An Assessment of Growth in Pro-environmental Worldviews from Freshman to Senior Year in an Undergraduate Liberal Arts College Setting

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ABSTRACT

This study looks at change in worldview of college students and variables that may affect this change. The research focuses on undergraduate students belonging to the class of 2015 from Albright College, a small liberal arts school of roughly 1,700, located in Reading, Pennsylvania. Administered surveys explored change in worldview and influence of academic major, sex, environmental knowledge, age, and race on development of a pro-environmental worldview. Baseline data collected during freshman orientation in 2011 was compared to data collected during the cohort's final semesters of college. Statistical tests included Chi square, t-tests, one way analysis of variance, and regression analysis. Mean NEP worldview scores increased to pro-environmental for each academic major from 2011 to 2015. College major, sex, and age are most influential on higher mean NEP scores. David Orr, a professor of Environmental Studies and Politics at Oberlin College, suggested that the uneducated are not primarily to blame for the environmental crisis (Orr 1994). This indicates the importance of college graduates possessing a pro-environmental worldview. As an individual better understands the interconnectedness of the social and natural world, the more willing and able they are to create change. These findings help draw conclusions on what elements of a four year undergraduate education experience are influential in pro-environmental worldview development.

INTRODUCTION

Numerous studies have found links between college students' academic major and their attitudes and behaviors toward the environment. This research focuses on a group of students attending Albright College, a four-year liberal arts college with a total enrollment of approximately 1,700 students located in Reading, Pennsylvania. Surveys were conducted to explore connections between variables of academic major, sex, environmental knowledge, age, and race and their influence on the development of a pro-environmental worldview. Baseline data collected during Albright college orientation in summer 2011 will be compared to data collected from the same cohort during their final semesters of college. This study longitudinally examines a single controlled population throughout their four year college education from 2011 to 2015. Since preliminary data is compared with final data of students within this particularly influential time, this type of longitudinal cohort research can draw remarkable conclusions of how a college or university education influences environmental worldview. In order to explore how students' average worldview toward the environment has changed, mean freshmen NEP scores will be compared to senior NEP scores. In addition, the influence of the aforementioned control variables on New Ecological Paradigm (NEP) scores will be analyzed to draw conclusions on what social and academic factors are most influential on NEP scores. Although the NEP scale contains the word "ecology" the essence of what is measured through the use of this scale is an individual's attitude, or worldview toward the natural environment, rather than any ecological principle.

Today, 50 years after the birth of the modern environmental movement and the subsequent era of heightened environmental awareness, research has shown that the general population is still lacking in environmental knowledge. However, the changing global environment and increased attention on environmental issues, or environmental concern, has led

to a new perspective among individuals regarding the interaction of humans and the natural world. The 1960s and 1970s were a time when environmental activism was at one of its highest points in United States. During this time, the population was becoming more concerned with environmental issues. Pro-environmental legislation was being passed and many governmental agencies were created to enforce the newly enacted environmental legislation. The first Earth Day was held as a protest to environmental ignorance, and a new worldview began to take shape. The cultural perception of human ecology changed and sociologists Riley E. Dunlap and Kent D. Van Liere began to develop the concept of the New Environmental Paradigm (now called the New Ecological Paradigm, or NEP).

The NEP scale has been used repeatedly to analyze and evaluate environmental worldviews, otherwise known as positive attitudes toward the natural environment, to understand the interdependence and interconnectedness between society and the environment. Harraway et al. (2012) completed a meta-analysis and found that the NEP scale has been used across a variety of disciplines to explore environmental worldviews since its development in the late 1970s. Fielding, McDonald, and Louis (2008) found the NEP Scale to efficiently measure general environmental attitudes, while studies by Schultz and Zelezny (1999), as well as de Groot and Steg (2008), confirm the reliability of the scale in examining the basis of values within environmental attitudes (Dunlap 2008). A person's worldview, as measured by the NEP, can be interpreted as more anthropocentric (human focused) or ecocentric (environmentally focused) (Harraway 2012).

The main focus of this research was to evaluate the effect of post-secondary education on the development of students' ecocentric, or pro-environmental worldview by measuring their change from the beginning to the end of their undergraduate college career at Albright College.

Variables of interest in this study that may affect a student's worldview include college major, sex, environmental knowledge, race, and age.

LITERATURE REVIEW

The New Ecological Paradigm emerged in the late 1970s and proposed ideas opposite to the dominant worldview at the time known as the Human Exemptionalism Paradigm (HEP). The HEP was the mainstream perception of sociologists lasting over a millennium, and is based on traditional ideas stemming from psychology, religion, history, economics, and popular culture. In short, HEP focuses on the notion that human beings are free from ecological constraints due to their extraordinary characteristics compared to other species, and supports the idea that the natural environment's purpose is to meet the needs of humans (Dunlap et al. 2002). Sociologists studied society for many years through this worldview previous to the new notion of embracing the finite nature of the natural world, and therefore the boundaries on the social world. In contrast to the HEP, the NEP calls to attention the finite nature of the physical environment and the limited resources available to humans (Dunlap et al. 2002). Sociologists emphasized the fact that the social world cannot be separated from the natural world, and recognized the importance of the intrinsic relationship between the two. The NEP Scale was created to assess the presence of an ecocentric, or pro-environmental, worldview that an individual possesses through measuring attitudes concerning the relationship of humans and the environment, the balance and limits of nature, and the rights of plants and animals (Dunlap et al. 2002).

