

A Mixed Methods Exploration of Postsecondary Education Students' Environmental Awareness and Worldviews

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Postsecondary education students are positioned to contribute to solving complex environmental problems present in the world today. This convergent mixed methods study aimed to explore environmental worldviews for undergraduate and graduate students at a public four-year university in the Southwest United States. The revised New Ecological Paradigm (NEP-R) Scale, demographic questions, and three open-ended questions were implemented in an online survey to explore participants' environmental worldviews. Using descriptive and non-parametric statistical analyses, the results of an online survey revealed that overall participants ($N = 513$) reported pro-environmental worldviews, and factors such as age and gender influenced environmental worldview scores. Moreover, identifying major and minor themes after coding responses to open-ended questions broadened the understanding of students' environmental worldviews in the context of experiencing higher education. Although the present study had limitations, the findings can assist postsecondary educational leaders, faculty, and practitioners in developing and implementing pro-environmental or sustainability-oriented policies, practices, and programs on higher education campuses.

Keywords: environmental attitudes, environmental awareness, environmental worldviews, mixed methods, postsecondary education students

A MIXED METHODS EXPLORATION OF POSTSECONDARY EDUCATION STUDENTS' ENVIRONMENTAL AWARENESS AND WORLDVIEWS

Individuals have confronted and will likely continue to encounter complex environmental and sustainability problems in the 21st century (United Nations, 2019). Researchers have argued that environmental problems have led to the decline, devastation, and deterioration of the planet (Radaković et al., 2017; Wolfgramm et al., 2015). Furthermore, people have witnessed increased extraction and consumption of natural resources in countries experiencing economic growth (Ahmed et al., 2020). Global citizens have observed the reality of a rapidly changing and intensifying climate, evident in warmer temperatures, variations in rainfall patterns, floods, droughts, and additional extreme weather occurrences (Blum & Hotez, 2018). In addition to environmental and natural resource degradation, Hayes et al. (2018) discussed a link between climate change and direct and indirect physical and health issues, such as acute

and chronic respiratory conditions and food insecurity (Hayes et al., 2018). The World Health Organization (WHO) (2018) has projected an increase in the human death rate due to climate change from 2020 to 2050.

The American College Personnel Association (ACPA) (2008) presented the concepts of environmental, social, and economic sustainability (referred to as sustainability's triple bottom line by ACPA personnel) as a framework to consider when addressing environmental and sustainability issues in campus communities. Hooey et al. (2017) further recommended that higher education professionals consider this framework for developing and implementing sustainable campus practices and cultures. As such, higher education professionals, including institutional leadership, faculty, and staff, can view their institutions as spaces from which pro-environmental and sustainability actions are realized, developed, and implemented to solve critical problems affecting society and the natural world.

Postsecondary education institutions have served an essential role in disseminating knowledge and fostering innovation (Salvioni et al., 2017). Moreover, these institutions have contributed to social change and finding solutions for complex problems (Washington-Ottombre et al., 2018). Postsecondary education leaders have responded to environmental issues by developing and implementing policies and procedures focused on environmental sustainability on their respective campuses (Henderson et al., 2017). Moreover, higher education institutions have included sustainability efforts in their mission statements and campus policies, such as 'green' initiatives and practices (Hooey et al., 2017).

The structure of higher education is conducive to the development and sustainability of environmental initiatives and programs (Vincent & Mulkey, 2015). However, postsecondary education institutions have encountered challenges in determining where to begin when developing a curriculum focused on sustainability (Montgomery et al., 2015). Higher education practitioners have recognized the challenges of pursuing sustainability change, including working with multiple stakeholders and limited resources (Barlett & Chase, 2013). Nonetheless, higher education institutions have implemented programs and used various forms of technology, such as social media, to enhance environmental awareness and knowledge among students, faculty, and staff (Hamid et al., 2017). These efforts have corresponded with higher education's role in contributing to students' development, focused on the human-nature dynamic of environmental sustainability (Mulkey, 2017). While college students have reported pro-environmental attitudes and awareness (Mifsud, 2012), engagement in sustainability behaviors has depended on individual norms and whether students have held biospheric, or traditional values (Whitley et al., 2016).

Faver et al. (2017) suggested that researchers examine how environmental worldviews vary by gender, academic status (i.e., graduate or undergraduate), and academic major among students at different universities. Koprina (2011) and Putu (2017) discussed examining environmental worldviews among individuals using quantitative and qualitative methods. These authors suggested that using a combination of qualitative and quantitative methods led to a more in-depth understanding of individual environmental attitudes and awareness. Further, Koprina (2011) noted that qualitative methods have added "contextual complexity" to a study (p. 1025) and could assist in the development of environmental awareness programs designed to strengthen environmental mindsets among individuals. Related to this current study, Bernstein and Szuster (2019) suggested the practice of supplementing quantitative scales of environmental worldviews with qualitative measures to provide context for research findings.

