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## Recycling attitudes and behaviors toward single-use plastics at the University of Nebraska-Lincoln

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**Recycling attitudes and behaviors toward single-use plastics at the University of  
Nebraska-Lincoln: An Undergraduate Thesis**

**By Jady Chasek**

**Presented to**

**The Environmental Studies Program at the University of Nebraska-Lincoln**

**In Partial Fulfillment of Requirements For the Degree of Bachelor of Science/Arts**

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## **Abstract**

Today, single-use plastics pose an issue in the world with pollution from improper disposal as well as from the manufacturing of single-use plastic products. There is a need for change, plastic products have begun to consume the planet and harm life on Earth. Many people look to college universities for an opportunity to change issues such as the overconsumption of single-use plastics. A college campus is the perfect environment to study what changes can be made to fix an issue as well as how to implement those changes. This study was conducted at the University of Nebraska-Lincoln, where the undergraduate student population was the target audience. This study was conducted through an empirical mixed methods survey which asked both open and closed-ended questions to collect data. Once the data was collected, it was then analyzed using a convergent mixed methods design. The results of this study indicate that there are both challenges and motivations to recycle on the individual level. Also found from the results, environmental behaviors fall on a spectrum from being very active to not very active. The findings from this study offer implications for the future at the individual and university level and also possibly beyond that. This study provides ample opportunities for future research on this topic beyond what has already been found.

## **Recycling behaviors with single-use plastics at the University of Nebraska-Lincoln: An Undergraduate Thesis**

Single-use plastics have become a large, world-wide issue within the last several years, concerning both sustainability, and for the overall well being of the world. Although convenient, single-use plastics create unneeded waste in the environment which contributes to landfill waste. The problem with the overuse of single-use plastics is not that humans are unaware of the issue. Instead many individuals do not view this issue as a serious threat that requires attention and action, hindering change. This population that needs to be addressed includes large corporations, large and small businesses, government, school systems, and individual people. The studies that have been conducted thus far on the topic of single-use plastics on college campuses include a wide range of topics such as looking at the overall effect of plastic on the world, how people have tried to make changes, and what the bigger picture looks like. Thus the purpose of this study is to look at college students' motivations and behaviors with regards to their use of single use plastics and to progress further into what can be done in the near future to encourage change on the university campus.

### **Literature Review**

#### ***Prevalence of Single-Use Plastics***

Single-use plastics are plastic items manufactured with the intention that the item will be used one time before being disposed of (Lindwall, 2022). Some examples of single-use plastics include water bottles, straws, grocery bags, packaging, balloons, cutlery, etc. Disposing these items usually involves throwing them away where they will then be taken to a landfill. This is the case because they are produced in a way that they can't be easily recycled or the material cannot be reused. According to Krause (2021) since plastic began to be commercially produced in the 1950s, about 8,300 million tons have been produced globally. The amount of plastic produced each year is almost equal to the weight of the human population as a whole (Lindwall, 2022). With that, 34.5 million tons of plastic waste is produced annually in the United States alone, where the majority ends up in landfills (Krause, 2021). A large portion of this plastic waste also ends up in oceans, the most common object being single-use plastic grocery bags (Wagner 2017). An estimated amount of 4.8-12.7 million tons of plastic ends up in the oceans every year (Krause, 2021). By the year 2050, it is estimated that there will be more plastic than fish in the ocean by weight (Krause, 2021). The plastic making its way into the marine environment surpasses the plastic being taken out because of its buoyancy and its ability to last hundreds of thousands of years (Wagner 2017). Microplastics, small pieces of plastic with a diameter of less than 1 mm, harm the reproductive system of fish and shellfish through consumption, so it's only fair to ask if this has the same effect on humans (Krause, 2021). Lastly, the production of plastic is proven to negatively affect the environment. The production of plastic, made from fossil fuels, leads to the emission of greenhouse gasses contributing to the issue of climate change (Krause, 2021). Clearly, these statistics point to the fact that single-use plastics continue to be one significant way that humans contribute to polluting the environment and further climate change. College campuses are continuously making efforts to lower their contribution towards this large-scale issue.

## *Efforts at the University of Nebraska-Lincoln*

The University of Nebraska-Lincoln utilizes many tools to help lower their contribution, one of those tools being AASHE. The Association for the Advancement of Sustainability in Higher Education (AASHE) offers insight into what the University of Nebraska-Lincoln has done to decrease the amount of single-use plastic waste on campus. The Sustainability Tracking, Assessment & Rating System (STARS), is a self-reporting rating system managed by AASHE that collects data and tracks progress in four main categories including academics, engagement, planning, and administration and operations. In UNL's latest report, waste management data shows there were 2,047 tons of material recycled compared to the 1,323 tons recycled in the baseline year in 2009 (STARS, 2023). Additionally, the total amount of waste generated on campus decreased from 5,786 tons in the baseline year down to 5,181 tons in 2018 (STARS, 2023). This noticeable amount of progress was made between the two time periods, was due to behavior changes such as...and the university provided information on what changes they made as part of this progress. AASHE provided the university a silver rating in sustainability initiatives, including its waste minimization and diversion efforts (STARS, 2023). UNL is currently in the process of submitting a report for the 2023-2026 period, which may provide insight into current trends stemming from their most recent efforts.

