Social Norms and Pro-environmental Behaviour in Sub-Saharan African

*JohnBosco Chika Chukwuorji**
*Kehinde Aderemi Ojewumi***
*Charles Adedayo Ogunbode****

Abstract

Social norms are strongly associated with pro-environmental behaviour, and social norm-based intervention is a popular strategy for promoting environmentally friendly behaviour. Recent body of knowledge has distinguished two types of social norms: injunctive norms (what most people should do or ought to do) and descriptive norms (what most group members do). However, Africa researchers in sub-Saharan Africa have scarcely investigated the dynamic relations of injunctive norms and descriptive norms with pro-environmental behaviour. We examined the contributions of descriptive norms and injunctive norms to pro-environmental behaviour in the sub-Saharan African context. Data was obtained from 581 students at a public university in Nigeria. They provided socio-demographic information and completed measures of social norms regarding negative emotional responses to climate change and sustainable consumption behaviours. Results showed descriptive norms were not a significant predictor of pro-environmental behaviour, but injunctive norm increase in injunctive norms was associated with reductions in pro-environmental behaviour. We also found a suppression effect (change of the original relationship), such that by itself, descriptive norms did not substantially predict pro-environmental behaviour but the inclusion of injunctive norms in the analytic model increased its positive association with pro-environmental behaviour. Similar suppressor effects were also found for the inverse association between injunctive norms and pro-environmental behaviour. This idea of mutual suppression suggests that social policies

* PhD, Senior Lecturer & Clinical Psychologist, Department of Psychology, University of Nigeria (Nsukka, Nigeria); Postdoctoral Research Fellow, College of Human Medicine, Michigan State University (Flint, USA). johnbosco.chukwuorji@unn.edu.ng.

** PhD, Senior Lecturer, Department of Psychology, Obafemi Awolowo University (Ile-Ife, Nigeria).

*** PhD, Assistant Professor, School of Psychology, University of Nottingham, UK

that promote pro-environmental behaviour due to shifts in descriptive norms will foster development in injunctive norms. Acknowledging this mutuality is informative for normative theory and can facilitate the efficient application of social norms as a tool for environmental behaviour policy.

Keywords: Africa, climate change, environmental protection, normative theory, psychology, sustainability

I. Introduction

Humans have narrow-mindedly shaped the planet to suit their perceived needs and comfort without taking into consideration other species within the planet. This can be seen in the over-exploitation of the numerous natural resources that the planet is endowed with thereby impacting the effective performance of the ecosphere that supports environmental tasks being executed at several dimensions, the quality of the environment and healthiness in general.[1] The consequences are that the waste from this over exploitation litter pools, lakes, rivers, and landfills all over the world. Even the vast oceans are not spared from these dreadful acts. Unfortunately, there seems to be no end in sight as countries are paying lip service to long-term solutions and regrettably, environmental pollution which is one consequence of these actions is not a local problem restricted to a particular country but, its effects are felt all over the world. Africa is at the receiving end of the damage due to numerous factors: poverty, increased population and urbanisation, and lack of scientific development.[2]

Water pollution, air pollution, illegal mining, gas flaring, bad farming methods, poor waste management, desert encroachment and forest degradation because of fires and unregulated cutting that jeopardise biodiversity and result in climate change are all instances of human-caused environmental problems being experienced in most parts of Africa.[3] To the extent that it is

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1 Alzubaidi H, 'Factors affecting consumers' pro-environmental behaviours in Saudi Arabia' in Dwivedi Y, Rana N, Slade E, Shareef M, Clement M, Simintiras A, Lal B (eds), *Emerging markets from a multidisciplinary perspective*, 2018, 303–314. Chung-Hall J, Craig L, Gravely S, Sansone N, Fong G, 'Impact of the WHO FCTC over the first decade: A global evidence reviews prepared for the Impact Assessment Expert Group' 28 *Tobacco Control*, 119–128. Miner J, Rampedi T, Ifegbesan P, Machete F, 'Survey on household awareness and willingness to participate in e-waste management in Jos, Plateau State, Nigeria' 12 *Sustainability*, 2020, 1047.

2 Mberu B, Mutua M., Kabaria C, Amugsi D, Muindi K, Levels of household exposure to solid waste dumpsites and associated loss to health in urban Kenya and Senegal, *6*(1), *Cities Health,* 2020, 168–179.

3 Hansmann R, Laurenti R, Mehdi T, Binder R, 'Determinants of pro-environmental behaviour: A comparison of university students and staff from diverse faculties at a Swiss University' 268 *Journal of Cleaner Production,* 2020, 121864.

accepted that environmental issues are linked to psychology,[4] it connotes that environmental problems have a direct relationship with human behaviour.[5],[6] If human behaviour becomes more pro-environmental, then, the likelihood that a more sustainable environment will be promoted is higher.[7] Due to enormous evidence that environmentally unfriendly human behaviour is the main source of environmentally harmful conditions afflicting the world, demanding healthier environmental behaviour as a way of reducing such destruction and attaining sustainable development is required.[8]

Pro-environmental behaviour is the engagement in actions that aid the environment, and the obliteration of pro-environmental behaviour is discerned from the personal choices people make as individuals or jointly with their group members to safeguard the environment and decrease the usage and damage of available natural deposits.[9] At the individual level, pro-environmental behaviour is noticeable from various environmental actions people take which comprises of waste recovery and recycling within households, cycling or trekking rather than making use of cars, keeping away from air transportation, and not making use of poly bags, and preservation of the numerous natural deposits.[10]

With the growth of public interest in understanding environmental behaviours, questions about factors that prompt acceptance of ecologically friendly behaviours have engaged the attention of researchers,[11] and this has translated into concern in understanding ways by which pro-environmental behaviour can

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4 Kühn T, Bobeth S, 'Linking environmental psychology and critical social psychology: Theoretical considerations toward a comprehensive research agenda' 13 *Frontiers in Psycholo*gy, 2022.