The purpose of this convergent mixed methods study was to explore environmental worldviews for students at a public four-year university in the Southwest United States. The following research questions guided this exploratory study:

1. What are the overall environmental worldviews for students?
2. What is the relationship between gender and environmental worldviews for students?
3. What is the relationship between academic level and environmental worldviews for students?
4. What is the relationship between academic majors and environmental worldviews for students?
5. To what extent and in what ways do qualitative open-ended survey questions contribute to a more comprehensive understanding of quantitative measures of environmental worldviews for students?

Methods

A convergent mixed methodology was implemented for this study to collect, analyze, and interpret quantitative and qualitative data (Creswell & Guetterman, 2019). Yin (2006) proposed that a mixed methods study's value exists in the convergence of evidence produced through combining methods to gain insight into a phenomenon. Further, Yin (2006) suggested that researchers not force qualitative and quantitative methods into the same analytic routines. Instead, the author recommended that researchers treat the two methods as a counterpart methodology. Moreover, Sandelowski et al. (2006) viewed mixed methods research as a synthesis or integration of qualitative and quantitative findings into a combined understanding of a phenomenon.

Plano Clark and Badiee (2010) discussed the importance of research question development and implementation in mixed methods studies. The co-authors suggested that research questions be answerable, important, have conceptual clarity, show congruence (i.e., questions fit the selected research method), and demonstrate qualitative and quantitative data integration. Moreover, Plano Clark and Badiee (2010) presented two models for consideration when designing a mixed methods study, (1) a traditional linear model and (2) an interactive model. For this study, research questions are associated with qualitative, quantitative, and mixed methods. Moreover, this study followed a traditional linear approach to answering research questions. As such, the research direction for this study was two-fold, (1) survey a specific population through the medium of an online, mixed-data questionnaire, and (2) synthesize qualitative and quantitative findings to obtain a better understanding of a research problem (Creswell & Guetterman, 2019).

Participant Selection

The sampling frame for this exploratory study included undergraduate and graduate students enrolled at a public four-year university in the Southwest United States recruited using convenience sampling. A survey contact list using email addresses from students participating in a doctoral educational leadership program was compiled, and university department directors' assistance was sought to disseminate an online survey participation invitation to recruit additional undergraduate and graduate students. Selection criteria included currently enrolled full-time and part-time students. Participants who did not complete the ordinal level instrument or were not 18 or older were excluded from the study. Lastly, participation in this study was voluntary, anonymous, and Institutional Review Board (IRB) approval was obtained before collecting data.

Participants

In total, 513 respondents were identified who met the criteria for inclusion in the study. Participants included 385 women and 120 men, with two students reporting gender as other and six students who preferred not to answer. Participants' average age was 34, with an average age of 27 for undergraduate students ($n = 206$) and 39 for graduate students ($n = 307$). Students enrolled with the university's college of education and human development represented the most participants ($n = 238$), followed by the college of arts and sciences ($n = 139$), college of business ($n = 61$), college of engineering ($n = 38$), college of fine arts and communication ($n = 33$), and no response ($n = 4$).

Instrument

The revised New Ecological Paradigm (NEP-R) Scale was identified as an ordinal level instrument for use in this study to measure participants' environmental worldviews. Dunlap et al. (2000) developed the revised NEP-R to measure ecological attitudes. The NEP-R is administered as a 15-item using a 5-point Likert-type numerical scale that ranged from (1) *strongly disagree* to (5) *strongly agree*. Further, the NEP-R authors structured the scale to where agreement with even-numbered responses corresponded with an endorsement of the dominant social paradigm while odd-numbered responses corresponded to NEP endorsement (Anderson, 2012). Even number questions were reversed coded, and individual NEP-R scores were computed by calculating the mean for NEP-R items (Gage & Graefe, 2019). High scores on the NEP-R indicated participants endorsed a new ecological paradigm worldview, while a low score provided evidence that supported endorsement of the dominant social paradigm (Dunlap et al., 2000).

Procedures

A survey research design was implemented using Qualtrics software to collect qualitative and quantitative data concurrently during fall 2020 and spring 2021. Institutional Review Board (IRB) approval was granted before collecting survey data. The survey included demographic information to include age, gender, college academic level, and college major (categorized by university college and department). Further, the survey included a published instrument to collect ordinal data for environmental worldviews and three open-ended questions. The following open-ended questions were developed to gain insight into participants' environmental worldviews in the context of experiencing higher education:

- How has your college experience influenced your environmental worldview?
- Describe how your university's efforts have exceeded or been inferior to other universities or organizations in terms of promoting environmental awareness.
- Explain why we should be doing more to bring awareness to environmental problems or why we have already done more than is necessary to raise awareness about environmental problems.