UNL has a variety of policies and strategies in place to encourage students to participate in pro-environmental behaviors. For example, UNL has a "Green Purchasing" strategy that allows the university to put policies into place to make the campus more "green". This includes purchasing products that are more environmentally friendly, minimizing consumption of natural resources, cutting down on waste, and maximizing the potential of reusing and recycling products (STARS, 2023). Since 2016 UNL has also made the change to become a foam-free campus (Foam Free Campus, 2023). This policy prohibits the sale, distribution or procurement of packing foam or expanded polystyrene (EPS) in the form of food containers and packaging materials. This decision is because EPS is not recyclable or biodegradable and styrene, listed on the Human Services National Toxicology Program List of Carcinogens, and can leach into food and beverages (Foam Free Campus, 2023). Another example is that in 2019, the university began a Recycling Pilot Program to increase recycling rates and reduce waste production on campus through making recycling easier and more understandable (UNL's Chancellor and Executive Leadership Team, 2020). The program replaces the previously randomly placed and mismatched waste containers with stations that have standardized signage and coloration and shape restricted openings. Additionally, the program asks building users to take personal responsibility for their waste by transporting and properly sorting their waste items. Waste audits and truck hauling data revealed trends of decreasing landfill waste as well as fewer recyclables being incorrectly disposed of. Based on the success of the pilot program, university leaders approved the program now referred to as the All in the Hall Recycling Program, as the campus-wide recycling standard. Installation of the containers into campus buildings will occur in the next couple of years and is expected to help make progress towards institutional sustainability goals (UNL's Chancellor and Executive Leadership Team, 2020). However, the major issue is that despite these efforts at the University level, we do not know the perspectives of college students who are actually making the decision whether or not to recycle their single-use plastics.

Finally, the Chancellor's Environmental, Sustainable, and Resilience Commission (CESRC) created the 2020 Environment, Sustainability, and Resilience (ESR) Master Plan to serve as a framework or road map to create a more sustainable and resilient campus. The master

plan outlines the university's agenda to target specific initiatives and efforts across different areas to create a sustainability-centric culture (CESRC, 2020). It includes ten areas of interest or aspirational goals including energy, health and wellness culture, land and ecosystem resources, transportation, and waste management. The aspirational goal for waste management is to "create a culture that strives for zero-waste and materials management through a circular economy" (CESRC, 2020). The plan provides two categories of objectives: long-term, which is aimed to be successful after 2025, and short-term, which will occur between 2022 and 2025. The long-term objectives include becoming a zero-waste campus by 2030, and to develop integrated procurement and waste management policies that apply to all resource streams by 2025. A few of the short-term objectives include: reducing the waste per capita by 50%, increasing the amount of zero-waste events by 25 per year for five years, and to create a campus building waste reduction award. With these goals, the plan recommends several specific strategies and actions to accomplish these objectives as well as specifics for measuring the goals performance. The ESR also outlines how each aspirational goal aligns with institutional objectives identified in UNLs N150 Report and N2025 Strategic Plan, and global goals identified by the UN Sustainability Development Goals (CESRC, 2020).

In terms of college students recycling, studies have shown that students are less likely to recycle in their residential area compared to long-time residents (Soderberg et.al., 2022). This study by Soderberg and colleagues (2022) also found that it is necessary for the owner of a house lived in by students to continue to provide the means to recycle household waste. This being because students have potentially developed habits that enable them to recycle after leaving the student housing. So after a student were to leave the housing provided by the institution, they need the tools necessary to continue that habit. In a study done by Blose and colleagues (2020) U.S. college students' recycling frequency is related to the students' perceived effectiveness, social group influence, and their family recycling behaviors. They also found that recycling frequency is not directly related to their social image concerns. Students expressed that recycling holds a key to a sustainable environment and waste management (Blose et.al., 2020). To realize their short and long-term goals, UNL administrators and planners will need to have students on board with their efforts. Thus, I ask:

**RQ1:** To what extent are UNL students motivated to recycle single-use plastics?

The issues related to single-use plastics cannot be connected to just one cause. This is a very broad topic and there are many variables that come into play. Ardiansyah and colleagues (2022) discussed the different variables that should be considered when examining the overuse and production of single-use plastics. The five main categories or variables provided were environment, economy, governance, socio-cultural, and technology (Ardiansyah et.al, 2022). The researchers also developed a list of thirty sub-categories to fit under the five main categories and described what specific type of impact those variables have overall (Ardiansyah et.al, 2022). For example, the variable 'Financial Scheme' (in terms of the financial aspect of using single-use plastics) is listed as an influential variable, meaning it has the potential to be a strong determinant (Ardiansyah et.al, 2022). Additionally the study explored the effect when two variables were put together. In the end, it was found that when two or more of these variables were taken into account, their effect is greater compared to just one variable on its own (Ardiansyah et.al, 2022).

Although the overuse of single-use plastics has become more well-known and apparent; there have been few actions taken to make a change. According to Viscusi & Bell (2012), fifteen

states in the United States do not have a recycling law or policy in place. There are seven states that require recycling and have a supporting law or policy in place. The rest of the states fall in between these two extremes (Viscusi & Bell, 2012). Nebraska does not have mandatory recycling, but has a required recycling plan. The authors found that states with no recycling law have the lowest amount of recycling (Viscusi & Bell, 2012). In contrast, the states with mandatory recycling laws, or more stringent regulations, have the highest rates of recycling in comparison (Viscusi & Bell, 2012). This study reveals the positive relationship between the rates of recycling and strict recycling laws or policies, demonstrating that efforts must come from numerous levels in order to be effective.

