



Pro-Environmental Behavior of Students: Trend in Publication

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Abstract: For years, studies on pro-environmental behavior (PEB) have been conducted widely. However, the trend of this issue reminds unclear. This study aimed to analyze the demographic location, the existing environmental theory, and the research design of PEB research over the previous ten years. PEB publications in students' contexts fluctuated where the number of publications has dropped over the past two years. Most studies were conducted without a theoretical framework; however, the Theory of Planned Behavior (TPB) was the most used environmentalism theory. The majority of research about PEB of students was conducted in Asia. To measure the PEB of students, researchers mostly used questionnaire based on theoretical models or scales and analyzed the data with quantitative approaches.

Keywords: Pro-environmental behavior; Systematic review; Publication trend

Introduction

Aspects of direct and indirect environmental actions have been explored by many psychologists and sociologists over the last 50 years, resulting in the term "pro-environmental behavior (PEB)" (Kollmuss & Agyeman, 2002). In simple words, PEB means environmentally friendly behavior and an indicator of human characterization in their actions to protect the environment (Kollmuss & Agyeman, 2002; F Lange, 2019; Shafiei & Maleksaeidi, 2020). This behavior includes the behavior of use transportation, inorganic materials, and industrial activities, such as recycling, household energy use, and green consumption (Fitriana et al., 2019; Gkargkavouzi, 2019). The actions of PEB are related to environmental protection, preservation, and sustainability which means that PEB is a crucial behavior that has to be explored and developed (Canlas et al., 2022).

To explore and develop PEB, a theoretical framework is helpful and necessary. The study about theories of PEB was conducted by many psychologists who then introduced several behavioral theories with different perspectives to explain the aspects of PEB (Nkaizirwa et al., 2021). The theories are the Theory of Planned Behavior (TPB), which has a link to the Theory

of Reasoned Action (TRA), and Norm Activation Model (NAM) or Norm Activation Theory (NAT), which also have a link to the Value Belief Norm (VBN) Theory (Canlas et al., 2022; Nkaizirwa et al., 2021; Odhiambo, 2019).

Determining the environmental theory used in each research is essential to determine the right decision according to the objectives. The different perspectives in each theory indicate the different ways to gauge each aspect of PEB that will be affected in the research design, including the instrument of research (Lange & Dewitte, 2019). Models or scales as the instrument of research have their characterization depending on the environmental theory and the characterization of the questions.

The crucial prerequisite for a scientific analysis of PEB is the ability to measure PEB (Lange & Dewitte, 2019). Instruments of research have been develop to measure PEB, challenging the researchers to choose from the tools/models on offered (Mónus, 2021). Researchers should adjust the instrument with their objectives, data collection, data analysis, and research location as the location is important in PEB. The models or scales also have specific characters based on the location where they were developed.

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Basically, the difference in places or locations causes different cultures that affected the PEB. The PEB is a study about the relationship between humans and space, which means each location has different effects on environmental behavior also (Díaz et al., 2020 ; Lissimia, 2021). Hence, the parameter of location needs to be evaluated to determine the number of publications based on the research location of PEB in education fields, and the location which more environmentalism.

The rationale for conducting this study is intriguing. While other studies conducted their meta-analysis across various age groups and all participants, this study focused on one age group. Focusing on one age group aims to get a valid result because different age groups have a specific relation with PEB (Patel, Modi, & Paul, 2017). Hence, making the categorizing and difference approach for humans of different ages is do important, so this study was conducted only for the young adult age group (senior high school students, university students), this age group consider as starting

point to make personal decision. This study aimed to analyze the demographic location, the existing environmental theory, and research design of PEB over the previous ten years.

Method

As the development of PEB studies, this systematic review contained detailed information using a meta-analysis approach to analyze articles indexed in Scopus, Google Scholar, and Science and Technology Index (SINTA) papers. To obtain the required articles, the articles database was assessed in an adapted four-stage of assessment into three stages: (1) Identification and screening, (2) eligibility, and (3) inclusion (Putri, Sulaeman, & Putra, 2022). The total of 50 final articles were obtained from this stage, consisted of 13 articles from Google Scholar, 31 articles from Scopus, and 6 articles from SINTA as shown in Table 1.