Results

Research Question 1

NEP-R items and summed scores were calculated and summarized to answer research question one; what are the environmental worldviews for students at a public four-year university located in the Southwest United States? Even-numbered NEP-R items were reversed coded and interpreted as disagreement indicating a pro-environmental orientation (Dunlap et al., 2000; Nam & Chatmon, 2015). The overall NEP-R index ($M = 3.55$, $SD = 0.65$) showed that participants measured toward a pro-environmental orientation using the item score categories ranging from 1.00 to 2.99 as a negative attitude toward the environment and a mean score ranging from 3.00 to 5.00 indicating a positive attitude toward the environment (Erkal et al., 2012). Overall, the reliability for the NEP-R was high, $\alpha = .83$.

NEP-R item mean scores were examined to gain insight into participants' environmental orientations (see Table 1). The most positive attitudes were demonstrated on items 3, 5, 7, and 9. These findings indicated that students agreed that human interference with nature could lead to disastrous consequences ($M = 4.01$), humans are seriously abusing the environment ($M = 4.29$), plants and animals have as much right as humans to exist ($M = 4.26$), and humans are subject to the laws of nature ($M = 4.55$). However, participants suggested that they mildly agreed, or were somewhat uncertain, with the notion that human ingenuity would ensure that humans would not make Earth unlivable, item four, ($M = 2.80$). Moreover, most participants agreed that Earth has plenty of resources if humans learn how to develop them, item six, ($M = 2.08$).

TABLE 1
NEP-R MEAN, MEDIAN, AND STANDARD DEVIATION RESULTS BY INSTRUMENT
ITEM (N=513)

NEP-R Item	<i>M</i>	<i>Mdn</i>	<i>SD</i>
1. We are approaching the limit of the number of people the Earth can support.	3.17	3.00	1.31
*2. Humans have the right to modify the natural environment to suit their needs.	3.12	3.00	1.22
3. When humans interfere with nature it often produces disastrous consequences.	4.01	4.00	1.07
*4. Human ingenuity will insure that we do not make the Earth unlivable.	2.80	3.00	1.20

5. Humans are seriously abusing the environment.	4.29	5.00	1.00
*6. Earth has plenty of natural resources if we just learn how to develop them.	2.08	2.00	1.17
7. Plants and animals have as much right as humans to exist.	4.26	5.00	1.15
*8. The balance of nature is strong enough to cope with the impacts of modern industrial nations.	3.60	4.00	1.23
9. Despite our special abilities, humans are still subject to the laws of nature.	4.55	5.00	0.71
*10. The so-called “ecological crisis” facing humankind has been greatly exaggerated.	3.66	4.00	1.39
11. The Earth is like a spaceship with very limited room and resources.	3.32	4.00	1.32
*12. Humans were meant to rule over the rest of nature.	3.21	4.00	1.48
13. The balance of nature is very delicate and easily upset.	3.76	4.00	1.13
*14. Humans will eventually learn enough about how nature works to be able to control it.	3.46	4.00	1.22
15. If things continue on their present course, we will soon experience a major ecological catastrophe.	3.99	4.00	1.22

Note. *Item reverse coded, higher scores indicate disagreement and a pro-environmental worldview.

A Kruskal-Wallis H test was conducted to determine if there was a difference in NEP-R summed scores (scores ranging from 15 to 75, with 75 indicating a high pro-environmental orientation) between student age groups: 18 to 21 ($n = 82$), 22 to 34 ($n = 187$), 35 to 49 ($n = 182$), and 50 plus ($n = 62$). Distributions of NEP-R summed scores were similar for all groups, as assessed by visual inspection of a boxplot. The Kruskal-Wallis H test results are reported as a chi-squared statistic because the chi-distribution approximates the H distribution (Brace et al., 2000; Laerd Statistics, 2015; McDonald, 2014). Adjusted p-values are reported. Effect sizes are reported as eta-squared measures (Tomczak & Tomczak, 2014). NEP-R summed scores were statistically significantly different between age groups, $\chi^2(3) = 15.949, p = .001, \eta^2 = .022$. Pairwise comparisons were performed using Dunn’s test with a Bonferroni correction for multiple comparisons (Laerd Statistics, 2015). This post hoc analysis revealed statistically significant differences in NEP-R summed scores between students aged 22 to 34 ($Mdn = 56.00$) and the 35 to 49 ($Mdn = 53.00$) ($p = .018, \eta^2 = .116$) and 50 plus ($Mdn = 50.50$) ($p = .003, \eta^2 = .294$) age groups.