Although the issue of single-use plastics seems to be a big issue to tackle, taking it step by step has been shown to be effective. Wagner (2017) discussed the impact of taking small steps towards a greater future and what this would look like. Specifically, the researcher examined the future of single-use plastic grocery bags which play a large role in the overuse of single-use plastics. Single-use plastic grocery bags are typically the top litter and flyaway issue at landfills and are especially problematic because of their longevity in the environment (Wagner 2017). Wagner (2017) reported that customers are more likely to utilize plastic single-use bags when they are available versus paper bags. In some states, there is a tax on using these bags while in others there are things like bans, different bag designs, and even consumer education policies (Wagner, 2017). These approaches are designed to decrease the consumption and negative effect of these bags. Similarly, Viscusi and Bell (2012) also supported the idea of lowering the number of single-use plastics by incorporating taxes or bans. Taxes and bans would require government systems to take action to limit the amount of plastic grocery bags that are distributed. However, large scale change still requires action from the general public. According to Wagner (2017), although hard data is difficult to collect, the recycling rate and consumption rate of plastic grocery bags is very low. The estimated 2014 recovery rate for all plastic bags, sacks, and wraps combined was 12.3% which showed a decrease from 2013 (Wagner, 2017). Reusing plastic grocery bags before discarding them is an important step that can be taken to make a difference (Wagner, 2017). In California in 2007, it was reported that 51% of grocery bags were reused before being discarded (Wagner, 2017). Reusing grocery bags, and other small steps, are great examples of what can be done by individuals to make a change.

Similarly, Herberz and Finkbeiner (2020) found that banning or imposing a premium price on single-use plastic items is effective at lowering the amount used. Banning or charging for the items makes plastics a “high commodity” item. If individuals value using grocery bags, they are required to pay the high price that comes with it. Since banning items could result in economic issues and backlash, Herberz and Finkbeiner (2020) recommended that charging for bags provides a better solution than placing bans on these items. Another solution for reducing the use of single-use plastic items is replacing or offering items made from a more sustainable material, such as wood or paper (Herberz & Finkbeiner, 2020). However, replacing plastic with more sustainable materials can have negative outcomes and could have limitations because a large amount of natural resources are required for making these sustainable items, and the long-term effect of production is still unknown (Herberz & Finkbeiner, 2020). There are many different resources used for different environmental products. For example, when manufacturing items that typically come from the forestry industry, there are many other resources used in its creation. The idea behind this is that when people are manufacturing items, there are a lot of valuable resources going to waste that aren't seen firsthand.

Another idea that has been studied and has proven to be effective is conducting incentive programs in order to get people to recycle more, which may be particularly useful in the college campus environment. Luyben and Cummings (1981) focused on the recycling behaviors of college students, found a positive correlation between recycling rates and having an incentive program in place. The study first measured the rate at which students recycled, then added an incentive program and remeasured. The difference in recycling rates was much higher after the incentive program was put into place (Luyben & Cummings, 1981). Other studies have also investigated changes or initiatives that help increase the amount of recycling on college campuses. O'Connor et.al. (2010) investigated the amount of recycling bins and the locations of recycling bins placed around campus. The study revealed that the rate of recycling increased when the recycling bins were placed inside of the classrooms (O'Connor et.al, 2010). There was no change made when more recycling bins were placed in common areas such as a residence hall lobby (O'Connor et.al, 2010). This study helps to identify the effect that the location and quantity of recycling bins has on a college campus.

When thinking of ways to lower the usage of single-use plastic water bottles, social aspects are also important to consider. For example, Bruchmann and colleagues (2021) found evidence of higher rates of recycling when the idea of recycling had been vocalized to students. When telling undergraduate students that their water bottle sustainability habits were above average, they had a more favorable impression of the idea of sustainability (Bruchmann et.al, 2021). On the other hand, individuals who were told their sustainability habits were average or below average, demonstrated a higher desire to become more sustainable (Bruchmann et.al, 2021). In another study, the authors noted that there is a positive relationship between attitudes and recycling behaviors (Schultz et.al., 2004). Schultz and colleagues (2004) also stated that past reported studies looked at the ability of environmental concern to predict recycling behaviors and confirm that there is a small, significant relationship. Although, an individual's knowledge about recycling programs has been correlated to higher recycling levels. Three different studies have found that knowledge is the big separator between recyclers and non recyclers (Schultz et.al., 2004). These findings from Schultz and others (2004) help to show the importance of being educated about the recycling process and, in turn, can help lead to an increase of recycled single-use plastics.

Reviewing past studies has revealed a focus on understanding the issue of single use plastics and lowering their use on U.S. college campuses revealed gaps and opportunities for the present study to investigate. Specifically, being able to use these resources to look into the future of this problem will help with guidance and success. After looking at the research that has been done in this field and on what is being done at numerous levels across the University campus, the second question used to guide my research about single-use plastics on college campuses is:

**RQ2:** What efforts are made by UNL students to reduce single-use plastics that could be introduced to campus?



## Methods

### Participants

The students who participated in this study were recruited through convenience sampling, which is a form of sampling achieved when participants volunteer themselves to participate in the research (Gill, 2020). A handful of university professors and instructors were asked to share the survey with the students currently enrolled in their classes, while others were also recruited through word of mouth by me. While this convenient method of sampling is easy and efficient, there are some limitations such as the participants not providing the best possible information as they may not be well educated on the topic of the study. A result of this is that they potentially won't provide quality responses in the study (Gill, 2020). Although this may be the case, it is beneficial to receive results that reflect the general population. The goal was to have limited researcher bias, meaning that I as the researcher did not select specific participants in hopes to reach a specific outcome (Treadwell & Davis, 2019). To avoid additional bias in the study, the surveys were also not administered in classes taken predominantly by UNL environmental students (Environmental Studies, Environmental Science, etc.).