5 Abun A, Aguot F, 'Measuring environmental attitude and environmental behaviour of senior high school students at Divine Word Colleges in Region I, Philippines' 1(2) International *Journal of Educational Research*, 2017, 33-69.

6 Thondhlana, G, Hlatshwayo N, 'Pro-environmental behaviour in student residences at Rhodes University, South Africa' 10 *Sustainability*, 2018, 2746.

7 Fernández D, López-Cabanas M, 'Ecología y psicología: Reflexiones desde Greenpeace [Ecology and psychology: Reflections from Greenpeace]' 380 *Guía de Psicólogo,* 2017, 3-6.

8 Akintunde A, 'Theories and concepts for human behaviour in environmental preservation' 1(2) *Journal of Environmental Science and Public Health*, 2017, 120-133.

9 Merino-Saum A, Baldi G, Gunderson I, Oberle B, 'Articulating natural resources and sustainable development goals through green economy indicators: A systematic analysis' 139 *Resources Conservation and Recycling*, 2018, 90–103.

10 Patel J, Modi A, Paul J, 'Pro-environmental behaviour and socio-demographic factors in an emerging market' 6 *Asian Journal of Business Ethics*, 2017, 189–214.

11 Casalo V, Escario J, 'Heterogeneity in the association between environmental attitudes and pro-environmental behaviour: A multilevel regression approach' 175 *Journal of Cleaner Production,* 2018, 155-163.

be triggered.[12] Subsequently, numerous studies have been conducted to elucidate environmental behaviours among different groups like students,[13] workers,[14] farmers[15] and consumers.[16] In fostering pro-environmental behaviour, studies have examined the associations between different factors that are central to pro-environmental behaviour and the net effect of this is the build-up of evidence to show the constructs, outcomes, and causes that lead to such behaviour.[17] In proper perspective, the various studies provide significant understandings of pro-environmental behaviour, however, they remain mainly narrow in their outlook, which then highlights the need for a more comprehensive investigation of pro-environmental behaviour research and its implication on strategies.

Higher educational institutions, being a principal part of a nation's development, are expected to play a critical role in the environmental sustainability of each country because they provide environmental education, skilled labour, and well-informed experts to tackle serious environmental issues that confront different countries.[18] As such, universities are expected to become role models in terms of environmental protection and practices for sustainable development.[19] University students are therefore expected to play an important role since they have acquired the technical knowledge critical for advancing the right pathways to foster environmentally friendly behaviour.[20] The systemat-

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12 Gruber V, Schlegelmilch B, 'How techniques of neutralisation legitimise norm- and attitude-inconsistent consumer behaviour', 121 *Journal of Business Ethics*, 2014, 29–45.

13 Chen F, Chen H, Guo D, Long R, 'Analysis of undesired environmental behaviour among Chinese undergraduates' 162 *Journal of Cleaner Production,* 2017, 1239-1251.

14 Tian Q, Robertson L, 'How and when does perceived CSR affect employees' engagement in voluntary pro-environmental behaviour?' 155, *Journal of Business Ethics,* 2019, 399.

15 Wang Y, Liang J, Ma X, Li X, Yang G, Ren G, Feng Y, 'Analysis of the environmental behaviour of farmers for non-point source pollution control and management: an integration of the theory of planned behaviour and the protection motivation theory' *1*(237) *Journal of Environmental Management*, 2019, 15-23.

16 Akbari M, Fozouni Z, Pino G, & Maleksaeidi, H, 'An extended model of Theory of Planned Behavior to investigate highly educated Iranian consumers' intentions towards consuming genetically modified foods' 227 *Journal of Cleaner Production,* 2019, 784-793.

17 Wang, Q., Kou, Z., Sun, X., Wang, S., Wang, X., Jing, H., & Lin P 'Predictive analysis of the pro-environmental behaviour of college students using a decision-tree model' 19(15) *International Journal of Environmental Research and Public Health,* 2022, 9407.

18 Juma-Michilena J, Ruiz-Molina E, Gil-Saura I, & Belda-Miquel S, 'An analysis of the factors influencing pro-environmental behavioural intentions on climate change in the university community' 36(3) *Economic Research- Ekonomska Istraživanja*, 2023, 2264373.

19 Saraçli S, Boca D, 'Factors influencing students' environmental behaviour for sustainable development' 20(1) *Environmental Engineering and Management Journal,* 2021, 1–12.