Research Question 2

NEP-R item and summed scores were examined to answer research question two; what is the relationship between gender and environmental worldviews for students at a public four-year university in the Southwest United States? Participants were excluded who reported their gender as other ($n = 2$) and preferred not to answer ($n = 6$). A Kruskal-Wallis H test was conducted to determine if there was a difference in NEP-R summed scores (scores ranging from 15 to 75) between gender groups: male ($n = 120$) and female ($n = 385$). Distributions of NEP-R summed scores were similar for all groups, as assessed by visual inspection of a boxplot. NEP-R summed scores were statistically significantly different between male ($Mdn = 51.00$) and female ($Mdn = 55.00$) students, $\chi^2(1) = 14.493, p < .001, \eta^2 = .028$.

Kruskal-Wallis H tests were conducted to determine where differences existed in NEP-R item scores (scores ranging from 1.00 to 5.00) between men and women participants. Distributions of NEP-R item

scores were not similar for all groups, as assessed by visual inspection of boxplots. Findings and adjusted p-values are presented (see Table 2). Group mean ranks were reported for the following reason, the distributions of groups were different, and a comparison of mean ranks rather than medians was conducted (Laerd Statistics, 2015). Moreover, the Kruskal-Wallis H test is performed after ordering all observations or scores by rank in a data set, returning ranked scores to their original groups, summing ranks for each group, and then calculating a chi-square statistic (Field et al., 2012; McDonald, 2014).

TABLE 2
RESULTS OF KRUSKAL-WALLIS H TESTS EXAMINING NEP-R ITEM SCORES BY GENDER (N=505)

NEP-R Item	Male (n = 120)	Female (n = 385)	$\chi^2(1)$	p	η^2
	Mean Rank	Mean Rank			
1. We are approaching the limit of the number of people the Earth can support.	227.98	260.80	4.856	.028	.004
*2. Humans have the right to modify the natural environment to suit their needs.	198.52	269.98	24.085	< .001	.042
3. When humans interfere with nature it often produces disastrous consequences.	229.92	260.19	4.526	.033	.003
7. Plants and animals have as much right as humans to exist.	203.11	268.55	23.973	< .001	.042
*8. The balance of nature is strong enough to cope with the impacts of modern industrial nations.	224.46	261.90	6.497	.011	.007
*12. Humans were meant to rule over the rest of nature.	227.84	260.84	4.918	.027	.004
*14. Humans will eventually learn enough about how nature works to be able to control it.	218.66	263.70	9.268	.002	.012

Note. *Item reverse coded with higher scores indicating disagreement and a pro-environmental worldview. Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Research Question 3

NEP-R item and summed scores were examined to answer research question three; what is the relationship between academic level and environmental worldviews for students at a public four-year university located in the Southwest United States? Academic levels were defined as either undergraduate or graduate students. All participants ($N = 513$) were included in the following analyses.

A Kruskal-Wallis H test was conducted to determine if there was a difference in NEP-R summed scores (scores ranging from 15 to 75) between different academic levels: undergraduate ($n = 206$) and graduate ($n = 307$) students. Distributions of NEP-R summed scores were similar for both groups, as assessed by visual inspection of a population pyramid. NEP-R median summed scores between undergraduate ($Mdn = 55.00$) and graduate ($Mdn = 54.00$) students were not statistically significant, $\chi^2(1) = .021$, $p = .884$.

Kruskal-Wallis H tests were conducted to determine where differences existed in NEP-R item scores (scores ranging from 1.00 to 5.00) between undergraduate and graduate participants. Distributions of NEP-

R item scores were not similar for all groups, as assessed by visual inspection of boxplots. NEP-R item scores were statistically significantly different between undergraduate and graduate students. Pairwise comparisons and adjusted p-values are presented (see Table 3).

TABLE 3
RESULTS OF KRUSKAL-WALLIS H TESTS EXAMINING NEP-R ITEM SCORES BY
ACADEMIC LEVEL (N = 513)

NEP-R Item	Undergraduate (<i>n</i> = 120)	Graduate (<i>n</i> = 385)	$\chi^2(1)$	<i>p</i>	η^2
	Mean Rank	Mean Rank			
9. Despite our special abilities, humans are still subject to the laws of nature.	243.52	266.04	4.032	.045	.002
NEP-R Item	Undergraduate (<i>n</i> = 120)	Graduate (<i>n</i> = 385)	$\chi^2(1)$	<i>p</i>	η^2
	Mean Rank	Mean Rank			
*12. Humans were meant to rule over the rest of nature.	283.54	239.19	11.592	< .001	.017

Note. *Item reverse coded with higher scores indicating disagreement and a pro-environmental worldview. Asymptotic significances (2-sided tests) are displayed. The significance level is .05

Research Question 4

NEP-R item and summed scores were examined to answer research question four; what is the relationship between academic major and environmental worldviews for students at a public four-year university located in the Southwest United States? Due to the large selection of academic majors offered at the university, participants were classified into one of six academic categories: college of arts and sciences (*n* = 139), college of business (*n* = 61), college of education and human development (*n* = 238), college of engineering (*n* = 38), college of fine arts and communication (*n* = 33), and no response (*n* = 4).