Table 1. Stages of the Investigation Papers

Stages	Characteristics	Articles
Identification and Screening	a. Keyword “Pro-Environmental Behavior” in SINTA, Scopus, and google scholars	995 Google Scholar 200 Scopus 6 SINTA
	b. Year of publication 2012-2022	
	c. Scope of education	
Eligibility	The study must be quantitative or qualitative research to gauge pro-environmental behavior.	59 Google Scholars 34 Scopus 6 SINTA
Inclusion	The subject of research is young adults (high school students or university students)	13 Google Scholars 31 Scopus 6 SINTA

Relevant articles for this systematic review were identified by Publish or Perish (PoP) application, and manual browsing on the SINTA website. The list of the journal from the application and website were quality checked to clarify the journals indexed in internationally or nationally indexing agents. Identification and screening articles were done using the keywords of “pro-environmental behavior” in the field of education with a publication range from 2012 to now. Using this filters, 995 articles from Google Scholar, 6 articles from SINTA, and 200 articles from Scopus were found. The article had to primarily focus on PEB young adults in education fields, all nonrelevant articles were removed from the list.

All the articles had to meet the following criteria and would be analyzed using the parameters in this study. The parameters were the used environmental theory, the participants, the location of study, and the methods, including data collection and data analysis. The theory included the used theoretical framework of PEB in papers (eg. Theory of Planned Behavior, Value-Belief Norm Theory, Norm Activation Model, etc) (Canlas et al., 2022; Odhiambo, 2019). The location (in

this case continent) of the study could be wherever with no limitations. Still, the participants must be high school, pre-university, or university students in the category of young adults. The studies could have various methods, that could be qualitative, quantitative, or mixed-method. Various measurement instrument were conducted, such as self-report (questionnaire, interview), field Observation, or Laboratory Observation (F Lange, 2019).

Result and Discussion

This study aimed to analyze the existing theories of PEB, and research design for exploring young adults’ PEB in education fields to gain a holistic picture of the most used environmental theory, and research design by the researchers. Many researchers have tried to classify students’ pro-environmental behavior over the previous 10 years on different continents using various environmental theories. However, there is no consistency in research designs and instruments.

Trend of PEB publication by year

Generally, based on Figure 1, the publication number on PEB in education fields fluctuated, with an obvious decrease in the last 2 years. This result showed there is contradictive with trend of environmental problems that tend to increase such as water quality (Subagiyo et al, 2019), and air quality (Sulaeman et al, 2020).

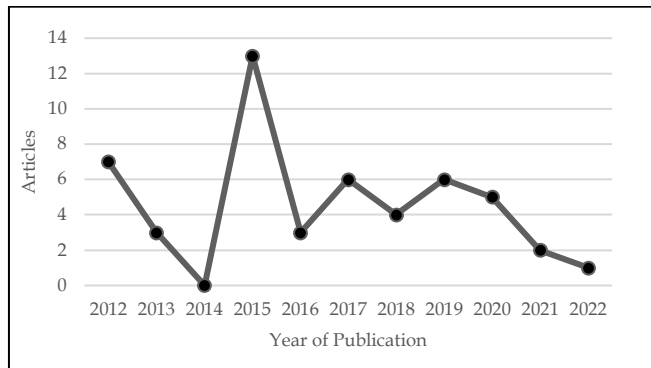


Figure 1. Number of publications in the previous 10 years

The high number of publications in 2015 might be caused by the gap that occurred in the previous year. Because of the lack number of PEB research in the education field, the topic should be intriguing for some research. As a result, many researchers try to conduct the PEB research in education which increase the number of publication in 2015.

Trend of PEB publication by the theory of PEB

The parameter of theory showed that over the past ten years the most environmentalism theory used by researchers was the Theory of Planned Behavior (TPB) as shown in Table 2 below. Some studies also used Value-Belief Norm (VBN) theory and Norm Activation Models (NAM), but these theories are not as popular as TPB.

Table 2. Frequencies of Theory of the study

Theory	n	Percentage
VBN	4	8%
TPB	18	36%
NAM	0	0%
Integrating VBN & TPB	1	2%
Integrating VBN & NAM	1	2%
Integrating NAM & TPB	1	2%
Non categorized	25	50%
Total	50	100%

Researchers seemed not to focus the study on theoretical aspects of PEB and were more interesting in figuring out the relation between PEB and demographic factors (e.g. gender and year of study), external factors

(e.g. institutional, economic, social, and cultural), and internal factors (e.g. motivation, environmental knowledge, values, attitude, environmental awareness, emotional involvement)(Kollmuss & Agyeman, 2002). This might because the environmentalism theoretical framework mostly has complexity explanation of its hierarchies, included indirect and direct factors.