20 Vicente-Molina A, Fernάndez-Sainz A, Izagirre-Olaizola J, 'Does gender make a difference in pro-environmental behaviour? The case of the Basque Country University students' 178 *Journal of Cleaner Production,* 2018, 89-98.

ic knowledge of what inspires students to act pro-environmentally is a vital domain of interest that has feasible application if the world is interested in moving in the direction of a sustainable future.[21]

A substantial number of current initiatives on sustainability are policies that emanate from the universities themselves, often involving "bottom-up" initiatives from faculty and students, informing decisions by policymakers.[22] According to Nuthall, at the recent UN Climate Change Conference (UNFCCC COP28), the Education Above All (EAA) Foundation, a Qatar-based organisation that promotes equal access to education and uses teaching and research to promote sustainability and positive environmental behaviour change, reported that they collaborated with the British Council to launch a project in Pakistan, whereby universities host sustainability clubs, based on a curriculum integrating a UN Development Programme climate change toolkit through which students have been able to get involved in underserved communities and practical tasks such as conservation and tree planting. In the end, this concept of partnership and collaboration empowers all stakeholders, not just the students.

Students, staff, and faculty at Strathmore University Nairobi– one of Africa's greenest universities, have also played important roles in the University's ground-breaking sustainability initiatives such as recycling, 'green' buildings, and energy conservation. The University has an environmental club which encourages staff and students to adopt sustainable behaviours. In addition to planting 1,000 trees around the campus, the club ran the 'Bring Your Own Bottle' social media campaign aimed at discouraging the use of plastics and organised a 'single use' sustainable awareness week to enlighten staff and students of the harmful effects of plastics use on human and environmental health.[23] Currently, 1,193 universities are part of the Race to Zero campaign - a global movement bringing non-state actors such as regions, cities, companies, and institutions together to take action to halve global emissions by 2030.[24] The African component is the African

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21 Yu, T-Y., Yu, T-K., Chao C-M 'Understanding Taiwanese undergraduate students' pro-environmental behavioural intention towards green products in the fight against climate change' 161 *Journal of Cleaner Production,* 2017, 390-402.

22 Nuthall, K. (2023, December 9). *COP28 session pushes value of HE sustainability targets*' accessed on March 2, 2024 <https://www.universityworldnews.com/post.php?story=20231209033934921&utm_source=newsletter&utm_medium=email&utm_campaign=AFNL0433>

23 Ruwoko, E '*Strathmore University – One of the 'greenest' in Africa*' accessed on March 2, 2024 from https://www.universityworldnews.com/post.php?story=20231129102124392&utm_source=newsletter&utm_medium=email&utm_campaign=AFNL0433.

24 Ruwoko E '*More universities set net zero emissions targets – Report*' accessed on March 2, 2024 <https://www.universityworldnews.com/post.php?story=20231209062518536&utm_source=newsletter&utm_medium=email&utm_campaign=AFNL0433> accessed on March 2, 2024.

universities' race to net zero, which brings experts from various professional areas together to take action for sustainable energy initiatives. The present study aims to examine the role of social norms in pro-environmental behaviour among Nigerian students.

II. Social norms and pro-environmental behaviour

Social norm as a social factor is derived from the various cultural standards existing in a country and refer to the cultural rules that guide behaviour in a society.[25] They are rules and standards understood by group members and which guide and/or restrain behaviours without necessarily applying force of laws.[26] Generally, social norms are those customs or actions that are by and large generally acceptable or those things that are frowned upon in a particular society. Thøgersen suggested that norms are ingrained and internalised deep into a person's standards,[27] but they are different from personal norms which are rules or standards set or approved for one's own behaviour.[28] However, social norms are regarded as precursors of personal norms that are imbibed through proper internalisation.[29] Internalisation denotes a functional technique by which dispositions, views, or behavioural guidelines are acquired, takes in those standards, and renders them into private values or targets.[30]

Fundamentally, social norm as an intervention on pro-environmental behaviour is based on the human drive to pursue social consent and achieve socially beneficial information from other people's behaviours in a particular location.[31] Some of the social knowledge that is sought is related to what is needed to be sure that the public environment is spotlessly clean, keys suggesting that others are not littering the environment, or turning off lights and other electronic devices in public domains, signalling that people are generally key to

[25] Ross L, *Perspectives on social order*, New York: McGraw-Hill, 1973.

[26] Cialdini B, Trost R, 'Social influence: Social norms, conformity and compliance' in D.T. Gilbert, S.T. Fiske and G. Lindzey (Eds.), *The Handbook of social psychology* (4th ed.). 1-2, McGraw-Hill, 1998.

[27] Thøgersen, J 'Norms for environmentally responsible behaviour: An extended taxonomy' 26 *Journal of Environmental Psychology,* 2006, 247–261.

[28] Klöckner A. 'A comprehensive model of the psychology of environmental behaviour—A meta-analysis' 23 *Global Environmental Chang*e, 2013, 1028–1038.

[29] Lauper E, Moser S, Fischer M, Matthies E, 'Explaining car drivers' intention to prevent road-traffic noise: An application of the norm activation model' 48 *Environment and Behaviour,* 2016, 826–853.

[30] Deci L, Ryan M, 'Toward an organismic integration theory' in Deci L (ed) *Intrinsic motivation and self-determination in human behaviour*, Springer, Boston, 1985, 113–148.

[31] Cialdini B, Goldstein J, 'Social influence: Compliance and conformity' 55 *Annual Review of Psychology,* 2004, 591–621.

the preservation of energy.[32] Psychologically, the processes involved in social norm-based information target two essential goals: to seek social guidance[33] and know how to avoid social exclusion[34], meaning people will be inclined to adhere to social norms to secure social approval and/or avoid social sanctions.[35] Social norms are influential features that are known to elucidate and forecast a host of pro-environmental behaviours, such as recycling,[36],[37] water conservation,[38] green purchasing intention,[39] eco-friendly fabric buying behaviour,[40] energy conservation,[41] and pro-environmental behaviour in tourism.[42]

Although there is a burgeoning body of literature in psychology, economics and law supporting the association between social norms and pro-environmental behaviour,[43],[44],[45] some evidence show that different social norm-based interventions have different influences on the changes noticed in pro-environmental

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33 Fischer P, 'The bystander-effect: a meta-analytic review on bystander intervention in dangerous and non-dangerous emergencies' 137(4) *Psychological Bulletin,* 2011, 517–537.