If participants entered more than one academic major (e.g., double majors), the first academic major listed by the participant was coded for analysis. Some participants listed all college degrees earned, whether undergraduate or graduate. In these instances, a participant’s reported academic level was used to select their appropriate academic program for inclusion in the survey analyses. Table 4 shows a summary of NEP-R summed scores for participants by college and department.

TABLE 4
NEP-R SUMMED SCORE SUMMARY STATISTICS BY COLLEGE AND DEPARTMENT
(N = 513)

College and Department	<i>n</i>	<i>M</i>	<i>Mdn</i>	<i>SD</i>
No Response	4	45.50	43.50	12.39
College of Engineering	38	51.50	51.00	8.85
College of Business	61	52.57	54.00	11.26
College of Education and Human Development	238	53.39	54.00	9.77
College of Arts and Sciences	139	53.58	55.00	9.51
College of Fine Arts and Communication	33	55.48	56.00	7.53

Note. College and department NEP-R summed scores are ordered from lowest to highest.

A Kruskal-Wallis H test was conducted to determine if there was a difference in NEP-R summed scores between academic majors categorized by college and department: college of arts and sciences ($n = 139$), college of business ($n = 61$), college of education and human development ($n = 238$), college of engineering ($n = 38$), college of fine arts and communication ($n = 33$), and no response ($n = 4$). Distributions of NEP-R summed scores were not similar for all groups, as assessed by visual inspection of a boxplot. The mean ranks of NEP-R summed scores were not statistically significant between groups, $\chi^2(5) = 5.752, p = .331$.

Kruskal-Wallis H tests were conducted to determine whether differences existed in NEP-R item scores (scores ranging from 1.00 to 5.00) between different colleges and departments. Distributions of NEP-R item scores were not similar for all groups, as assessed by visual inspection of boxplots. NEP-R item score 12 was statistically significantly different between groups, $\chi^2(5) = 16.559, p = .005, \eta^2 = .019$. Pairwise comparisons were performed using Dunn's test with a Bonferroni correction for multiple comparisons (Laerd Statistics, 2015). Adjusted p-values are presented. A significant difference in mean ranks was found for item 12 (humans were meant to rule over the rest of nature) between the college of arts and sciences (mean rank = 285.33) and the college of education and human development (mean rank = 239.51), $\chi^2(1) = 45.813, p = .045, \eta^2 = .114$.

NEP-R item score 14 was statistically significantly different between groups, $\chi^2(5) = 21.429, p = .001, \eta^2 = .028$. Pairwise comparisons were performed with a Bonferroni correction for multiple comparisons. Adjusted p-values are presented. A significant difference in mean ranks was found for item 14 (humans will eventually learn enough about how nature works to be able to control it) between the college of education and human development (mean rank = 276.39) and the college of engineering (mean rank = 193.32), $\chi^2(1) = 83.079, p = .014, \eta^2 = .292$.

Research Question 5

Open-ended questions were analyzed to gain insight into participants' perspectives towards environmental worldviews in the context of experiencing higher education. Participants' verbatim responses were presented with the following details in parenthesis to support the mixed methods approach of this study: gender, identification number, and NEP-R summed score (e.g., male, 5, 56). Prior et al. (2019) used a similar reporting method to present participant details along with verbatim responses in a study examining the disruptive effects of environmental contamination on health.

How has your college experience influenced your environmental worldview? A review of open-ended responses revealed that 361 of the 513 (70.37%) participants provided a relevant answer to the question, and 152 participants either did not answer the question or provided an answer that was not relevant to the question. While analyzing responses, three major themes emerged to include: *influence*, *no influence*, and *uncertainty*. The theme, *influence*, indicated that participants reported that their college experience influenced their environmental worldview. In contrast, *no influence* indicated that students' higher education experience did not influence their environmental worldview. Lastly, *uncertainty* indicated that a participant was unsure whether experiencing higher education had influenced their environmental awareness or worldviews.

Participants ($n = 195$) indicated that college experience had influenced their environmental worldview in some way. For instance, one participant stated that the time spent in college provided opportunities to explore "many topics to include learning about the environment and the many ways humans are causing harm" (female, 215, 71). Another participant mentioned that learning about science had influenced their interest in preserving the environment (female, 337, 69). One participant noted that their college experience and intellectual exposure had "broadened my understanding of the human industrial impact on earth" (female, 120, 64).

Conversely, 160 participants reported that their college experience had no, or minimal, influence on their environmental worldviews. These participants often used wording such as "hasn't" or "has not" in their responses to whether college experience influenced their environmental worldviews. Other participants were not as direct in their responses. For instance, some participants reported college experience as a minimal influence by using wording such as "not very much" (female, 136, 64), "hasn't really" (e.g., female, 220, 64; female, 45, 62; female, 247, 58), or "very little" (female, 285, 44).