In determining the influence of college major on levels of pro-environmental worldviews, studies found that the different values perpetuated by academic disciplines influence levels of environmental concern, thus resulting in either a more anthropocentric or ecocentric worldview. As disparate academic disciplines have different ways of viewing and understanding the world, it

is not surprising that a student's major would play a role in their worldview. In fact, Lang (2011) utilized the NEP Scale to find that students majoring in different areas of study were likely to have different environmental attitudes and behaviors. Students majoring in economics, forestry, computer science, commerce, law, engineering, math, business, and hotel, restaurant and institutional management had lower environmental scores on the NEP Scale than students in other majors including the arts and natural and social sciences. Incoming students majoring in business scored lowest on the NEP Scale. One explanation of this phenomenon is that students majoring in these subjects have a more "individualistic and/or competitive ideology" than students in other majors and that this ideology contributes to their environmental worldview (Lang, 2011:204).

While evaluating different variables and their influence on NEP scores, Dunlap and Van Liere (1980) account for many variables including social class and sex, however, one major variable not included is level of education. Although education level can be categorized as a part of social class, these two variables are not necessarily intrinsically linked. In 1998, the Roper Center for Public Opinion Research, in partnership with the National Environmental Education and Training Foundation administered surveys nationwide revealing persistent misconceptions by the United States population with respect to the environment. For example, the majority of United States citizens believe that the country's electricity is produced in non-air-polluting ways such as hydroelectric generation, while only 27% of Americans are aware that the majority of electricity production is from the burning of coal or other flammable materials (Wolfe 2001). In addition, many citizens were incorrect when asked what the main source of surface water pollution is, with only 22% responding with the correct answer of run-off from yards, city streets, paved lots, and farm fields. David Orr, a professor of Environmental Studies and Politics

at Oberlin College, suggested that the uneducated are not primarily to blame for the environmental crisis. Rather the individuals who have a college degree, yet still possess the anthropocentric world view of humans dominating nature, are responsible (Orr 1994). This indicates the importance of college graduates gaining a better foundation of environmental knowledge and awareness in order for change to be made. Jennings, Smith, and Ghosh (2014) found levels of environmental knowledge of incoming freshmen at Albright College to be lower than the national average for three of the five questions used to assess environmental knowledge. The mean environmental knowledge score mean of the freshmen during 2011 was 2.52 out of 5. This mean score illustrates that, on average, freshmen students received a failing grade on the environmental knowledge test; only half of the students received a passing grade (3 out of 5 correct) on the environmental knowledge test.

Education is an important contributor to environmental worldview because it encourages openness to change and allows for an understanding of modern science, which nurtures a greater understanding of the importance of supporting the environment (Nawrotzki 2013). In Nawrotzki's conclusions, education was found to have a positive influence on the NEP scale. Teksoz (2012) also concluded that levels of environmental knowledge have a positive influence on levels of environmental concern, attitudes, and responsibility that they possess. Teksoz (2012) suggests that adults with more knowledge regarding environmental issues have been found to care about the environment more and show more positive emotional bonding toward the environment. Increased environmental knowledge has been found to have a positive relationship with environmental concern and ecocentric worldviews (Jennings, et.al. 2014). Hsu (2004) also found that increased environmental education led to an increased sense of responsibility and empowerment and increased pro-environmental behavior.

In addition to major and environmental knowledge, sex has been found to be an influential variable on ecological or a pro-environmental worldview. In a study evaluating environmental education, males were found to have higher levels of knowledge in regard to the environment, however, females had higher levels of pro-environmental attitudes, behaviors, awareness, and involvement in environmental activities (Jannah 2013). This disconnect between increased environmental knowledge and increased pro-environmental worldview may be due to the utilitarian ideals upheld in the United States society of using Earth's resources for human benefit instead of than protecting them. According to studies conducted by Zelezny, Chua, & Aldrich between 1988 and 1998, women have a greater general environmental concern than men. Dunlap and Van Liere (1980), further posit that males are only concerned with economic gain and therefore less concerned with environmental protection. In a study of 119 students attending college, Zelezny, Chua, & Aldrich (2000) found that women had higher pro-environment scores on the NEP scale compared to men, regardless of age. Some suggestions as to why women exhibit greater positive environmental attitudes is that they are socialized as caregivers more so than men, and that women are more likely to have a stronger sense of responsibility to others and exhibit more altruistic behaviors (Zelezny 2000). Women's higher level of environmental concern has been attributed to an increased sensitivity to environmental threats on personal and family safety (Nawrotzki, 2012). In a study conducted at the University of Otago, Dunedin, New Zealand, environmental worldview it was found that women possessed a stronger pro-environmental worldview than men, and it is repeatedly concluded that women have stronger pro-environmental views than men overall (Harraway, 2012).

Not only do college major, sex, and environmental knowledge affect environmental worldview, but other demographic variables including age and race can influence an individual's

worldview. Age of the individual is important when evaluating worldviews because it is a variable that greatly contributes to a person's change in worldview. The typical student pursuing a post-secondary undergraduate degree spends an average four years at an institution. Along with learning and maturing for these four years, students are also aging. The average four year age difference of a student from high school graduation to college graduation is from age 18 to age 22, and some studies using the New Ecological Paradigm scale have shown that age does not have a significant influence on environmental worldview (Hawcroft and Milfont 2010). In a meta-analysis of NEP survey studies over the last 30 years, Hawcroft and Milfont (2010) found that age was not a significant predictor in NEP scores. This analysis included the age range of 18 to 60 and no significant differences were found.

