2024

Reexamination of College Students' Behaviors and Knowledge of Recycling

Ella Hilbrant
University of Northern Iowa

Reexamination of College Students' Behaviors and Knowledge of Recycling

A Thesis Submitted

in Partial Fulfillment

of the Requirements for the Designation

University Honors

Ella Hilbrant

University of Northern Iowa

May 2024

This Study by: Ella Hilbrant

Entitled: Reexamination of College Students' Behaviors and Knowledge of Recycling

has been approved as meeting the thesis requirement for the Designation University Honors

Approved by:

Dr. Alicia Rosburg, Honors Thesis Advisor

Dr. Jessica Moon Asa, Director, University Honors Program

Introduction

The motivation for and consistency of recycling behavior varies widely from person to person. For some, motivation stems from concern for the environment, while others lack motivation to recycle at all or will only recycle if convenient. Within college students, differences in motivation and recycling habits may depend on factors such as personal demographics, involvement in specific classes or student groups, recycling habits before college, etc. Recycling behaviors can also stem from environmental literacy, which is how individuals understand, process, and use environmental information needed to make informed, sustainable, and environmentally friendly decisions (Null et al. 2021). Furthermore, on-campus recycling programs may influence these behaviors through convenience level, cost, and educational outreach.

According to the US Environmental Protection Agency (EPA, 2022), recycling is the collection and processing of materials and the creation of new products. Recycling is one way to protect environmental resources and maintain human health (Largo-Wight et al., 2013). Given recycling's impact on the environment and the economy, it is important to understand the drivers of recycling behavior and how these drivers might vary with different populations. In this paper, I focus on college students; these individuals will be making decisions for their communities in the near future and we can glean insight into their decisions based on their current knowledge, beliefs, and habits on campus. For example, is a students' concern for the environment reflected in their willingness to financially support environmental initiatives? Is participation in environmental-related courses or groups related to their recycling knowledge or behavior? What demographics of college students are willing to financially contribute more to environmental initiatives? What factors contribute to college students' on campus recycling behavior?

Evaluating these types of questions, especially within a given institution, provides valuable information regarding current and potential recycling-related efforts.

Evaluating recycling behavior among college students is not new to the University of Northern Iowa (UNI). Wilcox (2014) explored factors that influence students' recycling behavior at UNI and surrounding colleges. Shipley (2021) built off Wilcox's research by deploying a survey with a handful of similar survey questions but added questions to provide deeper insights into recycling habits, beliefs, and knowledge among UNI students. Shipley (2021) provided comparisons with Wilcox (2014) and overviewed the new survey findings through summary statistics.

For this project, I redeployed the Shipley (2021) survey in early 2024 with minor modifications in order to identify potential changes (or consistency) among UNI students over time. Further, I performed more advanced statistical analysis, specifically t-tests and regression analysis, using both the 2021 and 2024 survey data to identify potential relationships between variables of interest and glean insight into some of the questions raised above. Further, this information will aid further research and initiatives at UNI regarding recycling, environmental-related activities, and funding.

Background and Review of Literature

Recycling directly relates to environmental issues of resource recovery and depletion (Wilcox, 2014). Non-environmental benefits of recycling include cost savings from less energy use and job creation (EPA, 2022). Recycling systems, however, also have costs. Individuals incur costs in allocating time and resources to sort, clean, and transport materials (Berglund, 2006). Institutions also incur implementation costs. Lonusbury (2001) explores the cost of

recycling programs at higher education institutions and notes how coordinators of programs emphasize the importance of awareness through educational outreach and publicity.

Concern for the environment in relation to recycling has been researched overtime. Schultz & Oskamp (1996) found that recycling requires a significant amount of effort, only those with high pro-environmental attitudes will recycle. Similarly, Best & Mayerl (2013) found a positive and significant relationship between recycling-specific attitude and the effect on recycling behavior. This finding is also present in other countries; Jerkia and Daud (2016) identified a pathway from environmental concern to attitudes to recycling behavior for householders in Selangor, Malaysia. Recent findings have also found this relationship in college students. Using self-reported recycling behavior methods, Chao et al. (2023) found that environmental concern had a significant positive effect on recycling behavior.

Recycling at higher education institutions is done through the use of recycling programs, and a body of research has explored the effectiveness of these programs. Mason (2017) found that campus support is vital for successful in-house and outsourced recycling programs. Null et al. (2021) found that even though students deemed themselves to be pro-environment, their actual knowledge was mediocre. Another study done by Arian et al. (2020) found that education on e-waste disposal was not enough to influence behavior; rather, cost was the most important factor of recycling behavior.

At UNI, there are multiple environmental programs; two programs that closely connect to recycling include the Iowa Waste Reduction Center (IWRC) and the Center for Energy and Environmental Education (CEEE). The IWRC serves small businesses by hosting training, educating, and assisting entities for environmental needs (IWRC, 2023). The CEEE aims to reduce community energy consumption and greenhouse gas emissions, inform public officials on

budget decisions that focus on reduction strategies, and work with community leaders to develop conservation and community resilience plans (CEEE, 2023).