Other participants reported college experience as a minimal influence on their environmental worldviews. As such, three underlying minor themes were identified within this category to include: *existing views*, *life experiences*, and *self-study*. For instance, one participant indicated that college had “not shifted my environmental world view very much” (female, 4, 71). Another participant indicated being “already aware of environmental issues” (female, 220, 64). As for life experiences, one participant reported, “I’ve been out of college [Bachelors] for a long time and my worldview is shaped more by the experience after college” (female, 457, 64). Similarly, a participant reported that their environmental worldview “was shaped well before I returned to studies for my MBA” (female, 483, 70). Other participants reported how self-study had influenced their environmental worldviews. For instance, one participant discussed how “my own personal interests and reading have been the major influencers in my environmental worldview” (female, 205, 62). Similarly, another participant reported that they had “developed my own opinion on my own research” (female, 53, 59). Lastly, one participant reported how individual research influenced their eco-friendly behavior and awareness of “greenwashing” (other, 98, 62).

Further analysis revealed that four participants expressed *uncertainty* in their responses as to whether college experience influenced their environmental worldview. For instance, one participant mentioned, “I am not sure if ‘college’ directly impacted my thinking, but people certainly did and they happen to be going to college” (female, 512, 50). Along the same line, another participant discussed how they were “not sure it has influenced my environmental worldview in any way” (female, 378, 45). Lastly, one participant mentioned how “it seems the ‘experts’ are not able to agree. So, this has left me confused” (female, 369, 33).

Describe how your university’s efforts have exceeded or been inferior to other universities or organizations in terms of promoting environmental awareness. A review of open-ended responses to the question revealed that 306 of the 513 (59.64%) participants provided a relevant answer to the question, and 207 participants either did not answer the question or provided an answer that was not relevant to the question. The following major themes associated with this open-ended question emerged: *promoted*, *similar efforts*, *not promoted*, *inferior*, and *unaware*. Moreover, minor themes were identified, which provided additional insight into understanding participants’ perspectives toward environmental awareness and practices.

Several participants ($n = 53$) discussed how their university promoted environmental awareness through various informational services, such as weekly email updates or recycling actions. One participant described the university’s efforts to raise environmental awareness through signage and newsletters and provided students opportunities to “join in” (female, 459, 36). Other participants discussed environmental awareness events on campus, such as promoting Earth Day and maintaining trash and recycle bins (female, 86, 60; female, 366, 45).

Some participants ($n = 15$) indicated that their current college was similar, or no difference existed in promoting environmental awareness on campus compared to other colleges or universities. Participants provided insight into how their current university compared to previous higher education institutions by writing statements such as, “same as community college in my experience” (female, 79, 51; female, 242, 64) or they have been “somewhat equal to other campus I have been a part of” (male, 317, 58). In terms of similarities in promoting environmental awareness, one participant mentioned campus actions such as posting signage, recycling, and holding Earth Day festivals (male, 470, 29).

Other participants ($n = 36$) reported that their university did not promote environmental awareness. In these instances, participants often wrote a direct statement indicating how their university “hasn’t” or “did not” engage in efforts to promote environmental awareness (female, 34, 54; female, 36, 50). For example, one respondent wrote that the university had not made “a concerted effort to promote environmental awareness or responsible stewardship of the planet” (male, 288, 63).

While examining responses, the minor theme, *recycling problem*, emerged. Some participants reported that the university did maintain recycling bins on campus, but there was no recycling facility located within proximity to campus to process the waste materials (female, 21, 55; female, 75, 60; other, 98, 62; male, 421, 64). Further, one participant mentioned that a student organization focused on environmentalism “had

too many roadblocks to be effective” and that this organization was “on track to be a change agent, but the city doesn’t even recycle anymore” (male, 430, 44).

While participants discussed how the university promoted or did not promote environmental awareness efforts, 17 participants specifically wrote that their university was inferior to other colleges, universities, or organizations in promoting environmental awareness. For instance, one participant noted, “Inferior, I have not seen any environmental promoting” (male, 48, 51). Other participants wrote how “it must be inferior due to lack of environmental awareness” (female, 202, 60) and “definitely inferior compared to other universities I have been to” (female, 512, 50). The latter participant discussed how their current university could only “do what students want” and could not force the issue.

Along the same line, three participants discussed how the university engaged in “lip service” instead of putting forth genuine effort to promote environmental awareness. The minor theme, *minimum effort*, emerged as a subset of inferior effort in promoting environmental awareness. For instance, one participant wrote how the university “seems to just be tipping their hat to environmental issues rather than taking them on” (male, 63, 54). A second participant explained how the university’s lack of effort in promoting environmental awareness was “typical of most organizations” (male, 259, 33). A third participant discussed how environmental awareness “is driven not by genuine regard for nature, but instead out of a desire to fit in” (male, 310, 27).