Although age has not been found to be a significant predictor of NEP scores, studies have suggested that environmental views have the greatest amount of development during an individual's youth, and only remain stable after young adulthood (Nawrotzki 2013). Young adulthood can be defined as ages 18-24 (Mulye 2009). Several findings through longitudinal research have concluded that value systems internalized throughout childhood, adolescence, and young adulthood many times are related to an individual's socioeconomic situations, and show little change throughout adulthood (Nawrotzki 2013). Van Liere and Dunlap (1980) hypothesize that younger people tend to have higher levels of environmental awareness because the youth population is not as active in the American economy or social order. Therefore they are more open minded and accepting of the change that is implied with addressing environmental issues. This is congruent with Nawrotzki's notion of values and beliefs being established throughout years of youth and solidified during adulthood. In conjunction with age, the educational design of Albright College may also play a role in the development of student's worldviews. A liberal

arts education intentionally tries to develop value systems that are rooted in interdisciplinary and critical thought. Both of these traits are needed to understand the complexities involved in the interconnectedness of global environmental problems, which may be indicators of the NEP result scores of this particular population. In relation to the independent variable of race and its effect on worldview, Lee (2008) found that in general African American college students possessed what he called a modest degree of pro-environmental attitudes, although respondents' scores were lower than other samples of college students. Lee also found that along with science and pharmacy majors, women scored higher on NEP Scales representing the possession of a more ecocentric worldview (Lee 2008).

Using the survey responses from the incoming freshmen students to Albright in 2011 as baseline data, this research aims to further investigate the change in worldviews of students who entered as freshmen in 2011 and will graduate as seniors in 2015. A modified version of the original 2011 survey that incorporates new questions accounting for socio-demographic variables was administered. These new questions were included to further analyze demographic influences on levels of environmental concern and worldview. The focus of this research is to investigate the effects of a post-secondary education on a student's worldview. Post-secondary education calls for specialization in a particular field, which allows for a more in-depth style of learning. Along with choosing a specific major, variables of sex, environmental knowledge, age, and race can also have an influence on a student's environmental worldview. The purpose of this study is to see if an ecocentric, or pro-environmental, worldview can develop from this education opportunity, or if the graduating students are more likely to maintain the initial worldview they possessed when entering college. Jennings et. al. (2014) found that incoming freshmen at Albright College in 2011 possessed a weak amount of environmental concern than most other

college students or members of the adult population. This original study of Albright's incoming freshmen found that on average, 30% of respondents in 2011 indicated indecisiveness, and an average of 47.4% of the respondents exhibited agreement with pro-environmental statements. This average agreement, however, is much lower than general population studies, with 66.5% of respondents exhibiting a pro-environmental worldview in Dunlap's study in 2000. In addition, two other studies of college students found, on average, about 66.8% (Rideout 2005), and 61.1% (Rideout et. al. 2005) of students demonstrated a pro-environmental worldview. This discrepancy in percentage of students exhibiting a pro-environmental worldview may be attributed to the fact that Albright's 2011 data consisted of incoming students, while other studies may include students from all levels of college. This research further investigates change in worldviews by comparing responses to the NEP Scale statements in 2015 to worldview results collected from this cohort four years ago in 2011.

METHODS

Participants

This study followed a longitudinal, cohort design. The participants of this study are from Albright College, a small liberal arts school of roughly 1,700, located in Reading, Pennsylvania. The cohort of students belonging to the graduating class of 2015 were surveyed for the first time at the very beginning of their college career during freshman orientation and then in their final year of post-secondary studies via their senior seminar course. This longitudinal cohort study allows for conclusions on how students' worldviews toward the environment have transformed after receiving the majority of their four year education (since they have not yet graduated). This study controls for demographics, academic major, and environmental knowledge, in order to help clarify the effect a post-secondary education has on an individual's worldview. In addition

to comparing results of the incoming freshmen to senior results, senior worldview results will be specifically evaluated using the independent variables already listed. Comparing previously gathered baseline data from freshman year in 2011 to the current year of 2014-2015 with the same students now in their senior year, allows for conclusions to be made on how the process of obtaining a post-secondary degree affects a student's worldview.

Materials

The senior survey instrument (Appendix II) consisted of four different environmental sections, which evaluated environmental knowledge, environmental behaviors, environmental awareness, and environmental attitudes measured by the New Ecological Paradigm scale. Various demographic questions including age, sex, and race or ethnicity are also present. The NEP scale is reliable, has been tested frequently, and is accepted as a standardized measure of environmental attitude (Harraway, 2012). The first administration of the freshman survey (Appendix III) to this particular cohort of students was during freshman orientation in August 2011, with 383 students completing the survey. The second administration happened in the 2014-2015 academic year in the senior seminars, or senior year capstone classes, of each concentration. The students remained anonymous to encourage honesty and were asked to fill out the survey during class time to ensure a successful response rate. Out of 340 seniors, responses from 215 students were received, for a response rate of 63.3%.

Measures

Dependent variable

The dependent variable of this study is environmental worldview. Environmental worldview can is defined as the collective views and attitudes that people possess toward the environment (Dunlap & Van Liere 1978). Environmental worldview is measured through the

New Ecological Paradigm Scale, which measures an individual's attitudes, values, and beliefs regarding the natural environment. An individual's responses to the NEP's 15 statements illustrate their ranking on the scale of anthropocentric to pro-environmental worldview (see Appendix I. for a description of all 15 indicators). The NEP Scale asked participants to rate their level of agreement with the statements on a 5-point Likert scale, ranging from "strongly disagree" coded as 1 point to "strongly agree" coded as 5 points. The NEP Scale statements consist of seven anthropocentrically agreeable, or human-focused statements and eight statements that are pro-environmental, or ecocentrically agreeable. In order to ensure reliable measures of worldview based on NEP responses, the seven human-focused statements were reverse coded. This NEP Scale has internal validity to be used as a single scale, or unidimensional measure as shown by a Cronbach's alpha of .83. Scoring of the NEP index follows Jennings et al (2014) in that the index ranges from 15-75, with a respondent score between 15 and 37.5 representing a lack of environmental concern, or an anthropocentric worldview, a score between 37.5- 52.5 representing undecided or a lack of "cohesive worldview in either direction" and scores of 52.5 and above representing a higher environmental concern, or an ecocentric worldview.

