examine the moderating effects of social support and gender on the relationships between environmental justice perceptions, environmental engagement, and general well-being among residents of Ota, Nigeria. The findings suggest that better perceptions of environmental justice are associated with higher levels of general well-being, emphasising the importance of fostering environmental fairness in enhancing community well-being. Higher engagement in pro-environmental behaviours was also linked to improved well-being, indicating the positive impact of these behaviours on mental and emotional health. Although environmental engagement significantly moderated the relationship between environmental justice perceptions and well-being, social support and gender did not show significant moderating effects, suggesting that their roles may be context-dependent and less influential in the presence of strong environmental justice perceptions and engagement.

Limitations of the Study

The reliance on self-reported data may introduce response biases, such as social desirability effects, potentially affecting the accuracy of the findings. The cross-sectional design further limits the ability to establish causality between environmental justice perceptions, environmental engagement, and general well-being. Additionally, focusing exclusively on residents of Ota, Nigeria, may reduce the generalisability of the results to other regions or populations with varying environmental and social contexts. In order to address these limitations, future research should consider longitudinal designs to explore causal relationships and expand to diverse geographic regions to validate and broaden the applicability of these findings.

Recommendations

Based on the findings, it is recommended that policymakers and community leaders focus on improving perceptions of environmental justice and promoting pro-

environmental behaviours to enhance overall well-being. Additionally, strategies to strengthen social support networks and address gender-specific needs should be considered in broader contexts, despite their less pronounced roles in this study. Future research should explore these relationships in different contexts and with longitudinal designs to better understand the causal pathways and further validate the findings.

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Conflicts of Interest

The authors declare no competing interest.

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Appendix I. Socio-Demographic Characteristics of Respondents

Variables	Groups	Frequency	Percentage (%)
Gender	Male	181	55.90
	Female	143	44.10
Marital Status	Married	183	56.48
	Single	81	25.00
	Divorced	31	9.57
	Separated	17	5.25
	Widower	11	3.40
Religion	Christianity	178	54.94
	Islam	59	18.21
	Traditional	24	7.41
	Others	5	1.54
Level of Education	None	27	8.3
	Primary	24	7.4
	Secondary	116	35.80
	Tertiary	187	43.20
	Post graduate	17	5.2
Employment Status	Employed full time	181	55.86
	Self-employed	96	29.63
	Unemployed	74	22.84
	Student	9	2.78
	Retired	18	5.56
House_hold Income	Less than 20,000	67	20.7
	20,000 - 50,000	148	45.7
	50,001 - 100,000	56	17.3
	100,001 - 200,000	34	10.5
	200,001 - 500,000	15	4.6
	More than 500,000	4	1.2
Residential Area	Sango	136	41.98%
	Osi	43	13.27%
	Iganmode	60	18.52%
	Ayetoro	45	13.89%
	Agbara	40	12.35%
How long you have been residing in the town	Less than 1 year	97	29.9
	1 - 5 years	124	38.3
	6 - 10 years	65	20.1
	More than 10 years	38	11.7

Continued

Household size	1 - 2	91	28.1%
	3 - 4	114	35.19%
	5 - 6	96	29.6%
	7 and above	23	7.10%
Do you have access to recycling facilities in your area?	Yes	68	20.99
	No	256	79.01
Do you have access to clean drinking water in your area?	Yes	103	31.79
	No	221	68.21
Have you participated in Any environmental activities in the past year?	Yes	99	30.6
	No	225	69.4
Health Status	Excellent	130	40.1
	Good	89	27.5
	Fair	54	16.7
	Poor	51	15.7

Age (in years), Mean: 43; SD = 16.79, Ranges between 18 to 64 years.

Appendix II. Ethical Certificates

Zertifikat
Certificat
Certificado
Certificate

Promouvoir les plus hauts standards éthiques dans la protection des participants à la recherche biomédicale
Promoting the highest ethical standards in the protection of biomedical research participants

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