As mentioned above, Wilcox (2014) conducted a survey of UNI students focused on students' attitudes towards recycling. Wilcox found that most students recycle as much as possible, and for those who don't, a lack of awareness was a key factor (Wilcox, 2014). Shipley (2021) conducted a survey in 2021 that included a few questions similar to Wilcox (2014) for comparative purposes but also included several new questions to evaluate students' knowledge of recycling, their willingness to pay for the green fund, and preferences for campus sustainability efforts. Shipley (2021) found that students were willing to allocate more money than their current allocation ($1.00 per academic year) to the UNI Green Fund, which is a small fee lumped into UNI students' fees used to support sustainability projects that benefit students. Compared to the Wilcox (2014) survey, school appeared to have more influence over recycling behavior (Shipley, 2021). In relation to this, Shipley (2021) also found that for those who were involved in an environmental class or group, not a single person indicated "Not at all" for their concern on the environment.

Research Methods

To analyze potential change over time, I redeployed Shipley's (2021) survey with minor adjustments (see Appendix A for full survey); minor adjustments included corrections for time-specific references, entity name changes between 2021 and 2024, and the addition of select follow-up questions per the request of the UNI Office of Sustainability (detailed below). The survey begins with a question regarding students' concern for the environment, which asks them to decide which statement they most align with ranging from "Not at All" to "Extremely Concerned". This is followed by two questions regarding their involvement in environmental

groups and/or classes. Participants are then asked to indicate their agreeableness on a 5-point Likert scale for statements regarding recycling such as their feelings of necessity, ease of recycling, influence of peers, family, or school. The next section of the survey asked questions about their recycling habits both on and off campus and their beliefs about peers' concern for recycling.

The next question set evaluated students' understanding of what can and cannot be recycled in UNI's non-housing buildings (i.e., academic buildings). Respondents were provided with a list of objects and asked to choose whether or not each object was recyclable in UNI's single-stream recycling system; students were provided three response options: "recyclable", "not recyclable", or "I don't know". The 2024 survey included the same items and initial options as Shipley (2021)'s survey. However, unlike Shipley (2021), the 2024 survey included a follow-up question for any item for which a respondent indicated "I don't know." These follow-up questions were added per the request of the UNI Office of Sustainability which requested information to determine what "action" the student would make if forced to make a decision to recycle or throw in the trash. Specifically, for any object for which a respondent selected "I don't know", the respondent was asked to "indicate whether you would choose to put the item in the recycling bin OR trash can despite your uncertainty." While these additional questions cannot be directly compared with the 2021 data, they provide valuable information about students' decision making and I analyze them separately.

At UNI, some of the funding from student services goes to the Green Fund for sustainability initiatives. Students pay a $1.00 fee per academic year towards this fund which helps support sustainability projects for students chosen by the Student Sustainability Engagement Committee. The survey question informs students about the fund and gives them a

hypothetical scenario regarding a potential fee increase. The question asks them to identify their maximum allocation (or willingness to pay) if this hypothetical increase were to occur. Respondents were given the following options: “I would not support any increase (remain $1 per year)”, “increase to $1.50 per year”, “increase to $2.00 per year”, “increase to $2.50 per year”, “increase to $3.00 per year”, and “Other. Please indicate your maximum allocation per year.” There was no option to request removing the green fund altogether.

The next section of the Shipley (2021) survey asked respondents to prioritize sustainability initiatives, while recognizing budget limitations. Sustainability initiatives listed included educational initiatives, energy efficiency efforts, protecting or restoring campus ecosystems, recycling/waste diversion initiatives, student focused speakers, student research projects, and sustainability themed events. Respondents used a sliding scale from 0 - 100 to indicate their relative priority of each initiative. Respondents were also provided an open-ended question to suggest sustainability initiatives they would like UNI to consider. The final section of the survey gathered student demographics. Respondents are asked to indicate their gender, age, classification, grade point average (GPA), primary college, and political affiliation.

To maintain consistency with Shipley’s (2021) data, the survey was sent to 1000 representative undergraduate students using a similar timeline. Specifically, the survey was sent in early January 2024 with two reminder emails; the survey was open for around three weeks and overlapped with the first week of classes. Shipley’s (2021) analysis of the 2021 data focused on summary statistics. While summary statistics are telling, they don’t test for the significance of variables to find key patterns or control for other variables when evaluating relationships. For this paper, I pooled together both data sets (2021 and 2024) to perform OLS regressions. I also

ran t-tests to check for differences-in-means between important variables across the two survey periods. This allows for some insightful comparisons and helps verify the ability to pool the data.

Prior to my regression analyses, I identified a number of hypotheses to test. Specifically:

1. Concern for the environment has a positive relationship with Green Fund willingness to pay, *ceteris paribus*.
2. Concern for the environment has a positive relationship with current recycling behaviors, *ceteris paribus.*
3. A person's recycling knowledge is correlated with their concern for the environment, *ceteris paribus*.
4. A person's recycling knowledge is correlated with their involvement in environmental groups and/or classes, *ceteris paribus*.

Using the 2021 and 2024 data, I ran multiple regressions using different dependent variables of interest. Based on current literature and interest from the UNI Office of Sustainability, I identified the following four dependent variables of interest.