34 Eisenberger I, Lieberman D, Williams D, 'Does rejection hurt? An fMRI study of social exclusion' 302(5643) *Science,* 2003, 290–292.

35 Keizer K, Schultz W, 'Social norms and pro-environmental behaviour' in Steg, L, Judith M, de Groot I (eds.), *Environmental psychology: An introduction*, John Wiley & Sons, 2018, 179–188.

36 Huber J, Viscusi K, Bell J, 'Dynamic relationships between social norms and pro-environmental behaviour: Evidence from household recycling' 4 *Vanderbilt Law Research Paper,* 2017, 17–61.

37 Muniandy G, Anuar M 'Determinants of academicians recycling behaviour' 10(7) *Management Science Letters*, *10*(7), 2020, 1597–1606.

38 Jaeger M, Schultz W, 'Coupling social norms and commitments: Testing the under detected nature of social influence' 51 *Journal of Environmental Psychology,* 2017, 199–208.

39 Nguyen N, Lobo L, Greenland S, (2016). 'Pro-environmental purchase behaviour: The role of consumers' biospheric values' 33 *Journal of Retailing and Consumer Services,* 2016, 98-108.

40 Kim H, Seock K. 'The roles of values and social norms on personal norms and pro-environmentally friendly apparel product purchasing behaviour: The mediating role of personal norms'51 *Journal of Retailing and Consumer Services,* 2019, 83–90.

41 Schultz W, Nolan, M, Cialdini B, Goldstein J, Griskevicius V, The constructive, destructive, and reconstructive power of social norms: Reprise' *13 Perspectives in Psychological Science*, 2018, 249–254.

42 Han H 'Travellers' pro-environmental behaviour in a green lodging context: Converging value-belief-norm theory and the theory of planned behaviour' 47 *Tourism Management,* 2015, 164-177.

43 Goldstein J, Cialdini B, Griskevicius V, 'A room with a viewpoint: Using social norms to motivate environmental conservation in hotels' 35 *Journal of Consumer Research*, 2008, 472–482.

44 Perry W, Richardson J, Harré N, Hodges D, Lyver B, Maseyk F, Taylor R, Todd H, Tylianakis M, Yletyinen, M, Brower A, 'Evaluating the role of social norms in fostering pro-environmental behaviours' 9 *Frontiers in Environmental Science,* 2021, 620125.

45 Juma-Michilena J, Ruiz-Molina E, Gil-Saura I, & Belda-Miquel S, 'An analysis of the factors influencing pro-environmental behavioural intentions on climate change in the university community' 36(3) *Economic Research- Ekonomska Istraživanja*, 2023.

behaviour.[46] Perhaps, the different SN-based mediations are grounded on diverse social norm constructs. It should be noted that all norms are not the same and may not have the same impacts. There are two categories of social norms: injunctive (what people should do or ought to do) and descriptive norms (what people actually do).[47] Injunctive norms entail the behaviour commonly accepted or objected to, while descriptive norms are the behaviour shown by most group members.[48] For example, descriptive norms are the perception of others' level of and frequency of adopting single-use plastics use (the norms of "is") and are mostly based on observations of how people make use of such products. On the contrary, injunctive norms, are the perceived approval of single-use plastic products (the norms of "ought") and represent perceived behavioural rules of the social group.

According to Cialdini et al.'s focus theory of normative conduct, both descriptive norms and injunctive norms function using different motivational methods. Descriptive norms predominantly work as a mental inquisitiveness which isoften used as a signal for adjustive or functional behaviours, for example, by observation of others on how they behave while in public transportation.[49] On the contrary, the injunctive norms operate through expectations of social sanctions when other people disapprove of one's behaviour.[50] Descriptive norms favouring pro-environmental behaviour may be viewed as extrinsically motivated, thereby reducing the norm's normative influence, as conformity can be negatively affected by perceptions that others are conforming mindlessly.[51] Despite the distinctive nature of these two forms of norms, their dynamic effects on pro-environmental behaviour are less well understood.[52] Some studies in Western cultures have suggested that descriptive norms are more strongly

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46 Bergquist M, Nilsson A, Schultz P, 'A meta-analysis of field-experiments using social norms to promote pro-environmental behaviours' 59 *Global Environmental Change*, 2019.

47 Thøgersen J, 'Norms for environmentally responsible behaviour: An extended taxonomy' 26 *Journal of Environmental Psychology,* 2006, 247–261.

48 Cialdini B, Kallgren A, Reno R, 'A focus theory of normative conduct: A theoretical refinement and reevaluation of the role of norms in human behaviour' 24 *Advances in Experimental Social Psychology,* 1991, 201-234.

49 Kormos C, Gifford R, Brown E, 'The influence of descriptive social norm information on sustainable transportation behaviour: a field experiment' 47(5), *Environment & Behaviour,* 2015, 479–501.

50 Cialdini B, Goldstein J, 'Social influence: Compliance and conformity' 55 *Annual Review of Psychology,* 2004, 591–621.