During and upon recruiting the participant group for this study, I took measures to protect the rights and welfare of the individuals involved. I attached an informed consent form to the beginning of the mixed methods survey which described the purpose of this project, and the participants' involvement. Also included was an overview of confidentiality measures, and the voluntary aspect of the project, as well as contact information if the participants had questions or concerns. As this study meets the criteria of a student project, it did not require the review or approval of an institutional review board.

The 31 participants in this study were all undergraduate students currently enrolled at the University of Nebraska-Lincoln (UNL). UNL students who filled out the mixed methods survey were asked to report their year in school (freshman, sophomore, junior, senior, or other), major, and where they currently lived (on campus, off campus, etc.). Students who participated in this study ranged in ages from 18-22 and were all undergraduates. Of the participants, 4 reported that they were a freshman (13%), 4 reported they were a sophomore (13%), 15 were juniors (48%), 10 participants were seniors in their fourth year or above (26%). The categories of majors that were represented included education (16%), health (10%), business (29%), social science (16%), animal science (6%), and environmental studies (23%). Lastly, the respective residences of the participants included 58% living in an off-campus house, 23% living in an off-campus apartment, 6% lived in an on-campus house, and the remaining 13% lived in an on-campus dorm.

### Mixed Methods Study Design

The research design method that was most effective for the nature of the research questions was an empirical mixed methods survey (Creswell & Plano Clark, 2018). The format of the survey included both closed-ended and open-ended questions. The closed-ended scales serve to collect quantitative, numerical data (Creswell & Plano Clark, 2018). Listed below, these questionnaires were four-point and five-point Likert scales which allowed the participants to specifically choose how much they agree/disagree with a provided statement about their environmental attitudes and behaviors (Joshi et al., 2015). The two open-ended questions asked participants to provide qualitative data that answered the 'how' and 'why' of the phenomenon that is being studied (Creswell & Plano Clark, 2018). These questions were placed at the beginning of

the survey in the form of open-ended response questions, in order to elicit longer responses from participants.

The reason for collecting quantitative and qualitative data is to be able to validate the results from each form of data (Creswell & Plano Clark, 2018). It is a large benefit that using a mixed methods approach allows a broad, complex research problem to be investigated. This is because there are many limitations that arise by using just one method, and on the same hand, the strengths of each method work together to limit weaknesses. Mixed methods have been argued to provide a way to utilize strengths of qualitative and quantitative data while canceling out each of the weaknesses that come with each. It also helps with answering questions that could not be answered by just qualitative or quantitative on its own (Creswell & Plano Clark, 2018).

After collecting the data from the surveys that were completed by the 31 participants, the data was analyzed by using a convergent mixed methods design. The convergent mixed methods design deals with collecting both qualitative and quantitative data and being able to combine the two types of data together in the analysis (Creswell & Plano Clark, 2018). This process is completed in three steps. The first step is to collect and analyze the quantitative and qualitative data. Next, the results will be merged and compared to each other. The final step in this process is to interpret the finalized data (Creswell & Plano Clark, 2018).

### ***Measures***

**Environmental concern and pro-environmental behaviors and attitudes questionnaire.** The first qualitative questionnaire in the form of a five-point Likert scale comes from a study done by Hidalgo-Crespo and others (2022). The study was based around understanding citizens' environmental concerns while also looking at their behaviors, attitudes, and their influence on energy use. In the original study, this questionnaire was aiming to measure environmental concerns and pro-environmental behaviors and attitudes (Hidalgo-Crespo et.al., 2022). For example; one question from this study states, "You are concerned with improving and protecting the environment."

**Environmental behavior questionnaire.** The second quantitative questionnaire also comes in the form of a four-point Likert scale which came out of a previous study done by Casey & Scott (2007). This scale was constructed using ecological behaviors and had items to cover a wide range of recycling behaviors, consuming behaviors, and conserving behaviors. With this scale, there were two additional sets of questionnaires being used, and this scale was strategically placed as the first in order to avoid bias on the later questionnaire sets (Casey & Scott, 2007). One statement from this study asks how much the participant agrees with; "I reuse plastic shopping bags for future shopping and/or other purposes."

### **Data Analysis**

To analyze the data and answer RQ1 and RQ2, various analyses were conducted. Prior to analyses, I prepared the data (Creswell & Plano Clark, 2018). The quantitative survey responses were checked for errors and cleaned so that all data could be interpreted uniformly in SPSS. The qualitative responses were also checked for accuracy, organized, and put into an Excel format. The second step was to explore the data via quantitative (one-way ANOVAs) and qualitative (thematic analysis) analyses. As a mixed methods study, the final step was to integrate these results and how they complement one another to answer my research questions.

The quantitative data was first analyzed to produce descriptive analyses for each variable. Then, separate one-way ANOVAs were ran for each of the categorical variables of interest related to UNL students (e.g., year in college, major, residence). The quantitative data was analyzed using statistical software, specifically SPSS, with tests of difference conducted. With the quantitative data, reliability was established, and there were procedures used to reduce threats of internal and external validity (Creswell & Plano Clark, 2018).