While participants either discussed the university’s failure or success in promoting environmental awareness on campus, 73 participants reported being *unaware* of environmental efforts on campus. The participants’ provided varied responses related to not being aware of environmental awareness efforts. Participants wrote how they had not noticed or been unsure about any environmental efforts on campus (female, 14, 47; female, 240, 64; female, 337, 69). Several participants stated that they had not paid attention or sought out information about environmental awareness on campus (female, 7, 56; female, 72, 50; female, 131, 64; female, 276, 45; male, 354, 45; male, 375, 39).

The minor themes *more effort needed* and *not relevant* were identified and provided additional insight into participants’ perspectives concerning their university’s efforts in promoting environmental awareness. For the theme, *more effort needed*, participants either provided a reflective statement about environmental awareness efforts or problems, offered suggestions on how their university could raise environmental awareness or promote environmental behavior or action, or both. For instance, one participant discussed how their university could “attempt to be more public” and share environmental knowledge and encourage recycling materials (female, 45, 62).

Lastly, five participants were identified who indicated environmental awareness efforts on campus, or as part of an academic curriculum, as not relevant. For instance, participants discussed perspectives such as how “my program does not have the space or need for environmental awareness” (female, 139, 61) and “I would have taken environment-related classes if this was something I was interested in” (female, 216, 51). Finally, one participant wrote, “I have no desire to adopt a particular world view or indoctrination of an education provider” (prefer not to answer, 472, 30).

Explain why we should be doing more to bring awareness to environmental problems or why we have already done more than is necessary to raise awareness about environmental problems. A review of open-ended responses revealed that 336 of the 513 (65.50%) participants provided a relevant answer to the question, and 177 participants either did not answer the question or provided an answer that was not relevant to the research question. After examining and coding responses to this question, five major themes emerged: *more effort needed*, *student reflection*, *enough has been done*, *uncertainty*, and *not concerned*. Moreover, a minor theme, *call-to-action*, was identified while examining responses. A *call-to-action* statement was defined as one in which participants responded with phrases such as “we need to” or “we should,” followed by a suggested action or solution to an environmental problem.

Overall, 122 participants reported that more effort was needed to promote environmental awareness or engage in pro-environmental actions. Participants wrote responses such as “we can never do enough to bring awareness to environmental problems” (female, 503, 63), “we should be doing more to help sustain our environment” (female, 19, 53), and “enough is never enough and more can always be done” (female, 21, 63). Lastly, a common topic mentioned by participants ($n = 53$) emphasized the importance of

promoting environmental awareness and taking corrective actions because we only have one Earth with limited natural resources.

The examination revealed that 42 participants suggested a *call-to-action*. For instance, one participant discussed how people should take responsibility for their actions by properly disposing of waste “to prevent harm to animals” (female, 76, 60). Participants also suggested changes in campus operations that could support pro-environmentalism such as “finding ways to normalize recycling and vegetarian options on campus” (other, 98, 62). Another participant suggested that “we should hold an event” and provided a suggestion of holding an environmental cleanup event (female, 17, 43).

Other participants expressed less optimistic outlooks towards environmental efforts through reflective statements. For instance, one participant wrote, “I feel that at this point, humans are past the point of truly changing their ways and would rather dismiss the idea than actually face the truth” (female, 246, 61). Another participant stated, “there are too many people who simply do not care or do not know enough about our environmental problems” (female, 400, 59). Lastly, two participants discussed how “we are headed for disaster if more people aren’t aware of environmental issues” (female, 130, 58), and the “world is headed in the direction of disaster” (female, 128, 59).

While examining responses, 11 participants suggested that we have done enough to promote environmental awareness. For instance, two participants discussed how we have done what is necessary, or plenty “has been done” to promote environmental awareness (female, 15, 60; female, 42, 43; male, 355, 33). One participant expressed a less optimistic view of promoting environmental awareness, suggesting that “there’s no way to undo what we’ve done” (female, 108, 58). One participant indicated that environmental problems “are way overly exaggerated” (male, 96, 32). Moreover, another participant wrote, “people are idiots and taking ‘environmental awareness’ to extremes” and suggested “stop it, already” (female, 462, 28).

Lastly, seven participants expressed *uncertainty* about whether more effort was needed or not needed to promote environmental awareness or expressed no concern about the issue. Participants who expressed uncertainty responded with brief statements such as “I don’t know” (female, 100, 55), “not sure” (female, 251, 55), or “unsure” (female, 351, 46; female, 378, 45; female, 418, 50). Participants who reported no concern provided brief statements such as “it doesn’t concern me” (female, 168, 15) or suggested environmental awareness not to be “an important issue” (female, 182, 43). Table 5 summarizes major and minor themes.