1. Willingness to Pay - Green Fund Quantity (2021 and 2024 pooled)
2. Current Recycling at Home (2021 and 2024 pooled)
3. Concern of Environmental Issues (2021 and 2024 pooled)
4. Percentage of Recycling Knowledge Correct (2024 only)

Independent Variables (control variables) across all specifications

Independent variables were identified by previous research. The first variable included was involvement in an environmental group, measured as an indicator variable of yes (1) or no (0). Enrollment (current or previous) in an environmental class was also included as an indicator

variable. These variables were included in the regression with the intuition that those confronted with environmental issues through groups or classes may be more inclined to recycle. The next control variable comes from respondents' response to “I only recycle because it is easy” which is measured on a 5-point Likert scale with 0 being “strongly disagree” to 4 being “strongly agree”. This variable is included to evaluate the role of perceived convenience on recycling behavior. Gender was included in the model based on the Shipley (2021) findings that female respondents indicated higher environmental concern. Another demographic variable included in the regression was respondents' year in college with the idea that as students get older they develop more clear recycling habits and perhaps recycle more or less than when they first came to college. Based on the Shipley (2021) and Wilcox (2014) findings, college was included assuming that science majors may have more defined recycling knowledge and habits than other majors like business or education. The last variable included in each regression model is political affiliation. Shipley (2021) found that Democrat respondents indicated more environmental concern than Republican respondents.

This regression analysis is conducted through the use of ordinary least squares (OLS). In my regression models, I have a few categorical dependent variables (i.e., environmental concern and current recycling at home). While an OLS regression model does not adjust for categorical data and treats the dependent variable as a continuous variable, I chose to use OLS for all of the regression analysis. Future research may consider using a binomial logistic or multinomial regression model to correct for the categorical nature of the dependent variable. Another potential concern with regression analysis is multicollinearity; to check for this concern, I ran pairwise correlation tests and found no strong correlation between control variables.

Results

Data (Summary statistics)

As noted above, the survey was sent in early January 2024 to a representative sample of 1000 UNI undergraduate students populated by the UNI Office of Institutional Research & Effectiveness. The survey got 246 initial respondents. Two observations were removed due to evidence of repeat respondents. When the original survey was deployed in 2021, there were no full-time online programs at UNI. In 2024, however, we realized post-survey that a small number of full-time online students were included in the representative survey base. Since full-time online students are not on-campus and do not experience on-campus recycling activities, I removed the 11 observations identified as online students. Further, consistent with Shipley (2021), I eliminated respondents that did not complete enough of the survey (specifically, at least 70% of the survey). Overall, 210 observations were complete enough in 2024 to analyze, which is similar to the 216 in the 2021 dataset.

(Table 1 about here)

The survey demographics were relatively consistent between the two survey time periods (see Table 1). In 2021, the survey respondents were 21.3% male and 78.7% female; in 2024, the composition was 19.6% male and 80.4% female. Based on t-tests to identify differences-in-means, there is no statistically significant difference between the two survey periods for the male demographic variable. Similarly, there is no statistical difference between time periods in terms of the year classification of respondents (i.e., freshman, sophomore, junior, senior) and primary college (i.e., college in which their first major is in). There were a couple notable differences; for example, GPA of students was greater in 2024 than 2021 and more people lived on campus in

2024 than 2021 (see Table 2). Overall, in terms of demographics, the 2021 and 2024 surveys were statistically similar enough to pursue pooled regression analysis.

(Table 2 about here)

UNI - Green Fund

For the Green Fund question, respondents were asked to identify their maximum willingness to pay with specified options and "other". The specified options included $1 (current fee value), $1.50, $2.00, $2.50, and $3.00, which are consistent with the values used in Shipley (2021). If a respondent selected "other", they were encouraged to type in their maximum allocation per year amount. For regression analysis, I recoded the Green Fund variable into a quantity value; specifically, the multiple choice selections were converted into the corresponding quantity value and any open-ended responses were manually entered. For the open-ended option, however, there were a few outliers. Since outliers can skew the standard deviation of this variable, I dropped three observations with WTP greater or equal to 20. This reduced the standard deviation from 5.05 to 1.70. The summary statistics for the Green Fund increase seem relatively consistent across years (see Table 3). However, in 2021, 26.4% of respondents indicated that they would be willing to support an increase to $3.00 whereas in 2024 only 18.6% indicated this allocation.

(Tables 3 and 4 about here)

Table 4 reports the regression results with the dependent variable of Green Fund maximum willingness to pay. For the variables included, *environmental concern* and *environmental group* both have a positive statistically significant relationship with willingness to pay. Environmental concern was reported on a 5-point Likert Scale from "not at all concerned" to "extremely concerned." Controlling for the other variables in the model, I find that a one unit

increase in environmental concern results in a $0.40 higher willingness-to-pay for the Green Fund on average. Similarly, *ceteris paribus*, respondents involved in an environment group, activity, or project are willing to pay $0.44 more to the Green Fund than students without this involvement. The results also indicate that freshmen have a lower willingness to pay relative to seniors (base group). Although not statistically significant, *Sophomores and Juniors* are also negative but less negative with each year closer to seniors. These results suggest that Green Fund willingness to pay is potentially increasing with status at UNI, which in most cases (but not necessarily all), aligns with time spent at UNI. Wilson College of Business students have a significant positive relationship, the Green Fund quantity indicating, all else equal, a student majoring in business has a maximum willingness to pay that is $0.64 higher than a comparable CSBS student. This is different from my initial expectations, which was that CHAS would have the highest willingness to pay.