Further, the qualitative data was analyzed using Braun and Clarke's (2019) six-step approach to reflexive thematic analysis. The first step is to prepare the data for analysis. In this step, the data will be transcribed, checked for accuracy, organized, and put into a format. The second step is to explore the data. The data will then be read through to gain a sense of the responses, the researchers' initial thoughts will be recorded, and then a codebook will be created. The third step is to analyze the data. The researcher will select an analysis approach based off of the research questions, then the data will be analyzed by hand and a coding process will be implemented. The fourth step is to represent the data analysis. In representing the analysis the qualitative data will be represented with discussions of themes following evidence for these themes, and the results will follow style guidelines. The fifth step is to interpret the results. The data will be summarized from the major findings, then will be interpreted to answer the research questions and relate the findings to past literature, and a personal assessment of the findings will be completed. After that, the limitations to the study will be identified along with the implications for future studies. The final step is to validate the data and results. The researcher will use validation strategies to check the data for accuracy and reliability (Braun & Clarke, 2019).

## Results

### RQ1: Attitudes and Motivation

Research question 1 asked about what motivates UNL students to recycle single-use plastics. The question asked to answer RQ1 was “How do you feel about recycling single-use plastics?”. I identified two themes from the data; Motivators of Recycling & Challenges of Recycling. The quantitative data revealed no significant difference between different groups including student’s grade, major, and place of residency. Although there was no significant difference, there was still valuable information provided by the data.

#### *Qualitative Data*

I grouped the qualitative data on participants’ feelings toward single-use plastics into themes of a) their multiple motivations for recycling and b) the challenges they encounter in recycling. Together, these themes illustrate the tensions of balancing student life with caring about the larger environment.

**Motivations of Recycling.** The theme of *Motivations of Recycling* is characterized by responses that indicated the participant had motivation or a positive attitude towards recycling single-use plastics in some way. The large portion of students (25%) indicated a favorable motivation towards recycling and indicated it was due to the potential environmental effect of recycling, or the desire to be sustainable and “green”. For example, one student said:

I worked on a farm and saw first-hand the damage single-use plastics can make on the environment and compost retrieved from the city. I think recycling is a very important, and simple thing everyone can do to help the environment (Participant 20).

In this quote from participant 20 they point to the potential environmental damages of not recycling, and how they are then motivated to help the environment. Another participant who was motivated by the environmental effects of recycling said, “If [single-use plastics] are not recycled they will probably end up in the ocean” (Participant 18). This quote demonstrates a participant whose motivation stems from the large effect of single-use plastics. While this participant pointed out the possible negative impact on the ocean, others talked about the lasting effect they have on the environment, one participant said:

I think it is essential that we at least make an active attempt to recycle single use plastics. The lasting impact it can have on the environment is not worth the convenience of just throwing it away into a conventional trash can (Participant 11).

This response from participant 11 discusses the environmental impact that single-use plastics can have and mentions the role that convenience plays in this. The various responses that discussed environmental impact were helpful to find what things students take into consideration when deciding to recycle single-use plastics.

Participant responses also demonstrated motivation towards recycling for many reasons beyond its sustainable effect. There were several responses that showed favor towards recycling single-use plastics but, didn’t not because of its “green” effect. A large portion of the participants (58%) indicated a favorable motivation towards recycling for a variety of different reasons. A participant that was motivated by the overall effect said, “I

think recycling single-use plastics is a great practice. I think many people throw their single-use plastics away without a second thought and I believe that at the end of the day it really adds up” (Participant 9). This response demonstrates how the participant thinks of the bigger picture of single-use plastics and the effect of taking small steps towards a greater goal. They also mention how “many people throw their single-use plastics away without a second thought”, this leads to the idea of breaking the habit that people have of throwing these items away and recycling instead.

Another participant discusses the idea of making these items more useful, “I think it is very important to recycle single-use plastics; they can be used for many different things than just the use that they are intended for” (Participant 1). This response shares the idea of breaking people’s habits with the response from participant 9. The habit to be broken is that people think the only option with single-use plastics is to throw them away immediately after using. Options outside of throwing single-use plastics away include; reusing them or recycling them. Since these participants showed motivation towards recycling, it is hopeful that alternative options like the ones shared above begin to be utilized.

**Challenges of Recycling.** The other overarching theme, *Challenges of Recycling*, was characterized by responses that indicated the participant had no motivation or a negative attitude towards recycling single-use plastics in some way. The majority of students whose response falls under this theme of no motivation towards recycling (12%) indicated the potential environmental effect of recycling, or the desire to be sustainable and “green” played a role in their lack of motivation.

For example, one student questions the actual effect of recycling in their response, “It seems counterintuitive, only because they are intended to be used one time so will they actually be recycled? These single-use plastics will also probably be dirty and unable to be recycled anyways” (Participant 29). This student questions the effect of recycling because of the steps that consumers must take before recycling single-use plastic items. They also discuss the single-use design of these products, putting question to whether or not these products are intended to be recycled or not.

While participant 29 questions the overall effect of recycling, another participant brings up the effect that their busy schedule has on their motivation to recycle; “I feel like recycling single-use plastics is a very important and necessary thing to do for our environment, but I am very bad at taking the time to go out of my way to recycle” (Participant 23). This student is aware of the positive impact that recycling has on the environment but is conflicted because of the extra work required to recycle. The challenge of recycling comes from both the extra time required as well as the convenience of “going out of their way” to recycle.

Similarly, another participant is aware of the effect that recycling has on the Earth but is challenged, “I know that it is harming our earth, but recycling is not something I do” (Participant 14). This response doesn’t specifically explain the lack of motivation but it is possible that the participant does not care to change even if it negatively affects the environment.