51 Ejelöv, E, Bergquist M, Hansla A, Nilsson A, 'Why are they eco-friendly? Attributing eco-friendly descriptive norms to intrinsic motivation increases pro-environmental purchase intention' 17(10) *PloS One*, 2022.

52 Huber J, Viscusi K, Bell J, 'Dynamic relationship between social norms and pro-environmental behaviour' 4(1) *Behavioural Public Policy*, 2018, 1-25.

impactful on pro-environmental behaviour than injunctive norms[53],[54]. Meta-analysis and systematic reviews have shown that social norms appear to be less influential in collectivistic countries than in individualistic countries[55],[56], which underscores the need for more studies in collectivist cultures.

Both the prevailing social norm and people's sensitivity to social norms also vary among cultures,[57].[58] Evidence also abounds that social norm-based mediations have a more powerful influence in advancing pro-environmental behaviour in society that promotes independence compared to cultures where things are cooperatively done.[59] Under these circumstances, the ambiguous proof suggests that social norms exert influence on intentions less in cultures where things are done collectively when compared with individualistic cultures.[60] At the same time, the country-specific norms do impact the norms of friends, family, and neighbours, which sequentially impact their pro-environmental behaviour.[61] The association between both descriptive norms and injunctive norms with pro-environmental behaviour has not been given the required attention it deserves especially among students in the sub-Saharan African setting. Despite the substantial research examining pro-environmental behaviour from various approaches and different populations, research on university students'

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53 Melnyk V, Herpen E, Jak S, Van T, 'The mechanisms of social norms' influence on consumer decision making: A meta-analysis' 227(1) *Zeitschrift* für *Psychologie*, 2019, 4–17.

54 Morren M, Grinstein A, 'The cross-cultural challenges of integrating personal norms into the theory of planned behaviour: a meta-analytic structural equation modelling (MASEM) approach' 75 *Journal of Environmental Psychology,* 2021, 101593.

55 Bergquist M, Nilsson A, Schultz P, 'A meta-analysis of field-experiments using social norms to promote pro-environmental behaviours' 59 *Global Environmental Change*, 2019.

56 Bergquist S, Schlegelmilch B, 'The impact of social norms on pro-environmental behaviour: A systematic literature review of the role of culture and self-construal' 13 *Sustainability*, 2021, 5156.

57 Constantino M, Sparkman G, Kraft-Todd T, Bicchieri C, Centola D, Shell-Duncan B, Vogt S, Weber U, 'Scaling up change: A critical review and practical guide to harnessing social norms for climate action' 23(2) *Psychological Science in the Public Interest,* 2022, 50–97.

58 Eriksson K, Strimling P, Gelfand M, Wu J, Abernathy J, Akotia S, Aldashev A, Andersson, A., Andrighetto, G., Anum, A., Arikan, G., Aycan, Z, Bagherian F, Barrera D, Basnight-Brown D, Batkeyev B, Belaus A, Berezina, E., Björnstjerna M, Blumen S, Van Lange M, ' Perceptions of the appropriate response to norm violation in 57 societies' 12(1) *Nature Communications*, 2021, 1481.

59 Bergquist M, Nilsson A, Schultz P, 'A meta-analysis of field-experiments using social norms to promote pro-environmental behaviours' 59 *Global Environmental Change*, 2019.

60 Morren M, Grinstein A, 'The cross-cultural challenges of integrating personal norms into the theory of planned behaviour: a meta-analytic structural equation modelling (MASEM) approach' 75 *Journal of Environmental Psychology,* 2021, 101593.

61 Culiberg, B, Elgaaied-Gambier L, 'Going green to fit in—Understanding the impact of social norms on pro-environmental behaviour, a cross-cultural approach' 40(2) *International Journal of Consumer Studies*, 179–185, 2016.

pro-environmental behaviour in general is still at its infancy level.[62] This is the gap thatthe current study hopes to fill. Based on the foregoing literature, we hypothesised that both descriptive norms and injunctive norms will be associated with increased pro-environmental behaviour among Nigerian students.

III. Method

i. Participants and procedure

Participants in this study were 580 students (294 women and 286 males) drawn from two universities located in southern Nigeria – Ebonyi State University Abakaliki in Ebonyi state and Obafemi Awolowo University, Ile-Ife in Osun state, Nigeria. Respondents were recruited using convenient sampling techniques. They were approached by trained research assistants (RAs) during normal class time in the last quarter of 2019. The RAs assured all the participants that their responses would be treated with utmost confidence and no respondent would be identified in person, thereby assuring them of the confidentiality of their responses. The questionnaire was administered in paper-and-pencil format. Only students who willingly consented to participate in the study received the survey and no reward was offered to participants. The DeMontfort University Health and Life Sciences Faculty Research Ethics Committee (FREC; ref.: 3434) where one of the authors was a faculty member at the time granted the ethical clearance for the study.

ii. Measures

We measured descriptive norms and injunctive norms about negative emotional responsesto climate change with eight items.[63] There were four items for descriptive norms (Most people close to me express feelings of distress when talking about climate change; Most people close to me are worried about the future effects of climate change; Most people close to me think that one should be concerned about climate change; Most people close to me expect others to

[62] Correia, E., Sousa, S., Viseu, C., & Leite, J. (2021). Using the theory of planned behaviour to understand the students' pro-environmental behaviour: A case-study in a Portuguese HEI. *International Journal of Sustainability in Higher Education*, 23(5), 1070-1089.