Some of the findings of insignificant effects are also notable. For example, there is no statistical difference in willingness to pay between the 2021 and 2024 sample. This is important for the UNI Office of Sustainability and the Student Sustainability Engagement Committee, as the mean reported willingness to pay is around $2.40 in both years, which is above the current fee of $1.00. This higher willingness to pay across both survey periods (over 3 years) indicates there is sustained student support for a potentially higher fee rate in the future.

Current residential recycling

Current residential recycling is a categorical variable where respondents answered on a 5-point Likert scale to the question: “In general, how often do you currently recycle at your residence when taking classes at UNI?” ranging from “Never” to “Often”.

(Table 5 about here)

Table 5 reports the regression results with the dependent variable of current residential recycling. *Environmental concern* is positive and statistically significant at the 1% level. This positive relationship between environmental concern and current residential recycling behavior aligns with expectations; students who are more concerned about the environment are expected to reflect their concern through actions, including recycling behavior. This is similar to the findings of Schultz & Oskamp (1996) which found that high environmental concern is a driver of recycling behaviors. Chao et al. (2023) also found that for students, environmental concern had a significant positive effect on recycling behavior.

I also find a negative relationship between current recycling habits and those that only recycle because it is easy. This finding is consistent with my initial expectations because Cedar Falls does not have a city-wide recycling program that makes it "easy" or low cost to recycle at home. While the city offers recycling dropoff centers, this creates a "cost" to individuals in both time and transportation. Curbside pick-up options are available in Cedar Falls but also at a cost.

The *Freshman* and *Sophomore* variables are also negatively related to current recycling. Relative to seniors, freshmen and sophomores are less likely to recycle at their current residence, suggesting that recycling at home is increasing the longer they spend in college. As they get older, perhaps they establish more recycling habits or are able to identify ways to make recycling "easier".

Percentage of recycling knowledge correct (2024 only)

To construct a measure of the respondents' actual recycling knowledge, I used their responses regarding the recyclability of 11 specific items in UNI's non-housing buildings. For

each of the 11 items, the respondent's selections (i.e., recyclable or not recyclable) were identified as correct or incorrect. If a respondent indicated "I don't know" in their initial response, I used their response to the follow-up question that asked participants to choose where they would place the item (recycling bin or trash). Since the follow-up questions are not in the initial survey (2021), analysis of this variable only uses 2024 data and cannot be compared with 2021. The dependent variable represents the percentage correct (number correct divided by the total number of items). Recycling scores ranged from 36 - 100%. The mean reported score was 77.7%.

(Table 6 about here)

Table 6 reports regression results for recycling knowledge. Environmental concern is positively related to recycling knowledge at a 1% significance level. This is consistent with my expectations; people more concerned about the environment are likely to take more initiative to know how to recycle appropriately. People who are more concerned about the environment may also stay up to date on the recyclability in their area. Null et al. (2021), however, found that even though students considered themselves more environmentally concerned, their average knowledge score was 50%. While the questions are not directly comparable, the results for UNI in 2024 suggest higher knowledge than in Null et al. (2021), especially for those with environmental concern.

Environmental concern

Environmental concern was a control variable in the previous regressions. However, I also wanted to see how some of the same control variables interact with environmental concern. Knowing how some of these factors may influence concern for the environment can be helpful

for future research and those who may want to influence students' behaviors on environmental issues.

(Table 7 about here)

Environmental concern is higher for respondents who are involved in an *environmental group* and enrolled (currently or previously) in an *environmental class*. This is consistent with my initial expectations; those who are involved in an environmental class and/or groups are more likely to have exposure to current environmental issues. Similarly, another significant positive variable was for students whose first major was in CHAS. This makes sense because CHAS has science majors, who could be more concerned with the environment.

The *republican* variable is negatively associated with environmental concern. This follows my expectations because liberals (base group) tend to put more weight on environmental issues than conservatives. *Sophomores* and *juniors* (relative to seniors) have a negative relationship with concern for the environment. However, the coefficients are less negative from one grade level to the next. There is also a negative relationship between those that *only recycle because it is easy* and their concern for the environment. This is consistent with my initial expectations because those that recycle regardless of their perceived ease are more likely to care about the environment.

Conclusion

My findings build upon the existing research on college recycling behavior, in particular Shipley (2021) and Wilcox (2014), through the use of regression analysis to identify statistically significant relationships. My findings reiterate the importance of environmental concern identified by Shipley (2021). Also consistent with Shipley (2021), a majority of UNI students are

still willing to support an increase to the UNI Green Fund; Wilcox (2014) similarly found a positive willingness to pay by college students, although not specific to the UNI Green Fund.