Independent variables

The independent variables of this study are college major, sex, environmental knowledge, age, and race. These main independent variables are evaluated for their influence on environmental worldview. College major, sex, age, and race are all measured through self-reported questions on the survey. College majors were grouped into Environmental Studies and Environmental Sciences, Natural Sciences, Social Sciences, Humanities, and Business. Environmental majors and business majors were separated to further investigate for expected

differences. Race was measured as White, Black, and Other. The independent variable of environmental knowledge was assessed through five multiple choice questions adopted from the National Environmental Education and Training Foundation (NEETF). These questions, used in the Roper Starch Worldwide Survey of Americans to assess environmental knowledge were also used in the initial study of college freshman during the 2011 Albright College orientation (Jennings et al. 2014). Using these same five questions to survey the environmental knowledge of this cohort again will be useful in comparing their responses from the surveys administered in 2011.

DATA ANALYSIS

SPSS Version 21 was used to analyze all data. Chi square analysis was used to test for change in environmental knowledge from freshman to senior year. The Chi-squared test assesses the differences in expected frequencies and observed frequencies in one or more categories to see if there is a significant difference in the outcomes (Greenhalgh 1997). Independent sample t-tests were used to longitudinally compare the changes in mean worldview scores from freshman year to senior year across independent variables. T-tests were employed to compare NEP mean scores because they compare two sets of data to test for a significant difference (Greenhalgh 1997). A one-way analysis of variance with post hoc was used to compare mean environmental worldview scores across several key sociodemographic variables including college major, sex, age, race, and environmental knowledge. The ANOVA tests evaluated significant differences in influence of college major on environmental worldview scores. A regression analysis was used in order to estimate the relationships between the multiple independent variables and the dependent variable (Greenhalgh 1997). The regression model displays the effect of each variable on NEP scores, Regression analysis is a favorable statistical test because it explains relationships between

independent and dependent variables, while holding certain independent variables constant (Lang 2011).

RESULTS

The demographic characteristics of the two samples are shown in Table 1. This table illustrates the change in the population from freshman to senior year, which can affect the data collected. Generally there are more females than males and there was an increase of the percentage of females from freshman to senior year, while there was a decrease in the male population of Albright. In regards to college major, there are many "undecided" freshmen, however that category does not apply to seniors as they must concentrate in a specific subject in order to graduate with a degree. In relation to the race category, there has been a change in diversity, with the African American and "Other" race categories decreasing and the White population increasing.

Table 1. Demographic characteristics of the sample (N=655).

Variable	Attribute		Freshman	Senior
Sex	Male		44.3	42.4
	Female		55.7	57.6
Age	Freshman	Senior		
	17	21	10.3	57.2
	18	22	73.3	30.3
	19	23	12.4	2.9
Academic Major	Humanities		19.8	26.1
	Social Science		45.6	51.2
	Natural Science		26.0	22.7
	Undecided		8.6	N/A
Race/Ethnicity	White		62.9	78.6
	African American		16.2	10.9
	Other		21.0	10.5

Table 2 describes the percentage of correct answers for the environmental knowledge questions. It displays percentage of respondents who responded with the correct answer for freshman year, senior year, and the national average. Overall, the percentage of questions answered correctly by the senior students in 2015 was greater than the percentage of questions answered correctly during freshman orientation in 2011. The percent correct of all questions displayed an increase and the overall knowledge score mean increased from 2.4 to 2.6. It was concluded that the first question showed a significant increase from freshman to senior year using a Chi square test; the Chi square was equal to 4.47. Although there was an overall increase in percentage of questions answered correctly, the cohort only reached the national average for 2 out of the 5 questions.

Table 2. The percentage of respondents who answered environmental knowledge questions correctly as compared with the percentage of correct responses nationally.

Environmental Knowledge	% Correct		
	Freshmen	Senior	National Average
Carbon monoxide is a major contributor to air pollution in the U.S. Which of the following is the biggest source of carbon monoxide? (motor vehicles)	49.6	58.6	65
How is most of the electricity in the U.S. generated? (burning oil, wood and coal)	42.4	43.7	33
What is the most common cause of pollution of streams, rivers, and oceans? (surface water runoff)	26.5	27.4	28
Which of the following is a renewable resource? (trees)	53.2	60.0	65
Where does most of the garbage in the U.S. end up? (landfills)	66.5	68.8	85
% with passing grade	45.7	50.9	45.0
Overall Knowledge Score Mean	2.4	2.6	

The data in Table 3 illustrates the significance of each independent variable on NEP scores while comparing freshmen NEP scores to seniors NEP score. Independent sample t-tests were used to longitudinally compare the changes in mean worldview scores from freshman year to senior year across independent variables. The asterisks present after the numbers of the t-test indicate significance and particular strength of each independent variable on the dependent variable of environmental worldview. The more asterisks present signify a stronger influence of significance. The values represented through asterisks (listed strongest to most weak) are as follows: ***<.001, ** p<.01, and *p<.05. If no asterisk is present there is no significance. There was significance across each variable except for "humanities" concentration and the "other race" category. Overall, all majors showed an increase in NEP score from the 2011 data and they are all considered to have pro-environmental worldview NEP scores because they are above a score of 52.5, which determines that a score is of pro-environmental worldview.