While some responses in this theme were focused toward the environmental impact of recycling, there were also responses that expressed the challenges of recycling but for a reason other than the environmental impact. One student’s response discusses the idea that there is a bigger issue at hand; overconsumption. In this response they said, “It can be helpful for items that

need to be unavoidably single use, like medical supplies, but it doesn't tackle the issue of them being over consumed in the first place" (Participant 31). They point out that with some items, such as medical supplies, it is hard to move away from the single-use design and that recycling is important for items like those. But, instead of focusing all attention on that, they suggest looking at the bigger picture of overconsumption.

While they discussed the issue of overconsumption, another student was more focused on the flaws and practicality of recycling. In their response they said;

I think recycling single use plastics is a good goal. But between the design of single use plastics (materials used, mixed materials, sizes of products) and the frequency with which recycling is either not attempted by waste companies or is done inefficiently, I think recycling these is more of an ideal than a practicality (Participant 15).

As participant 15 brings up, there are a lot of factors that go into recycling products, especially single-use plastics. Because of the many flaws that they point out, their motivation level is very low and they are not likely to become motivated.

### ***Quantitative Data***

To analyze the quantitative data for RQ1, I ran multiple one-way ANOVAs that could point out significant differences between groups of participants in the study (cite). Specifically, I tested for differences in (a) environmental concern, (b) pro-environmental attitudes, and (c) environmental behaviors based on independent categorical variables of (a) year at UNL (e.g., freshman, sophomore, junior, senior, fifth year), (b) major (e.g., education, health, business, social science, animal science, environmental studies), and (c) current residence (e.g., on-campus dorm or house, off-campus apartment or house).

First, results reveal no significant difference in environmental concern between grade levels of students:  $F(4, 26) = 2.080, p > .05$ . However, pairwise comparisons using LSD reveal juniors ( $M = 3.905, SD = 0.568$ ) have significantly lower levels of environmental concern than both freshman ( $M = 4.464, SD = 0.244, p = .045$ ), and seniors ( $M = 4.429, SD = 0.373, p = .030$ ). This meant that participants who were juniors had lower levels of environmental concern compared to those who were freshman or seniors.

Next, results reveal no significant difference in pro-environmental attitudes between UNL students from different majors:  $F(5, 25) = 1.638, p > .05$ . Pairwise comparisons using LSD reveal environmental studies students ( $M = 4.531, SD = 0.366$ ) have significantly greater levels of pro-environmental attitudes than health students ( $M = 3.381, SD = 0.360, p = .018$ ). This meant that participants who were environmental studies majors had higher levels of pro-environmental attitudes compared to those who were health majors.

Finally, results reveal no significant difference in environmental concern between student residences:  $F(3, 27) = 2.592, p > .05$ . However, pairwise comparisons using LSD reveal students who live in off-campus houses ( $M = 3.944, SD = 0.537$ ) have significantly lower levels of environmental concern than those living in off-campus apartments ( $M = 4.408, SD = 0.373, p =$

.035). This meant that participants who lived in an off-campus house had lower levels of environmental concern compared to those who lived in an off-campus apartment.

Overall to answer research question 1, the most common theme was Motivators to Recycle-Environmental Effect. The second most common theme was Challenges to Recycling-Other Standpoint, which included a variety of answers. The next highest was Motivators to Recycle-Other Standpoint. The theme with the least amount of responses was Challenges to Recycling-Environmental Effect. The quantitative data

## **RQ2: Environmental Behaviors**

Research question 2 asks about what efforts students are already taking to reduce single-use plastics, and if those actions could be introduced to the campus setting. The question asked to answer this question was “How, if at all, do you aim to reduce single-use plastics in your day to day life?”. I identified three themes of students’ environmental behaviors from the data; Lifestyle Changes, Avoidance, and Nothing. The quantitative data revealed significant differences between student’s majors and environmental behavior, but no significant difference between student’s residence and environmental behaviors. Although there was no significant difference with the second group, there was valuable information provided by the data.

### ***Qualitative Data***

I grouped the qualitative data on participants’ efforts with reducing single-use plastics into themes of a) lifestyle changes participants have made to reduce single-use plastics b) avoidance behaviors participants use to reduce single-use plastics and c) participants doing nothing to reduce single-use plastic usage. With the three overall themes, it is important to note that the responses from the survey do not necessarily fall into one set theme and are not all or nothing. Instead, their behaviors fall somewhere on a spectrum from being very active and involved to not being active or involved at all. Together, these themes help to gauge how active or inactive students are with their efforts of reducing single-use plastics.

**Lifestyle Changes.** The most occurring theme was *Lifestyle Changes*. This theme is characterized by responses that mention personal use of reusable products in place of single-use products. Some of these include grocery tote bags, metal or glass straws, and reusable water bottles. The theme also includes responses that mention advocating the issues that come along with single-use plastics, and the benefits of not using them. Along with that, the theme includes responses that mention the idea of recycling more. It also includes responses that mention eating more meals at home to reduce single-use plastic usage. One participant talks about the swaps that they have made in their life to reduce single-use plastics;

I use a hydro flask religiously. This helps me to very rarely use plastic water bottles or plastic straws. I have several reusable straws at home, and I don’t use straws at public restaurants. I do use grocery bags, but reusable bags are very accessible, and I should use those instead (Participant 3).