My findings also suggest that there is a relationship between current residential recycling and concern for environmental issues, which is consistent with previous literature. Previous research finds that concern for the environment is an important variable across the board in determining students' recycling behaviors (Best & Mayerl, 2013; Chao, 2023). My findings also support the negative relationship of responses to "I only recycle when it is easy" and dependent variables *current residential recycling habits* and *concern for environmental issues*. Classification variables such as sophomores and juniors, compared to seniors, also have a negative relationship with current residential recycling habits suggesting that students may be finding ways to make recycling easier as they are in college longer.

As with any survey and regression analysis there are limitations that must be acknowledged. First, some outliers in my data could skew the results. In the Green Fund question, I removed these outliers to lower the standard deviation of the variables to try and minimize these effects. Surveys are also highly susceptible to bias. People that have stronger feelings toward the topic may be more likely to fill out the survey. There is also the possibility participants try and select the answers they think are right versus how they actually feel about that question. For example, participants might indicate they are more concerned with the environment than they actually are to look better and/or feel better about themselves. Another thing to consider is that while the sample size of both surveys are sufficiently large for regression analysis (i.e., greater than 30), a greater survey size might yield more accurate results.

To incentivize survey participation, respondents had the opportunity to enter a drawing for $25 dollar Amazon gift cards. Funding for these gift cards was provided through the UNI

Green Fund due to selection from the Student Sustainability Engagement Committee. This project would not have been possible without the Student Sustainability Engagement Committee and the UNI Office of Sustainability. Thank you to Eric O'Brien for his help, guidance, and insights for my project.

To encourage recycling behavior at UNI, my research suggests that instilling concern for the environment may be the most effective pathway. UNI could try to increase concern for the environment by offering more sustainability classes or groups. Future research should study more intentionally the factors underlying college students' environmental concern. Research on college students and the role that universities play in developing habits is important since students carry these habits with them post-college. Research should also explore other opportunities (e.g., K-12, community-level initiatives) where students may develop concern for the environment. Colleges may have limited influence regarding environmental concern depending on the students' K-12 education and/or pre-established concerns and habits.

Table 1: Demographics

	2021 - Survey Population (216 undergraduates)	2021 - UNI Student Population (9522 total, 8304 undergraduate)	2024 - Survey Population (210 undergraduates)	2024 - UNI Student Population (9021 total, 7742 undergraduate)
Male	21.3%	38.6%	19.6%	35.9%
Female	78.7%	61.4%	80.4%	64%
Freshman	20.8%	18.6%	23.65%	17%
Sophomores	16.2%	18.5%	19.21%	17.1%
Juniors	33.8%	25.9%	27.59%	22.2%
Seniors	29.2%	35.9%	29.56%	26.5%
On-Campus	44%	35%	60.58%	38.7%
Off-Campus	56%	65%	39.52%	61.3%
Wilson College of Business	14.8%	19.6%	17.73%	19.3%
College of Education	23.2%	21.9%	23.15%	16.5%
College of Humanities Arts and Sciences	33.8%	32.6%	32.02%	30.8%
College of Social and Behavioral Sciences	22.2%	18.1%	23.15%	23.9%
Not specified	3.25%	7.8%	3.94%	9.2%

Table 2: Survey Demographics - Grade Point Average

	2021	2024
Less than 1.5	0%	0.46%
1.5 to 1.99	0%	0.93%
2.0 to 2.49	4.43%	4.17%
2.5 to 2.99	6.4%	12.5%
3.0 to 3.49	24.63%	23.15%
3.5 to 3.749	23.15%	25.46%
4.75 to 4.0	41.48%	33.33%

Table 3: Summary Statistics - Green Fee Increase

Green Fee Increase		
	2021	2024
I would not support an increase	13.89%	17.62%
$1.50 increase	25.46%	26.67%
$2.00 increase	27.31%	25.24%
$2.50 increase	3.70%	7.14%
$3.00 increase	26.39%	18.57%
Other (in 2024 ranged from 5-20 with “none” and “any”)	3.24%	4.76%

Table 4. Willingness to pay - green fund regression results

Independent Variables	Coefficients	P-Value
Environment Concern	0.399337	0
Environmental Group	0.444811	0.023
Environmental class	-0.0082598	0.964
Recycling when it is easy	-0.0327043	0.687
Male	-0.1570546	0.485
Freshman	-0.4067964	0.1
Sophomore	-0.268152	0.301
Junior	-0.0298467	0.895
CBiz	0.6439527	0.02
COE	-0.17174	0.944
CHAS	0.1053315	0.301
Inter	0.1571359	0.898
Republican	-0.0340426	0.892
Independant	-0.0729955	0.743

Table 5: Current Residential Recycling - regression results

Independent Variables	Coefficient	P-value
Environment Concern	0.5161138	0.006
Environmental Group	0.3187966	0.319
Environmental class	0.0419694	0.891
Recycling when it is easy	-0.5213217	0
Male	-0.2696226	0.469
Freshman	-0.8004759	0.045
Sophomore	-0.8441546	0.045
Junior	-0.5375783	0.155
CBiz	-0.1539964	0.728
COE	-0.1239986	0.762
CHAS	-0.0858929	0.818
Inter	3.44618	0.094
Republican	0.2580815	0.528
Independant	0.0428286	0.904
Percent of recycling correct	0.8467909	0.517