[63] Ogunbode C, Doran R, Hanss D, Ojala M, Salmela-Aro K., van den Broek K, Bhullar N, Aquino D, Marot T, Schermer A, Wlodarczyk A, Lu S, Jiang F, Maran A, Yadav R, Ardi R, Chegeni, R., Ghanbarian, E., Zand, S., Najafi, R., Park, J., Tsubakita, T, Tan, S, Chukwuorji C,& Karasu, M. 'Climate anxiety, wellbeing and pro-environmental action: Correlates of negative emotional responses to climate change in 32 countries' *Journal of Environmental Psychology*, 2022, 101887.

be worried about a future affected by climate change). Injunctive norms also had four items (Most people my age sound worried if talking about the future impacts of climate change; Most people my age seem anxious when expressing their views on climate change; Most people my age expect others to be concerned about climate change; Most people my age think one should be worried about the consequences of climate change). Responses are made using a 5-point Likert scale as follows: strongly disagree (1), disagree (2), neither disagree nor agree (3), agree (4), and strongly agree (5). Scores on the items of each dimension were added to obtain a total indicator of the form particular of social norms. For the current research, the reliability coefficient of the descriptive norms and injunctive norms measure were Cronbach's alpha (α) of 0.73 and 0.75. The values surpassed the conventional reliability threshold ($\alpha = 0.70$).[64]

We assessed pro-environmental behaviour with an 8-item measure of sustainable consumption behaviours.[65] The items of the questionnaire were as follows: try to influence family and friends to act pro-environmentally; cycle or walk instead of driving; restrain oneself from buying unneeded new clothes; save energy in the household; choose not to fly; take public transportation instead of the car; avoid food waste; and make climate-friendly food choices. Participants were asked to indicate how often they engage in each behaviour on a 5-point scale of 1 (almost never), 2 (seldom), 3 (sometimes), 4 (often), and 5 (almost always). Acceptable reliability value ($\alpha = 0.72$) in the Nigerian sample was reported for the pro-environmental behaviour measure in our previous study.[66]

iii. Data analyses

We conducted a survey to obtain our data using a cross-sectional design. Frequencies and percentages were used for the item level analysis of responses to pro-environmental behaviour questions. We used Pearson's correlations to examine the relationships of age, gender, social norms, and pro-environmental

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64 Nunnally, J.C. (1970). *Introduction to psychological measurement*. New York: McGraw-Hill.

65 Ogunbode C, Doran R, Hanss D, Ojala M, Salmela-Aro K., van den Broek K, Bhullar N, Aquino D, Marot T, Schermer A, Wlodarczyk A, Lu S, Jiang F, Maran A, Yadav R, Ardi R, Chegeni, R., Ghanbarian, E., Zand, S., Najafi, R., Park, J., Tsubakita, T, Tan, S, Chukwuorji C,& Karasu, M. 'Climate anxiety, wellbeing and pro-environmental action: Correlates of negative emotional responses to climate change in 32 countries' *Journal of Environmental Psychology*, 2022, 101887.

66 Ogunbode C, Doran R, Hanss D, Ojala M, Salmela-Aro K., van den Broek K, Bhullar N, Aquino D, Marot T, Schermer A, Wlodarczyk A, Lu S, Jiang F, Maran A, Yadav R, Ardi R, Chegeni, R., Ghanbarian, E., Zand, S., Najafi, R., Park, J., Tsubakita, T, Tan, S, Chukwuorji C,& Karasu, M. 'Climate anxiety, wellbeing and pro-environmental action: Correlates of negative emotional responses to climate change in 32 countries' *Journal of Environmental Psychology*, 2022, 101887.

behaviour. For the test of the hypothesis, we conducted a hierarchical multiple regression using the stepwise method. With multiple regression analysis, we were able to simultaneously add the two forms of social norms in separate steps as predictors (independent variables) in the regression model while pro-environmental behaviour was the outcome (dependent variable). Thus, we were able to do a better job explaining the variation in the pro-environmental behaviour on account of each form of social norms. This ability to make more accurate predictions is a major advantage of hierarchical multiple regression.[67] The significance of all the results was tested at the probability level of .05.

iv. Results

The age of the participants ranged from 18-58 years, with an average age of 25.21 (*SD* = 7.93) years.

Table 1: Participants' responses to items for assessing descriptive norms.

	Almost never	Seldom	Some-times	Often	Almost always
Cycle or walk instead of driving or being driven in a car	18.1%	16.5%	45.6%	14.3%	5.5%
Restrain myself from buying new clothes that I don't need	14.3%	12.7%	32.5%	26.0%	14.5%
Choose not to fly	42.2%	14.8%	18.1%	10.3%	14.7%
Try to influence my family and friends to act in a climate-friendly way	15.5%	18.2%	35.6%	16.2%	14.5%
Save energy in the household	7.9%	12.7%	37.7%	23.6%	18.1%
Take public transportation instead of the car	15.1%	13.1%	30.5%	21.3%	20.0%
Avoid food waste	9.2%	7.2%	22.4%	27.2%	33.9%
Make climate-friendly food choices	14.1%	15.0%	33.7%	21.9%	15.3%

In Table 1, the majority of the participants cycle or walk instead of driving or being driven in a car sometimes, often, or almost always. Similarly, a very substantial number restrain themselves from buying new clothes that they don't need. However, not up to half of the respondents would choose not to fly. The majority of them reported that they try to influence their family and friends to

[67] Mendenhall W, Beaver J, Beaver M, '*Introduction to probability and statistics'* (13ed) Belmont, Brooks/ Cole, 2009.

act in a climate-friendly way sometimes, often, or almost always. In the same vein, they would also save energy in the household and take public transport instead of the car, make climate-friendly food choices, and avoid food waste.