Table 3. Comparison of Freshmen NEP Scores to Senior NEP Scores

Variable	Attribute	NEP Score		Test of Significance
		Freshmen	Senior	
Entire Sample		49.95	54.08	-5.08***
Sex	Male	47.53	51.19	-3.22**
	Female	52.07	56.45	-4.09***
Age	17/18-------21/22	50.4	53.49	-3.52***
Concentration	Humanities	50.25	52.68	-1.48
	Social Science	49.39	54.27	-4.14***
	Natural Science	50.66	54.90	-2.41*
	Undecided	50.7	N/A	
Race/Ethnicity	White	49.99	54.18	-4.24***
	African American	48.03	53.8	-2.60*
	Other	51.64	55.86	-1.73

*** p<.001, ** p<.01, * p<.05

Table 4 delineates senior NEP scores for each area of college concentration. Business and Environmental majors were extracted from the categories of concentrations due to the expected difference within the concentrations. The one way analysis of variance (ANOVA) showed no significant difference however it was very close with an F value equal to 2.2 (p=.07) close to significant (p<.05).

Table 4. College Concentration and NEP Scores

Academic Major	N	Mean
Business	34	53.1
Env	7	62.9
Social Science	40	54.7
Physical Sci	37	54.0
Humanities	37	52.7
F	2.2 (p=.07)	

Table 5 is a regression model estimating the relationships between the multiple independent variables and the dependent variable. It is measuring the effect of each variable on the NEP score. The reference group for all academic majors is environmental majors, for race it is white, and for sex it is males. According to the regression model Environmental Studies and Environmental Science students had significantly higher NEP scores than all other majors indicating the possession of the most pro-environmental worldview. The concentration that showed the lowest NEP score was Humanities. While environmental knowledge did not prove to be significant, there was a positive effect present as shown by the unstandardized coefficient (.14). In addition, race did not prove to be significant. The variable of age is significant and sex proved to have the strongest effect (beta=.35). The R2 explains the amount of variation is present that can be explained through the variables. There is a very high R2 of 0.203, which

shows that 20% of the variation present in the NEP score is explained through the independent variables evaluated.

Table 5. Strength of variable influence on higher NEP scores

Variable	Unstandardized Coefficient	Standardized Coefficient
Business Concentration	-8.22	-0.4*
Humanities Concentration	-9.13	-0.45**
Social Science Concentration	-7.58	-0.39*
Natural Science Concentration	-8.52	-0.42*
Sex (M/F)	6.09	.35***
Age	1.13	.21**
African American	-0.26	-0.01
Other Race	2.16	0.08
Environmental Knowledge	0.14	0.02
r^2	0.203	

DISCUSSION

Environmental Knowledge

Overall, the environmental knowledge of the cohort of the class of 2015 increased from 2011 to 2015. This may be due to the inherent environment of college that fosters learning as well as the requirements of general education classes for this liberal arts college that are made up of all different disciplines. Although there was a noticeable increase in the percentage of students who answered the questions correctly, there was only a significant difference for question number 1, and the national average of percent correct was only achieved for 2 out of the 5 questions.

Academic Major

Environmental studies and environmental sciences were found to have the highest mean NEP score overall. Environmental studies and environmental science students possess a significantly higher NEP score than all other majors, as shown by the regression model in Table

5. One reason that environmental majors possess the most pro-environmental worldview may be that their coursework throughout the four years of college is related to and focused on the environment. While the two concentrations may differ in the specific focus of the social world and the environment (environmental studies) compared to the natural world and the environment (environmental science), many course requirements overlap, and almost all requirements within the majors relate to the environment both socially and naturally. In contrast, all other majors have their own specific subject matter and classes that teach concentration-related topics. These subject matters do not necessarily relate to the environment socially or naturally, although some classes might have environmental themes.

The concentration that showed the lowest mean NEP score was Humanities. Humanities at Albright College consists of Literature, History, Language Cultural Studies, and Religious Studies. This phenomenon may be a feature produced from the lack of environmental topics embedded within these concentrations, or it may be related to the fact that the core essence of humanities is the study to human centered topics. Although Humanities exhibited the lowest mean NEP score of 52.7, they closely followed Business at 53.1. Social Science and Physical Science came in second with an NEP score of 54.7 for Social Science and 54.0 for Physical Science. Still this NEP score represents a pro-environmental worldview.

It is intriguing that all students' NEP scores graduating in 2015 increased since the first time they responded to the survey as incoming freshmen. This overall increase in environmental worldview may be attributed to the general studies requirements. At Albright College, since it is a liberal arts college, many classes are required to graduate that may not necessarily be within a student's particular major or concentration. For example, all students are required to take a natural science course with a lab, and courses in art, language, quantitative reasoning,

humanities, and social science. These different subjects may relate to the environment, especially the natural science, which can influence worldview to have a leaning toward the pro-environmental end of the spectrum. This liberal arts design has the intention of developing value systems that are rooted in interdisciplinary and critical thought. The fact that this particular cohort of college undergraduate students attended a liberal arts college for four years to obtain a degree, may be an indicator of the increased NEP result scores of this particular population. These critical and analytical thinking skills while utilizing an interdisciplinary approach are strongly encouraged at Albright and necessary in most classes, especially in IDS courses that emphasize this type of interdisciplinary thinking. Both of these traits are needed to understand the complexities involved in the interconnectedness of global environmental problems, which may be a reason as to why this population more prone to higher NEP scores after receiving the four-year liberal arts education.