Table 6. Recycling Knowledge Percent Correct - regression results

Independent Variables	Coefficients	P-Value
Environment Concern	0.0363245	0
Environmental Group	0.0082842	0.645
Environmental class	0.0070543	0.683
Recycling when it is easy	0.0089937	0.215
Male	0.0045503	0.828
Freshman	-0.0261204	0.243
Sophomore	-0.041692	0.076
Junior	-0.0040047	0.85
CBiz	0.0312116	0.209
COE	0.0050241	0.827
CHAS	0.0064216	0.76
Inter	0.0974936	0.398
Republican	-0.0223922	0.3
Independant	0.0157546	0.43

Table 7: Environmental Concern - Regression results

	Coefficient	P-value
Environmental Group	0.3515302	0
Environmental class	0.3115101	0
Recycling when it is easy	-0.1717648	0
Male	-0.1633335	0.123
Freshman	-0.143979	0.215
Sophomore	-0.2120511	0.082
Junior	-0.1872665	0.078
CBiz	-0.032144	0.805
COE	0.0547726	0.636
CHAS	0.274546	0.011
Inter	0.7691641	0.184
Republican	-0.6066519	0
Independant	-0.202283	0.10446

References

Arain, A.L., Pummill, R., Adu-Brimpong, J., Becker, S., Green, M., Illardi, M., Van Dam, E., Neitzel, R.L. (2020). Analysis of e-waste recycling behavior based on survey at Midwestern US university. *Waste Management* 105. pp. 119-127. https://doi.org/10.1016/j.wasman.2020.02.002

Berglund, C. (2006). The assessment of households' recycling costs: The role of personal motives. *Ecological Economics.* 56(4). pp 560-569. https://doi.org/10.1016/j.ecolecon.2005.03.005

Best. H., Mayerl, J. (February 22nd, 2013). Values, beliefs, attitudes: An empirical study on the structure of environmental concern and recycling participation. *Social Science Quarterly.* 94(3). (pp. 691-714). https://doi.org/10.1111/ssqu.12010

Center for Community Energy & Environmental Education (CEEE). (2023). *Community Energy / Climate Action Planning.* https://ceee.uni.edu/community-energy-climate-action

Chao, C. M., Yu, T. K., & Yu, T. Y. (2023). Understanding the factors influencing recycling behavior in college students: the role of interpersonal altruism and environmental concern. *International Journal of Sustainability in Higher Education.* 24(5). (pp. 969-985).

Chepesiuk R. (2007). Environmental literacy: knowledge for a healthier public. *Environ Health Perspect*. 115(10). https://doi.org/10.1289%2Fehp.115-a494

Environmental Protection Agency (EPA). (2022). *The US Recycling System.* https://www.epa.gov/circulareconomy/us-recycling-system

Iowa Waste and Reduction Center (IWRC). (2023). *Environmental Consultation and Education*. https://iwrc.uni.edu/

Jerkia, N., & Daud, S., (2016). Environmental Concern and Recycling Behavior. *Procedia Economics and Finance*. 35. (pp. 667-673). https://doi.org/10.1016/S2212-5671(16)00082-4

Largo-Wight, E., Johnston, D. D., Wright, J. (January 2013). The efficacy of a theory-based, participatory, recycling intervention on a college campus. *Journal of*

Environmental Health, 76(4), pp. 26+. https://link.gale.com/apps/doc/A349904559/AONE?u=uni_rodit&sid=bookmark-AONE&xid=18df638e

Lonusbury, M. (2001). Institutional sources of practice variation: Staffing college university recycling programs. *Administrative Science Quarterly*. 46(1). pp 29-56. https://doi.org/10.2307/2667124

Mason, B. E. (2017). Chapter 2. In A. Kumar & D. Kim (Eds.), *A comprehensive overview of university and college recycling programs.* (pp. 29-49). Bentham Science. 10.2174/97816810847181170101

Null, B. D, Feeser, K., Kurtzhals, G. (2021). An assessment of environmental literacy, behaviors, attitudes and lifestyle factors of college students. *Journal of American College Health*. https://doi.org/10.1080/07448481.2021.1975720

O'Brien, E. (October 23rd, 2023). Personal Communication.

Schultz, W. P., & Oskamp, S., (December 1996). Effort as a moderator of the attitude-behavior relationship: General environmental concern and recycling. *Social Psychology Quarterly.* 59(4). (pp. 375-383). https://doi.org/10.2307/2787078

Shipley, T. (2021) Evaluating college students' attitudes and understanding of recycling. (2021). Honors Program Theses. 490. https://scholarworks.uni.edu/hpt/490

The Recycling and Reuse Technology Transfer Center (RRTTC). (2023). *Recycling and Reuse Center / Panther Caucus.* https://panthercaucus.uni.edu/funding-priorities/recycling-and-reuse-center

Wilcox, M. A. (2014). *A study of college student attitudes and behaviors related to recycling.* [Doctoral dissertation, University of Northern Iowa]. Dissertations and Theses @ UNI. https://scholarworks.uni.edu/etd/2

Appendix A

Welcome to the online survey for research at the University of Northern Iowa about students' knowledge, habits, and motivation in regards to recycling. Your participation in this survey is **completely voluntary**. If you do not wish to participate in this study, you can simply close your web browser. You can choose not to answer some or all of the questions. Your responses will remain strictly **confidential** and **anonymous**, and data from this research will only be reported in aggregated levels.