TABLE 5
SUMMARY OF SURVEY QUESTIONS MAJOR AND MINOR THEMES

Survey Question	Major Themes	Minor Themes
1. How has your college experience influenced your environmental worldview?	Influence, No influence, Uncertainty	Existing views, Life experiences, Self-study
2. Describe how your university’s efforts have exceeded or been inferior to other universities or organizations in terms of promoting environmental awareness.	Promoted, Similar efforts, Not promoted, Inferior, Unaware.	Recycle problem, Minimum effort, More effort needed, Not relevant
3. Explain why we should be doing more to bring awareness to environmental problems or why we have already done more than is necessary to raise awareness about environmental problems.	More effort needed, Student reflection, Enough has been done, Uncertainty, Not concerned.	Call-to-action

Discussion

This convergent mixed methods study aimed to explore environmental worldviews for postsecondary education students at a public four-year university in the Southwest United States. Creswell and Guetterman (2019) discussed how researchers should compare qualitative and quantitative data results to determine whether both sets of data support or diverge. After examining the mixed methods online survey data, qualitative and quantitative results were supportive and combined to provide insight and contextual depth to realizing participants' environmental worldviews.

Quantitative results indicated that, overall, participants tended to hold pro-environmental worldviews. A key finding from the online survey showed that women possessed higher pro-environmental worldviews than men. Other researchers such as Shephard et al. (2009) and Erdogan (2013) also found that women reported more pro-environmental orientations than men in previous studies of postsecondary education students. Exploring differences in NEP-R item scores between women and men students added insight into understanding these differences (see Table 2). After examining participant age groups, students aged 22 to 34 held higher pro-environmental worldviews than 35 and older.

An examination of NEP-R summed scores between graduate and undergraduate participants revealed no significant difference in environmental worldviews. After examining NEP-R item scores between academic levels, graduate students measured significantly higher on NEP-R item 9 (despite our special abilities, humans are still subject to the laws of nature) than undergraduate students. Further, undergraduate students measured significantly higher on NEP-R item 12 (humans were meant to rule over the rest of nature) than graduate students.

An examination of NEP-R summed scores showed no significant difference between students enrolled in different colleges and departments. Müderrisoglu and Altanlar (2011) and Nam and Chatmon (2015) previously found that a student's academic major did not influence environmental attitudes. However, Kuo and Jackson (2014) found undergraduate students pursuing engineering majors measured lower in endorsing pro-environmental worldviews than non-engineering majors. Further, Lang (2011) found that undergraduate students pursuing business majors reported lower pro-ecological worldviews than non-business majors. In this study, two significant differences emerged while exploring NEP-R item scores between the university's colleges and departments. First, college of arts and sciences students tended to disagree more than education and human development students on the notion that humans were meant to rule over the rest of nature. Second, college of education and human development students tended to disagree more than engineering students on the idea that humans will eventually learn enough about how nature works to control it.

Various themes emerged while coding answers to the three open-ended questions (see Table 6). For reporting purposes, major and minor themes were organized and counted. Tashakkori and Teddlie (1998) described this strategy as the concurrent analysis of the same qualitative data. The co-authors discussed using descriptive statistics, such as frequency counts, to organize and summarize data. Besides combining qualitative with quantitative data to better understand environmental worldviews, open-ended questions provided a platform for participants to express attitudes, opinions, and thoughts toward environmental issues.

LIMITATIONS AND FUTURE RESEARCH

The present study contributes to a better understanding of postsecondary education students' environmental worldviews by answering a call to examine additional influencing factors on environmental worldviews. However, this study was not without limitations. For example, the possibility that the survey structure, including the context of questions, could have influenced participants' answers (Pienaar et al., 2015). Further, the use of convenience sampling produced findings that are not generalizable outside of the sampling population (Creswell & Guetterman, 2019). Lastly, data collection and analyses were limited by time constraints.

Suggestions for future research include examining additional demographic and personality traits' influences on pro-environmental worldviews and behaviors (Pavalache-Ilie & Cazan, 2018). Furthermore,

researchers should continue to examine environmental worldviews using qualitative and quantitative methods (Kopnina, 2011; Putu, 2017). Moreover, participant insights and concerns about environmental issues provided additional ideas for future research. For instance, one study participant discussed how people living in lower socio-economic areas might experience greater disparity because of environmental problems, such as outside entities depleting local resources. Pastor and Morello-Frosch (2018) also discussed examining how individuals affected by a lower socio-economic status had confronted social inequities related to environmental problems. By gaining insight into postsecondary education students' environmental worldviews, higher education stakeholders can recognize the students who identify as change agents for institutional efforts to achieve and promote pro-environmental and sustainability goals (Daneri et al., 2015).

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