Sex

As the previous literature explains, it is common for females to exhibit higher NEP scores compared to males. In both the freshman and senior data, female NEP scores were significantly higher than male NEP scores. In the senior results, there was a greater level of significance present for females. This increased significance ($p<.001$) may be attributed to receiving a post-secondary education, as well as the other variables that were tested in this study. The concept of females being more in tune with the environment has been articulated by many sociologists within their studies. Zelezny, Chua, & Aldrich (2000) found that women had higher pro-environmental scores on the NEP scale compared to men. In addition, Nawrotzki (2012) determined that women's higher level of environmental concern has been attributed to an increased sensitivity to environmental threats on personal and family safety (Nawrotzki, 2012). It

is interesting to see that 29.4% of male respondents are business majors, while only 16.5% of female respondents were business major, and business was one of the majors with the least pro-environmental worldviews. More research could be done on this topic to further investigate the differences in sexes and the way they perceive and relate to the natural environment.

Age

Along with the independent variable of sex, age is found to have a significant influence on higher NEP, or pro-environmental, scores in this study. The standardized coefficient for age was .21. While some published literature proposes that age does not have a significant influence on environmental worldview, the statistical finding within this research is consistent with the findings of Nawrotzki. Nawrotzki (2013) states that environmental worldview is developing, especially during childhood, adolescence, and young adulthood and begins to remain stable after young adulthood. Young adulthood can be defined as ages 18-24 (Mulye 2009). As the average college student's age ranges between 18-24, it can be inferred that environmental worldviews are still developing during this time. Therefore, this is the pinnacle time period of environmental worldview development. Nawrotzki (2013) asserts that only after young adulthood do worldviews about the environment solidify, which allows for the deduction that the majority of undergraduate students are still developing environmental worldviews throughout their college career. Therefore, it is interesting that age has a significant influence on environmental worldview, and this time period is critical as it is an important influence that would change perspectives. Since age has a positive relationship with environmental worldview, and NEP scores increased overall throughout the four years these students spent at Albright, there is a commonality of educational experience. Therefore, NEP scores very well may be as much related to education as to age, which further backs the previous studies finding age to be not

significant. Ultimately, a longitudinal study that compares college to non-college respondents is needed to further test this possibility of the effects of the post-secondary educational experience against the effects of age.

Race

All variables exhibited significant effects on higher NEP scores except environmental knowledge and race. The "Other Race" category displayed the least amount of effect on NEP scores. This may be due to the small number of students that are not African American or White. This is congruent with previous literature in that no significant influence was found.

CONCLUSION

Age proved to be very influential, however, there are limitations to this study that include the lack of a control group of people from the same birth cohort and age range that are not currently enrolled in a post-secondary institution of education. The independent variable of age is perhaps linked to years spent in college and intellectual maturity, since students took the survey at the beginning and the end of their college career. The finding of the high influence that sex had on NEP scores can be a cause for future research into the reason behind male and female perspectives and relationships with the natural environment. Perhaps a qualitative study is needed to better gleam the reason for this difference.

Ultimately, NEP scores of this cohort population increased from freshman to senior year demonstrating an increase in pro-environmental worldviews. Independent variables that strongly influenced the increase of a pro-environmental worldview included age, sex, and college major. While it was interesting to find that race and environmental knowledge were not statistically significant, the preconceived notion of environmental majors having higher NEP scores was confirmed. Referring back to the idea that it is not those who are uneducated that are to blame for

the environmental crises of the world, but those who have college degrees, yet still possess an anthropocentric view are responsible (Orr 1994), these results can instill a sense of hope for future generations confronting and mitigating environmental issues. As college graduates gain a better foundation of environmental awareness, concern, and pro-environmental worldviews, it will facilitate the possibility for change to be made. Measuring and monitoring NEP scores from the beginning to the end of this specific population's college experience can help draw conclusions on what elements of a four year undergraduate education and experience are more influential in worldview development. New Ecological Paradigm scoring and comparison of worldview demonstrates growth in levels of pro-environmental worldview of this specific cohort, which may have implications for other populations born within the same years and are simultaneously participating in a four year liberal arts post-secondary education.

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APPENDIX I. NEP Scale Indicators

NEP Scale Indicators (even numbers are anthropocentric, odds are pro-environmental)
1. We are approaching the limit of the number of people the earth can support.
2. Humans have the right to modify the natural environment to suit their needs.
3. When humans interfere with nature it often produces disastrous consequences.
4. Human ingenuity will insure that we do NOT make the earth unlivable.
5. Humans are severely abusing the environment.
6. The earth has plenty of natural resources if we just learn how to develop them.
7. Plants and animals have as much right as humans to exist.
8. The balance of nature is strong enough to cope with the impacts of modern industrial nations.
9. Despite our special abilities humans are still subject to the laws of nature.
10. The so–called 'ecological crisis' facing humankind has been greatly exaggerated.
11. The earth is like a spaceship with very limited room and resources.
12. Humans were meant to rule over the rest of nature.
13. The balance of nature is very delicate and easily upset.
14. Humans will eventually learn enough about how nature works to be able to control it.
15. If things continue on their present course, we will soon experience a major ecological catastrophe.