In this response, participant 3 discusses the changes that they have made in their life to reduce single-use plastics. They have chosen to replace single-use plastics with reusable items that they will be able to reuse several times before throwing it away. There were several similar responses in this theme that discuss using the reusable option in place

of the option made of single-use plastics. While many participants discussed the idea of replacing, others mention advocating the issue, “I try not to use single-use plastics to begin with, especially when I am given the choice as a consumer. I can also **encourage others to do the same in a respectful manner to enhance that impact**” (Participant 8). This participant discusses the impact that encouraging others has on the issue. Although, in the same response they also talk about avoiding single-use plastics to begin with. Because *Avoidance* was an emergent theme in this study, this goes to show that the themes overlap and the behaviors discussed in the responses fall on a spectrum.

**Avoidance.** The next theme, *Avoidance*, is characterized by responses that discuss avoiding single-use plastics overall because of the negative effect that they leave. One participant discusses how they avoid take-out containers to reduce their single-use plastic waste; “I use a reusable water bottle and eat most of my meals at home to **avoid take out containers**” (Participant 19). In this response, the participant mentions using a reusable water bottle as part of their efforts, which overlaps into the *Lifestyle Changes* theme. Participant 19 also mentions avoiding take-out containers to help reduce single-use plastic items.

Similar to participant 19, another student’s avoidance is in the form of avoiding plastic water bottles and containers, they said “I avoid water bottles and other plastic containers whenever I can. Whenever I do use single-use plastics (like grocery bags and water bottles) I try to reuse them” (Participant 22). Along with mentioning the idea of avoiding single-use plastics, they also mention reusing these items when necessary. There were several responses similar to this where the participant discussed a couple different behavioral items.

**Nothing.** The theme *Nothing*, includes the responses that claim to not aim to reduce single-use plastics in their lives. Many responses in this category talk about the factor of convenience or having a busy life as a student.

This participant mentions how they are too lazy or forget often, “I do not, simply because I forget or feel too lazy to take the time to think and act on it” (Participant 29). This response from participant 29 emphasizes the challenges that come with being a busy college student while trying to reduce single-use plastics. It also touches on the idea that recycling requires effort, and that the participant is too “lazy” and does not want to put-forth effort.

Along with participant 29, another participant confesses that their environmental behaviors are limited due to being a busy college student. While this participant’s response falls into the *Nothing* theme, they also mention behaviors that fall into the *Lifestyle Changes* theme such as owning reusable items and cooking at home more. They said “I have a reusable straw and use tupperware and try to always cook at home, other than that I don’t do anything because I’m in college and **it’s more convenient to not with my busy schedule**” (Participant 22). This response is interesting because it mentions ideas from completely different ends of the spectrum.

### ***Quantitative Data***

Similar to RQ1, to analyze the quantitative data for RQ2, I ran multiple one-way ANOVAs that could point out significant differences between groups of participants in the study (cite). Specifically, I tested for differences in environmental behaviors based on independent categorical variables of (a) major and (b) current residence.



Results reveal a significant difference in environmental behavior between UNL students from different majors:  $F(5, 25) = 2.598$ ,  $p = .05$ . Pairwise comparisons using LSD reveal environmental studies majors ( $M = 3.219$ ,  $SD = 0.299$ ) have significantly greater levels of environmental behaviors than education majors ( $M = 2.671$ ,  $SD = 0.679$ ,  $p = .034$ ), health majors ( $M = 2.353$ ,  $SD = 0.311$ ,  $p = .006$ ), and business majors ( $M = 2.686$ ,  $SD = 0.430$ ,  $p = .018$ ). Additionally, the social sciences students ( $M = 2.988$ ,  $SD = 0.146$ ) have significantly greater levels of environmental behavior than health students ( $M = 2.353$ ,  $SD = 0.311$ ,  $p = .047$ ). This meant that participants who were environmental studies majors had higher levels of environmental behavior compared to those who were education, health, or business majors. Further, social science majors had higher levels of environmental behaviors compared to health students.

The results reveal no significant difference in environmental behavior between student residences:  $F(3, 27) = 2.547$ ,  $p > .05$ . Pairwise comparisons using LSD reveal students living in off-campus apartments ( $M = 3.092$ ,  $SD = 0.343$ ) have significantly greater levels of environmental behavior than students living in off-campus houses ( $M = 2.634$ ,  $SD = 0.501$ ,  $p = .026$ ). This meant that participants who lived off-campus apartments had higher levels of environmental behavior compared to those who lived in an off-campus house.

To answer RQ2, the most common theme identified was *Lifestyle Changes*, which included 17 responses. The next most used themes were *Avoidance* and *Nothing*. There were many responses that could have fallen into two different themes because the responses fall on a spectrum. The quantitative data revealed significant differences between student's majors and environmental behavior, but no significant difference between student's residence and environmental behaviors.

## Discussion

In this study, I aimed to examine UNL undergraduate students' attitudes and behaviors toward single-use plastics using a mixed methods approach. There were 31 survey responses collected and utilized to answer RQ1 and RQ2. To answer my research questions, I used a mixed methods survey to ask participants about (a) gauging how motivated they were to change their single-use plastic recycling behaviors and (b) what behaviors they engaged in regarding single-use plastic recycling. I have found that students are generally motivated and do have positive attitudes towards recycling single-use plastics, though there are many reasons for students to lack motivation as well. In addition, there are things that college students do currently that can be encouraged and efforts from the University can complement these. In this section, I will interpret what I found from my results, provide a couple ideas on how this information can be implemented, and lastly discuss some possible limitations of this study.