Results of our Pearson's correlations also showed that older students had higher scores in descriptive norms ($r = 0.09$, $p<.05$), but the relationship of age with injunctive norms ($r = 0.05$) and pro-environmental behaviour ($r = -.01$) were not significant. The relationship of gender with descriptive norms ($r = 0.04$) injunctive norms ($r = -.07$) and pro-environmental behaviour ($r = -.02$) were not significant. Those with higher scores in descriptive norms reported higher injunctive norms ($r = .67$, $p<.001$).

Table 2: Hierarchical multiple regression predicting pro-environmental behaviour by descriptive norms and injunctive norms.

Predictors	**Step 1**				**Step 2**	
	B	β	t	B	β	t
Descriptive norms	0.06	0.04	0.94	0.18	0.12	2.02*
Injunctive norms				-0.19	-0.11	-1.98*
R^2	0.01			0.02		
ΔR^2	0.01			0.01		
F	0.89(1, 579)			2.40(2, 578)		
ΔF	0.89(1, 579)			3.91(1, 132)**		

*$p < .05$; **$p < .05$; $\Delta R2$ = Change in $R2$; ΔF = Change in F

The results of the hierarchical multiple regression for testing the hypotheses are shown in Table 2. Descriptive norms were added in the first step of the regression model. It was not a significant predictor of pro-environmental behaviour, β = 0.04, and the model was not significant, $F(1, 579) = 0.70$. In step 2 of the regression model, an injunctive norm was added, and it was a significant negative predictor of pro-environmental behaviour, β = -0.11, $p<.05$. Thus, an increase in injunctive norms was associated with reductions in pro-environmental behaviour. The model was significant, F Change $(1, 578) = 4.09$, $p<.05$. However, we obtained a suppression effect in the regression model. Suppressors are variables that when added to a regression model, change the original relationship between an independent variable and the outcome by making it stronger, weaker, or no longer significant—or even reversing the direction of the relationship (i.e., changing a positive relationship into a negative one) (Guinn, 2019). Essentially, suppression effects are seen in cases where the inclusion of a second predictor

increases the predictive power of one or both predictors (Watson et al., 2013). In our case of this suppression effect, the relationship between descriptive norms and pro-environmental behaviour was strengthened (enhanced) by the inclusion of injunctive norms in the same model. Thus, in the second step of the regression, students with higher descriptive norms reported increased pro-environmental behaviour.

We repeated another regression model in which we added injunctive norms at first and then descriptive norms in the second step of the regression. We obtained a similar suppression effect for the inverse association between injunctive norms and pro-environmental behaviour. Specifically, our finding represents what Watson et al. (2013) called cooperative or reciprocal suppression involving cases in which injunctive and descriptive norms (the predictors or independent variables) correlate oppositely with pro-environmental behaviour (the outcome or dependent variable) but are positively associated with one another; and in this case, including both predictors in the regression equation increases both of their beta weights. Due to the similarity of both results, we did not report the values of this second regression because it would be a repetition of what we had already shown.

v. Discussion

Our study aimed to examine the contributions of descriptive norms and injunctive norms in the pro-environmental behaviour of a sub-Saharan African student sample in Nigeria. We first evaluated the responses of the students to the items of the measure of pro-environmental behaviour. Although a reasonable percentage of the participants cycle or walk instead of driving or being driven in a car and restrain themselves from buying new clothes that they don't need, not up to half of the respondents would choose not to fly. As the respondents in the present study are students, it is possible that many of them have not travelled in an aeroplane. To such people, the thrill of boarding a flight is something they would cherish and so it might be unacceptable to them if one says they should not fly to protect the environment. Efforts to encourage environmentally friendly might be more fruitful for behaviours that do not engage in for the thrill of it. For example, most of the students are already used to travelling in cars on the road. It is therefore not surprising that they admitted that they would cycle or walk instead of driving or being driven in a car.

We expected that descriptive norms and injunctive norms would be associated with increased pro-environmental behaviour among Nigerian students. Our results showed that students who had higher descriptive norms

reported increased pro-environmental behaviour. This finding is in line with our earlier hypothesis which stated that descriptive norms would be associated with increased pro-environmental behaviour among Nigerian students. The finding also supports past research indicating that social norms are linked with pro-environmental behaviour,[68].[69] People are more inclined to behave in a pro-environmental way when they see that other reference groups or individuals around them are also doing the same.

Similarly, we found that injunctive norms were significantly associated with pro-environmental behaviour. However, unlike the positive association between descriptive norms and pro-environmental behaviour, there was a negative association. Those that other people approve or disapprove of was associated with less pro-environmental behaviour. This finding is consistent with the results of some studies in Western cultures that descriptive norms more robustly impact pro-environmental behaviour than injunctive norms,[70].[71]. This finding implies that fostering pro-environmental behaviour is most likely to be effective if it targets norms that are based on what people do. It has been observed that rules or standards set or approved for one's behaviour are acquired through internalisation. Theoretically, internalisation functions partly by means of expected pride or guilt, that is, how one feels about a particular issue of interest. Hence, social norms-based interventions that trigger such feelings have been reported to be more effective in promoting PEB.[72]

A fundamental area of interest in the development of social norms is its motivational roots.[73] The pro-environmental behaviour motivation may either arise intrinsically or extrinsically, but there is a certain proposition that presenting the motivation to engage in pro-environmental behaviour as intrinsically driven

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[68] Huber J, Viscusi K, Bell J, 'Dynamic relationship between social norms and pro-environmental behaviour' 4(1) *Behavioural Public Policy*, 2018, 1-25.