APPENDIX II. Senior Survey

ENVIRONMENTAL KNOWLEDGE

1. Carbon monoxide is a major contributor to air pollution in the U.S. Which of the following is the biggest source of carbon monoxide? Is it….
   a. Factories and businesses
   b. Motor vehicles
   c. Trees
   d. Acid Rain
   e. Don't Know

2. How is most of the electricity in the U.S. generated? Is it….
   a. By burning oil, coal and wood
   b. With nuclear power
   c. Through solar energy
   d. At hydro electric plant
   e. Don't know

3. What is the most common cause of pollution of streams, rivers, and oceans? Is it…
   a. Dumping of garbage by cities
   b. Surface water running off yards, city streets, paved lots, and farm fields
   c. Trash wasted into the ocean from beaches
   d. Waste dumped by factories
   e. Don't know

4. Which of the following is a renewable resource? Is it…
   a. Oil
   b. Iron ore
   c. Trees
   d. Coal
   e. Don't know

5. Where does most of the garbage in the U.S. end up? Is it in…
   a. Oceans
   b. Incinerators
   c. Recycling centers
   d. Landfills
   e. Don't know

ENVIRONMENTAL AWARENESS

6. What are the first *three* words that come to mind when you hear the word sustainability?

7. Can you identify *three* activities in your day-to-day life that have an impact on the environment?

   a.

   b.

   c.

8. Can you think of *three* activities in your day-to-day life that you would be willing to change to reduce the impact on the environment?

a.

b.

c.

ENVIRONMENTAL BEHAVIOR

9. How often do you engage in the following behaviors?

Switch appliances (computer, ipod, etc.) off rather than leaving them on standby	Always	Often	Occasionally	Never	Don't Know
Switch lights off when you leave the room	Always	Often	Occasionally	Never	Don't Know
Unplug devices(cell phone chargers, etc.) when not in use	Always	Often	Occasionally	Never	Don't Know
Print off the internet rather than reading online	Always	Often	Occasionally	Never	Don't Know
Print double-sided or multiple pages per paper	Always	Often	Occasionally	Never	Don't Know
Use reusable shopping bags	Always	Often	Occasionally	Never	Don't Know
Recycle	Always	Often	Occasionally	Never	Don't Know
Reduce the use of water	Always	Often	Occasionally	Never	Don't Know
Reduce the use of air conditioning in the summer	Always	Often	Occasionally	Never	Don't Know
Lower the thermostat in the winter	Always	Often	Occasionally	Never	Don't Know
Buy/eat organic or local food/produce	Always	Often	Occasionally	Never	Don't Know
Have food left over on your plate following meals	Always	Often	Occasionally	Never	Don't Know
Use other types of transportation, such as walking, biking or taking the bus, instead of driving	Always	Often	Occasionally	Never	Don't Know
Participate in outdoor recreation	Always	Often	Occasionally	Never	Don't Know

ENVIRONMENTAL ATTITUDES

10. Please provide your opinion on the following statements.	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree	Don't Know
We are approaching the limit of the number of people the earth can support.	1	2	3	4	5	6
Humans have the right to modify the natural environment to suit their needs.	1	2	3	4	5	6
When humans interfere with nature it often produces disastrous consequences.	1	2	3	4	5	6
Human ingenuity will insure that we do NOT make the earth unlivable.	1	2	3	4	5	6
Humans are severely abusing the environment.	1	2	3	4	5	6
The earth has plenty of natural resources if we just learn how to develop them.	1	2	3	4	5	6
Plants and animals have as much right as humans to exist.	1	2	3	4	5	6
The balance of nature is strong enough to cope with the impacts of modern industrial nations.	1	2	3	4	5	6
Despite our special abilities humans are still subject to the laws of nature.	1	2	3	4	5	6
The so–called 'ecological crisis' facing humankind has been greatly exaggerated.	1	2	3	4	5	6
The earth is like a spaceship with very limited room and resources.	1	2	3	4	5	6
Humans were meant to rule over the rest of nature.	1	2	3	4	5	6
The balance of nature is very delicate and easily upset.	1	2	3	4	5	6
Humans will eventually learn enough about how nature works to be able to control it.	1	2	3	4	5	6
If things continue on their present course, we will soon experience a major ecological catastrophe.	1	2	3	4	5	6

11. How much would you be willing to pay in additional student fees (currently you pay approximately $400 per semester) to make Albright a more environmentally friendly campus?

a. I do not want to see my fees increase
b. $5 per semester
c. $10 per semester
d. $15 per semester
e. $20 per semester

TIME SPENT AT ALBRIGHT

12. To the best of your memory, how many courses did you take related to the environment (for example, ecology, environmental economics, environmental sociology, environmental policy, intro to environmental studies, ecological history)

_____ # of courses

12a. If you have taken more than one course related to the environment, which one do you think had the greatest influence on your environmental views?

_____ Name of course

13. Are you a member of ECO (Environmental Campus Outreach)?

Yes No

13a. If you are a member of ECO, how active would you say you are?

Very Active Active Somewhat Active Inactive

14. How many experience events have you attended related to environmental issues/problems?

_____ # of experience events

15. During your time at Albright, have you taken part in any of the following *environmentally minded* activities? (circle all that apply)

a. Volunteerism required for a scholarship

b. Volunteerism not required for a scholarship

c. Service learning project associated with a course

d. Alternative Spring Break

DEMOGRAPHIC BACKGROUND OF RESPONDENT

16. What is your age?

_____ years

17. What is your gender?

Male Female

18. Are you Hispanic/Latino?

Yes No

19. What is your racial identification?

White African American American Indian/Native Alaskan

Asian Native Hawaiian/Pacific Islander Other: _____ (Please specify)

20. What is your concentration (major)/ co-concentration (co-major)?

_____ Concentration

_____ Co-Concentration (if any)

21. How would you characterize the area in which you grew up?

Urban Suburban Rural

22. Where did you come to Albright from?

Pennsylvania Other state: _____ (please specify) Internationally

23. Where do you currently live?

On-campus (residence halls) Off-campus

24. Which of the following best describes your political orientation?

Very conservative Conservative Liberal Very liberal

25. Are you a first generation college student (i.e. your parents or grandparents did not attend college)?

Yes No

26. Growing up, my family was…

Wealthy Comfortable Struggling Poor

Feel free to use the space on the back of this page to share any other thoughts you have.