### Interpretation of Findings

In this study, I gathered quality quantitative and qualitative data which provided rich insight into UNL student perspectives, especially in terms of their motivations and behaviors toward the environmental issue of recycling single-use plastics. One finding from this study worth expanding over is the conflict that is present between the impact that single-use plastics have on the environment. That is, it was both motivating and challenging to students. Looking at the qualitative data from RQ1, some participants claimed to be more motivated to recycle due to the positive effect that recycling has on the environment. The specific environmental effects that were discussed in the participants' responses included the impact that single-use plastics have on the ocean and its contribution to pollution. As discussed in the study done by Blose and colleagues (2020), college students' recycling frequency is related to the students' perceived effectiveness, and also believe that recycling is the key to a sustainable environment. On the other hand, responses from this same qualitative data claimed to be less motivated to recycle due to the lack of environmental impact. Some of these participants questioned the amount of single-use plastics that make it all the way through the recycling process and are recycled, and others were concerned with the larger issue of consumption. After evaluating the entire qualitative data set for RQ1, I found that the environmental impact of single-use plastics can be both a motivator and a challenge to students. Because of this, Blose and others (2020) indicate that the individuals' behavior is then affected positively by recycling more, or negative by recycling less. If a student doesn't perceive recycling as effective, their recycling frequency is much lower (Blose et.al., 2020).

Another interesting finding in this study is the difference in environmental behaviors between students living on campus and students living off campus. Looking at the quantitative data from RQ2, I found that participants who lived in off-campus apartments had higher levels of environmental behavior compared to those who lived in an off-campus house. In the study done by Soderberg and colleagues (2022), they found that it is necessary for off-campus housing to provide the tools needed to recycle. The students have developed the habit of recycling when living on campus, and after they move off campus it's the new managements' responsibility to help them continue that habit (Soderberg et.al., 2022). Looking at the availability to recycling that students have when they live in an off-campus house compared to an off-campus apartment, there is a difference in availability. Off-campus apartments typically have recycling available but not

mandatory, off-campus houses depend on the house. This could be an explanation for the results of the quantitative data from RQ2.

Also found from the quantitative data from RQ2, environmental studies majors who participated in the study had significantly greater levels of environmental behaviors than education majors, health majors, and business majors. This finding is not something that surprised me; it makes sense that individuals who are environmental studies majors have higher levels of environmental behaviors compared to other majors. The individuals that choose this major are typically environmentally motivated, therefore take part in more environmental behaviors. A study from Desa and colleagues (2012) discusses the importance of all university community members taking part in environmental behaviors. They say the focus on universities is important since campuses educate the future decision-makers of society (Desa et.al., 2012). Since this study found that environmental studies majors show the highest levels of environmental behaviors, these students may be the key to changes being made throughout the entire campus.

### **Practical Implications and Future Directions**

The results of this study show that UNL students who participated in the survey generally had a positive attitude towards recycling single-use plastics and were also generally motivated to recycle them. A possible implication moving forward could be for the university to begin vocalizing the effect of recycling more to the student body on campus. Bruchmann and colleagues (2021) found evidence that students' rates of recycling are higher when the idea of recycling had been vocalized to them. The study found that if a student was informed that their water bottle sustainability habits were above average, they were more favorable towards the idea of sustainability. Similarly, if a student was told that their water bottle sustainability habits were average or below average, they demonstrated a high desire to become more sustainable (Bruchmann et.al, 2021). Another future action could be for the university to take small steps in order to reach the larger goal of reducing single-use plastics on campus. In a study done by Wager (2017), they discuss the importance of taking smaller steps towards a greater, more sustainable future. Although the study focuses on small steps with single-use plastic grocery bags, I believe a similar concept can be applied to the use of most all single-use plastics. Some responses from the survey help to illustrate this possibility by mentioning how single-use plastics add up over time, resulting in a need for change.

Another possible implication could be to begin an incentive program for the faculty, staff, and all students on the UNL campus to recycle more. This technique was found to be effective after a study was done by Luyben and Cummings (1981). The results of this study found that there is a positive correlation between incentive programs on a college campus and higher recycling rates. Looking at applying this to the UNL campus, an incentive program could be started in the residence halls on campus. Doing this would allow for easy access to data and could eventually be expanded to the entire campus if successful.

### **Limitations**

Some limitations have been identified after completing this study. First, there may be limitations present because this study was conducted exclusively to a subset of UNL undergraduate students. Because this study excluded faculty, staff, and graduate students, it doesn't capture the nature of the entire UNL campus. Another limitation may be present from the small sample size of 31 participants. The UNL campus has about 20,000 undergraduate students,

so this sample size is very low relative to the entire population. There may also be other limitations that arise depending on future direction. However, the mixed methods approach to this study provides a balance of potentially generalizable information about students' motivates and behaviors, as well as rich qualitative insights into them (Creswell & Plano Clark, 2018).

## **Conclusion**

The aim of this mixed methods study was to examine college students' attitudes and behaviors towards recycling single-use plastics at the University of Nebraska-Lincoln. I wanted to better understand why there was a lack of recycling single-use plastics on campus, especially whether it was a motivation or a behavior issue. With this, I found that students are both positively and negatively motivated to recycle single-use plastics because of the environmental effect. Students' environmental behaviors fell into three themes but the responses illustrated that they behaved on a spectrum of recycling behaviors, from active to inactive, and for a variety of reasons. The findings of this study matters because it has helped to fill the gaps that were present in the previous research. The results of this study help to expand knowledge about college students' attitudes and behaviors towards recycling single-use plastics.

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