There were 25 studies, or 50% of studies, that did not use environmentalism theory as a framework for their research. Still, some of them contained part of the environmentalism theory to measure PEB, such as using GEBs (Dimas, 2015), CNS, and EID scale (Gkargkavouzi et al., 2018), E-PVQ and E-SVS (Bouman et al., 2018), 2-MEV and NEP (Manoli, C., Bruce, Sanlyn, & Franz, 2019) as the instrument of research, or the other scales that are part of environmentalism theory (motivation, awareness, values, intention, knowledge, etc).

One of the interesting findings in this research was the use of PEB theories. While the other study used only one theoretical framework to explore PEB, three studies integrated two environmentalism theories in one research. One study integrated VBN and TPB (Abun & Racoma, 2017), VBN and NAM (Meyer, 2016), and the other integrated NAM and TPB (Onokala et al., 2018), which each theory has different perspectives to explain PEB. Not only in education fields, integrating TPB and VBN was also done by some researchers in another focus of research (Gkargkavouzi, 2019; Han, 2015; López-Mosquera & Sánchez, 2012). Integrating two theories in one research could explain the PEB and its aspect better than just using one theory, because it could provide specific and meaningful implications, and provide a degree of valuable and original insight (Han, 2015).

Trend of PEB publication by demographic

Regarding the demographic of the studies, Table 3 displays the results that indicated the majority of research about PEB was done in Asia (30 studies or 60%). Europe and America didn't have significant differences in demographic location. Some researchers studied PEB not only in one country but also compared the PEB among countries, such as exploring PEB both in USA and Chinese (Onokala et al., 2018), USA and Korea (Kim, 2013), and also did in the USA and Europe (Vicente-Molina, 2013).

Table 3. Demographic data of the study

Location	n	Percentage
Europe	10	20%
America	6	12%
Africa	1	2%
Asia	30	60%
Europe & America	1	2%
America & Asia	2	4%
Total	50	100%

Comparing the publication number of PEB research in education and general fields, they have different result. In general fields, two different studies gave different results, one study said that most publications were conducted in Europe (Nkaizirwa, Nsanganwimana, et al., 2021), and the other one gave the result that the most publication was run in Europe and America (Díaz et al., 2020) however, according from this study for education research primary conducted in Asia.

Trend of PEB publication by data collection

Table 4 displays the frequencies of data collection in the previous ten years. Researchers mainly used closed-ended questionnaires based on theoretical models or scales. Besides questionnaires, interviews and observation were also done by some researchers to conduct their study, and one research was done by using both the questionnaire and interview.

Table 4. Frequencies of the data collection of the study

Method	n	Percentage
Questionnaire	45	90%
Interview	3	6%
Observation	1	2%
Questionnaire & Interview	1	2%
Total	50	100%

The difference between data collection conducted by researchers might be caused by the advantages of each instrument. To evaluate the treatment of PEB or explored the mechanism of PEB, data could be better collected by observation. To get the category or characterization of PEB, the researchers could do their research by using a self-report that contains both questionnaire and interview (F Lange, 2019). Questionnaire and interview aren't instruments that must be implemented independently, both of them could be integrated into one research to get complexity and detailed information (Freed, 2019).

Trend of PEB publication by data analysis

Table 5 displays the frequencies of data analysis in the previous ten years. Researchers who did their studies in the previous ten years mostly used a quantitative approach to analyze the data.

Table 5. Frequencies of the data analysis of the study

Data Analysis	n	Percentage
Quantitative	43	86%
Qualitative	6	12%
Mixed-method	1	2%
Total	50	100%

Most studies used quantitative approaches to explore the relationship between demographic or theoretical aspects and PEB. A qualitative approach was

used by researchers who aimed to glean detailed information about the respondent's experience (Fung & Adams, 2017), develop recommendations from their research (Levy and Marans, 2012), or done by researchers who did their research by interviewing the respondent (Fernández-Manzanal et al., 2015).

As seen in tables and figures, the numbers of PEB studies over the previous ten years were not widely conducted by researchers. In the study of PEB, using the whole environmentalism theory as a framework is necessary. However, most researchers did not thoroughly refer the entire existing theory, instead using the models or scales which are basically part of it. In the research design, most of those studies used the same methods to collect and analyze the data, which used a quantitative approach and collected the data through a questionnaire

Conclusion

According to the study, PEB studies were mostly conducted in Asia, with fluctuated publication trend over last ten years. Generally, the Theory of Planned Behavior (TPB) was dominantly used in PEB research. However, the majority of PEB researchers conducted their research without theoretical framework over the previous ten years. To measure the students' PEB, a closed-ended questionnaire was the most used instrument by researchers with items accorded by some environmental models or scales, where data were analyzed using quantitative rapprochement.

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