APPENDIX III. Freshman Survey

ENVIRONMENTAL KNOWLEDGE

27. Carbon monoxide is a major contributor to air pollution in the U.S. Which of the following is the biggest source of carbon monoxide? Is it….
   a. Factories and businesses
   b. Motor vehicles
   c. Trees
   d. Acid Rain
   e. Don't Know

28. How is most of the electricity in the U.S. generated? Is it….
   a. By burning oil, coal and wood
   b. With nuclear power
   c. Through solar energy
   d. At hydro electric plant
   e. Don't know

29. What is the most common cause of pollution of streams, rivers, and oceans? Is it…
   a. Dumping of garbage by cities
   b. Surface water running off yards, city streets, paved lots, and farm fields
   c. Trash wasted into the ocean from beaches
   d. Waste dumped by factories
   e. Don't know

30. Which of the following is a renewable resource? Is it…
   a. Oil
   b. Iron ore
   c. Trees
   d. Coal
   e. Don't know

31. Where does most of the garbage in the U.S. end up? Is it in…
   a. Oceans
   b. Incinerators
   c. Recycling centers
   d. Landfills
   e. Don't know

ENVIRONMENTAL AWARENESS

32. What are the first *three* words that come to mind when you hear the word sustainability?

33. Can you identify *three* activities in your day-to-day life that have an impact on the environment?

   a.

   b.

   c.

34. Can you think of *three* activities in your day-to-day life that you would be willing to change to reduce the impact on the environment?

a.

b.

c.

ENVIRONMENTAL BEHAVIOR

35. How often do you engage in the following behaviors?

Switch appliances (computer, ipod, etc.) off rather than leaving them on standby	Always	Often	Occasionally	Never	Don't Know
Switch lights off when you leave the room	Always	Often	Occasionally	Never	Don't Know
Unplug devices(cell phone chargers, etc.) when not in use	Always	Often	Occasionally	Never	Don't Know
Print off the internet rather than reading online	Always	Often	Occasionally	Never	Don't Know
Print double-sided or multiple pages per paper	Always	Often	Occasionally	Never	Don't Know
Use reusable shopping bags	Always	Often	Occasionally	Never	Don't Know
Recycle	Always	Often	Occasionally	Never	Don't Know
Reduce the use of water	Always	Often	Occasionally	Never	Don't Know
Reduce the use of air conditioning in the summer	Always	Often	Occasionally	Never	Don't Know
Lower the thermostat in the winter	Always	Often	Occasionally	Never	Don't Know
Buy/eat organic or local food/produce	Always	Often	Occasionally	Never	Don't Know
Have food left over on your plate following meals	Always	Often	Occasionally	Never	Don't Know
Use other types of transportation, such as walking, biking or taking the bus, instead of driving	Always	Often	Occasionally	Never	Don't Know

ENVIRONMENTAL ATTITUDES

36. Please provide your opinion on the following statements.	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree	Don't Know
We are approaching the limit of the number of people the earth can support.	1	2	3	4	5	6
Humans have the right to modify the natural environment to suit their needs.	1	2	3	4	5	6
When humans interfere with nature it often produces disastrous consequences.	1	2	3	4	5	6
Human ingenuity will insure that we do NOT make the earth unlivable.	1	2	3	4	5	6
Humans are severely abusing the environment.	1	2	3	4	5	6
The earth has plenty of natural resources if we just learn how to develop them.	1	2	3	4	5	6
Plants and animals have as much right as humans to exist.	1	2	3	4	5	6
The balance of nature is strong enough to cope with the impacts of modern industrial nations.	1	2	3	4	5	6
Despite our special abilities humans are still subject to the laws of nature.	1	2	3	4	5	6
The so–called 'ecological crisis' facing humankind has been greatly exaggerated.	1	2	3	4	5	6
The earth is like a spaceship with very limited room and resources.	1	2	3	4	5	6
Humans were meant to rule over the rest of nature.	1	2	3	4	5	6
The balance of nature is very delicate and easily upset.	1	2	3	4	5	6
Humans will eventually learn enough about how nature works to be able to control it.	1	2	3	4	5	6
If things continue on their present course, we will soon experience a major ecological catastrophe.	1	2	3	4	5	6

37. How much would you be willing to pay in additional student fees (currently you pay approximately $400 per semester) to make Albright a more environmentally friendly campus?

a. I do not want to see my fees increase
b. $5 per semester
c. $10 per semester
d. $15 per semester
e. $20 per semester

DEMOGRAPHIC BACKGROUND OF RESPONDENT

38. What is your age?

_____ years

39. What is your gender?

Male Female

40. What is your racial or ethnic identification?

White African American American Indian/Native Alaskan

Asian Native Hawaiian/Pacific Islander Hispanic, Latino

Other: _____ (Please specify)

41. What is your concentration (major)?

_____ Concentration

42. Where are you coming to Albright from?

Pennsylvania Other state: _____ (please specify) Internationally

43. Where do you currently live?

On-campus (residence halls) Off-campus

44. Are you a first generation college student (i.e. your parents or grandparents did not attend college)?

Yes No

45. What is your best estimate of your parents'/guardians' annual income?

Less than $25,000 $25,000-$49,999 $50,000-$74,999
$75,000-$99,999 $100,000 or more