[69] Jaeger M, Schultz W, 'Coupling social norms and commitments: Testing the under detected nature of social influence' 51 *Journal of Environmental Psychology,* 2017, 199–208.

[70] Melnyk V, Herpen E, Jak S, Van T, 'The mechanisms of social norms' influence on consumer decision making: A meta-analysis' 227(1) *Zeitschrift* für *Psychologie*, 2019, 4–17.

[71] Morren M, Grinstein A, 'The cross-cultural challenges of integrating personal norms into the theory of planned behaviour: a meta-analytic structural equation modelling (MASEM) approach' 75 *Journal of Environmental Psychology,* 2021, 101593.

[72] Bergquist M, Nilsson A, Schultz P, 'A meta-analysis of field-experiments using social norms to promote pro-environmental behaviours' 59 *Global Environmental Change*, 2019.

[73] Ejelöv, E, Bergquist M, Hansla A, Nilsson A, 'Why are they eco-friendly? Attributing eco-friendly descriptive norms to intrinsic motivation increases pro-environmental purchase intention' 17(10) *PloS One*, 2022.

can increase the descriptive norm's influence.[74] While the assumed motivational basis for injunctive norms is to get social approval and avoid social disapproval, we should not expect people to comply with a generalised descriptive standard unless they believe that other people are likewise genuinely motivated to do the new behaviour, as it has been observed that the intrinsic motivation of others is crucial for peoples' conformity to the given norm.[75] When additional external incentives are already in place to motivate pro-environmental behaviour, it may be especially important to emphasise the intrinsic motivation of other people. Generally, interventions to foster pro-environmental behaviour are more likely to be effective if they target those norms that are more likely to arise from the internal beliefs of individuals (e.g., pollution is dangerous to my health). We suggest that such interventions that are based on the intrinsic motivation of students to engage in environmentally sustainable behaviours should be given more attention.

Although the findings of our study have potentially important implications for interventions to promote environmentally friendly behaviours, some notable limitations of the study must be considered. First, our study was cross-sectional in nature, and we obtained the data using self-report measures. The nature of the data does not permit any definitive conclusions about causal relations. Perhaps, behaving in a more environmentally protective way may lead to greater existence of more social norms for such behaviour in those settings. We note, however, that research and theory typically view social norms as a precursor of pro-environmental behaviours. Second, our sample was drawn from two universities in Southern Nigeria which limits the generalizability of our findings to student populations that share characteristics with the current sample. We might have had voluntary response bias (only those individuals willingly agreed to participate in the study received the survey form), self-selection bias (students choose whether or not to participate in the survey) or non-response bias (differences between those that participated and those who did not agree to participate). Hence, we cannot truly speak to the representativeness of the sample. Third, the data was also collected retrospectively as the respondents were required to report information about their past behaviours. This type of data is more likely to be influenced by recall bias. Our findings need to be replicated in a prospective design

[74] Ejelöv, E, Bergquist M, Hansla A, Nilsson A, 'Why are they eco-friendly? Attributing eco-friendly descriptive norms to intrinsic motivation increases pro-environmental purchase intention' 17(10) *PloS One*, 2022.

[75] Pronin E, Berger J, Molouki S, 'Alone in a crowd of sheep: asymmetric perceptions of conformity and their roots in an introspection illusion' 92(4) *Journal of Personality & Social Psychology,* 2007, 585–595.

with a larger, more representative sample of students and use of longitudinal design to establish temporal occurrence of the connections that exist between social norms and pro-environmental behaviour. Fourth, the *R* square (*R*2) values which showed the proportion of variance in pro-environmental behaviour explained by both injunctive and descriptive norms in the regression model were small. Hence, the predictors did not effectively explain the variation in the pro-environmental behaviour. Future research needs to consider other proximate and distal factors that potentially contribute to pro-environmental behaviour. Fifth, we were unable to examine the mediators and moderators of the association between social norms and pro-environmental behaviour. Moderators would have helped us to clarify the conditions or situations under which social norms are most likely to influence pro-environmental behaviour, while mediation would help to delineate the pathways through which social norms influence pro-environmental behaviour. Future research should consider this direction in different cultural contexts or with different demographic groups to advance the field of pro-environmental behaviour. Although we did not measure a specific pro-environmental behaviour, there is a consensus that the effects of social norms hold for a variety of pro-environmental behaviours. However, future research should see if these associations hold with specific behaviours such as plastic use.

IV. Conclusion

This study has yielded important preliminary evidence for the association between social norms (descriptive norms and injunctive norms) and pro-environmental behaviour in a sample of sub-Saharan African students. We view our results as insightful and promising, both theoretically and practically, because the model in which injunctive norms were included enhanced the positive association between descriptive norms and pro-environmental behaviour to become more robust. Interventions that target descriptive norms among students in the sub-Saharan African region may substantially increase their engagement in pro-environmental behaviours. Specifically, incorporating interventions designed to decrease injunctive norms and increase descriptive norms among students into such programs could be most beneficial.