To participate, you must be an **undergraduate student at the University of Northern Iowa**. The survey should take around **10 minutes**.

In return for your time and effort, you will have the opportunity to enter a drawing to win one of ten $25 Amazon gift cards. Please note that in order to participate in the drawing, we will need to collect your email address. In accordance with University policy, the names and student ID number of UNI students receiving compensation (i.e., gift cards) must be reported to OBO for tax purposes. This information is reported apart from any responses collected. We will detach the survey data from your personal information to ensure anonymity.

There are no foreseeable risks to you as a participant in this project. Confidentiality will be maintained to the degree permitted by the technology used. Specifically, no guarantees can be made regarding the interception of data sent via the Internet by any third parties. We may also use the data again later in other research studies and may share the de-identified datasets with other researchers interested in the topics.

By clicking "I agree" below, you give your consent to participate in this survey.

If you have any questions about the survey, please contact Ella Hilbrant at hilbrane@uni.edu. If you have questions about your rights as a participant in this research project, please contact the University of Northern Iowa Institutional Review Board (IRB) Human Protections Administrator at (319) 273-3217 or by e-mail at rsp@uni.edu.

○ **I agree**

Generally speaking, how concerned are you about environmental issues?

- ○ Not at all concerned
- ○ Slightly concerned
- ○ Moderately concerned
- ○ Very concerned
- ○ Extremely concerned

Are you currently or have you ever been involved in any environmental groups, environmental volunteer activities, or environmental donation projects?

- ○ Yes
- ○ No

Are you currently taking or have you ever taken any environmental-related courses?

- ○ Yes
- ○ No

Please indicate your reaction to each of these statements about recycling.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Whether I recycle depends on how easy it is	○	○	○	○	○
Recycling makes me feel like I am doing my part to protect the environment	○	○	○	○	○
Recycling is a hassle and not really worth the effort	○	○	○	○	○
Recycling makes me feel good	○	○	○	○	○
I will recycle only if required	○	○	○	○	○
Recycling is a necessary activity	○	○	○	○	○
My recycling efforts, or lack thereof, are influenced by my peers	○	○	○	○	○
My recycling efforts, or lack thereof, are influenced by my family	○	○	○	○	○
My recycling efforts, or lack thereof, are influenced by what I've learned in school	○	○	○	○	○

In general, how often did you recycle at your home PRIOR to attending UNI?

- ○ Never
- ○ Rarely
- ○ Sometimes
- ○ Often
- ○ As much as possible

In general, how often do you <u>currently</u> recycle at your residence when taking classes at UNI?

- ○ Never
- ○ Rarely
- ○ Sometimes
- ○ Often
- ○ As much as possible

Do you live on or off campus?

- ○ On-campus
- ○ Off-campus

Display This Question:

If Do you live on or off campus? = On-campus

How easy do you think it is to find a container to recycle in university housing?

- ○ Very difficult
- ○ Difficult
- ○ Neutral
- ○ Easy
- ○ Very easy

In general, how often do you recycle in UNI's non-housing buildings (i.e., academic buildings)?

- ○ Never
- ○ Rarely
- ○ Sometimes
- ○ Often
- ○ As much as possible

How easy do you think it is to find a container to recycle in UNI's non-housing buildings (i.e., academic buildings)?

- ○ Very difficult
- ○ Difficult
- ○ Neutral
- ○ Easy
- ○ Very easy

How much do you believe your <u>peers</u> at UNI care about recycling?

- ○ Not at all
- ○ A little
- ○ A moderate amount
- ○ A lot
- ○ A great deal

How well do you believe you know what you can and cannot recycle in UNI's non-housing buildings (i.e., academic buildings)?

- ○ Not at all
- ○ A little
- ○ A moderate amount
- ○ A lot
- ○ A great deal

For each item, indicate whether you believe the item can be recycled in UNI's non-housing buildings (i.e., academic buildings).

	Recyclable	Not Recyclable	I Don't Know
Tin Can	○	○	○
Cheeseburger	○	○	○
Plastic Bag	○	○	○
Newspaper	○	○	○
Greasy Pizza Box	○	○	○
Coca-Cola Can	○	○	○
Styrofoam	○	○	○
Clean Glass Bottle	○	○	○
Unwashed Food Containers	○	○	○
Empty Cardboard Box	○	○	○
Disposable Coffee Cups	○	○	○

Display This Question:

If "For each item, indicate whether you believe the item can be recycled in UNI's non-housing building…" [I Don't Know] (Count) >= 1

For each item that you selected "I don't know" in the previous question, please indicate whether you would choose to put the item in the recycling bin OR trash can despite your uncertainty.

Display This Question:

If For each item, indicate whether you believe the item can be recycled in UNI's non-housing buildin... = Tin Can [I Don't Know]

Tin can

- ○ Recycling bin
- ○ Trash can

Display This Question:

If For each item, indicate whether you believe the item can be recycled in UNI's non-housing buildin... = Cheeseburger [I Don't Know]

Cheeseburger

- ○ Recycling bin
- ○ Trash can

Display This Question:

If For each item, indicate whether you believe the item can be recycled in UNI's non-housing buildin... = Plastic Bag [I Don't Know]

Plastic bag

- ○ Recycling bin

○ Trash can

Display This Question:

If For each item, indicate whether you believe the item can be recycled in UNI's non-housing buildin... = Newspaper [I Don't Know]

Newspaper

○ Recycling bin

○ Trash can

Display This Question:

If For each item, indicate whether you believe the item can be recycled in UNI's non-housing buildin... = Greasy Pizza Box [I Don't Know]

Greasy Pizza Box

○ Recycling bin

○ Trash can

Display This Question:

If For each item, indicate whether you believe the item can be recycled in UNI's non-housing buildin... = Coca-Cola Can [I Don't Know]

Coca-Cola Can

○ Recycling bin

○ Trash can

Display This Question:

If For each item, indicate whether you believe the item can be recycled in UNI's non-housing buildin... = Styrofoam [I Don't Know]

Styrofoam

- ○ Recycling bin
- ○ Trash can

Display This Question:

If For each item, indicate whether you believe the item can be recycled in UNI's non-housing buildin... = Clean Glass Bottle [I Don't Know]

Clean Glass Bottle

- ○ Recycling bin
- ○ Trash can

Display This Question:

If For each item, indicate whether you believe the item can be recycled in UNI's non-housing buildin... = Unwashed Food Containers [I Don't Know]

Unwashed Food Containers

- ○ Recycling bin
- ○ Trash can

Display This Question:

If For each item, indicate whether you believe the item can be recycled in UNI's non-housing buildin... = Empty Cardboard Box [I Don't Know]

Empty Cardboard Box

- ○ Recycling bin
- ○ Trash can

Display This Question:

If For each item, indicate whether you believe the item can be recycled in UNI's non-housing buildin... = Disposable Coffee Cups [I Don't Know]

Disposable Coffee Cups

- ○ Recycling bin
- ○ Trash can

If there is an item for which you are uncertain about its recyclability, is it better to recycle the item or not recycle the item?

- ○ Recycle
- ○ Do not recycle
- ○ I do not know

UNI currently allocates approximately $1 per student per year from the Student Services fee towards a Student Green Fund. The fund supports sustainability projects that benefit students. Decisions for funding are made by a committee of students. Consider the following hypothetical scenario. Suppose you were asked to vote whether you would support or not support an increase in the Student Services fee in order to increase the Student Green Fund. Using the option below, indicate the maximum allocation (after the proposed change) for which you would vote YES in support of the increased fee. Note: assume there is no option to remove the existing $1 fee.

- ○ I would not support any increase in the Student Services fee to increase support of the Student Green Fund (i.e., remain at $1 per year)
- ○ Increase to $1.50 per year
- ○ Increase to $2.00 per year
- ○ Increase to $2.50 per year
- ○ Increase to $3.00 per year
- ○ Other. Please indicate your maximum allocation per year:

_____

Resources to support UNI sustainability initiatives are limited (e.g., time and funding). We would like to know your preferences for how these <u>limited resources</u> should be prioritized. Please use the sliding scales below to indicate the priority that you would place on each initiative given budget constraints exist.

	No priority / Highest priority / Do not know 0 10 20 30 40 50 60 70 80 90 100
Educational initiatives (e.g., signage to denote current practices)	
Energy efficiency efforts	
Protecting or restoring campus ecosystems	
Recycling/waste diversion initiatives	
Student focused speakers	
Student research projects	
Sustainability themed events (e.g., Earth Day/Month activities)	

Do you have any suggestions for other sustainability initiatives that you would like UNI to consider?

_____

_____

_____

_____

_____

This last set of questions will ask you about your socio-demographic characteristics and college profile.

I identify myself as

- ○ Male
- ○ Female
- ○ Other

What is your age?

_____

What is your current classification?

- ○ Freshman
- ○ Sophomore
- ○ Junior
- ○ Senior

Is this your first year at UNI?

- ○ Yes
- ○ No

Which college is your major in? (*Note: if you have multiple majors, choose the college your first major is in)*

- ☐ Wilson College of Business (CBiz)
- ☐ College of Education (COE)
- ☐ College of Humanities, Arts, and Sciences (CHAS)
- ☐ College of Social and Behavioral Sciences (CSBS)
- ☐ Interdisciplinary Studies
- ☐ Undeclared or Undecided Major
- ☐ Other/I don't know (Please type your first major below if you do not know the college) _____

What is your overall grade point average (GPA)?

- ○ Less than 1.5
- ○ 1.5 to 1.99
- ○ 2.0 to 2.49
- ○ 2.5 to 2.99
- ○ 3.0 to 3.49
- ○ 3.5 to 3.749
- ○ 3.75 to 4.0

What political party do you feel closer to?

- ○ Democratic party
- ○ Republican party
- ○ Independent
- ○ No affiliation

Thank you for participating! Please enter your UNI email address (i.e. "uni.edu" email) to enter the drawing for one of ten Amazon $25 gift cards.

_____