Boston College Plastic Use and Student Behavior Regarding Reusable Dishware

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Abstract

Plastic use has been drastically increasing over the last couple of hundreds of years, and its polluting effects are altering ocean and terrestrial ecosystems. Boston College is only a small fraction of the earth's population that contributes to the growing amount of plastic consumption. However, it is still a population that is consuming an unnecessary amount of plastic. This project studied Boston College's plastic consumption in dining halls in the hope that it would provide a better understanding of current consumption practices and provide insight to a sustainable alternative. This project conducted a cost-benefit analysis of plastic and china dishware in order to provide an economic basis for future plastic reduction programs. The analysis revealed that Boston College spent about $1,976,262.03 on single use plastic items in 2018 which dwarfed the mere $34,375.00 dollars spent on replacing the reusable china products. Additionally, a survey was completed by Boston College students, N = 76, that collected data on quantitative plastic consumption and qualitative plastic behavior. An observational study was conducted at Addies to explore whether asking students directly about their eating location leads to a decrease in unnecessary plastic use. Survey results demonstrated that there was a significant difference in weekly plastic consumption between groups of students who believe Boston College recycles and those who do not. Students who believe Boston College recycles use more plastic per week than others. Other group differences were statistically analyzed through the survey results. The observational data from Addies reported that the majority of students (51.8%) of students were giving false information on eating location in order to receive the "to go" containers from Addies' workers. Overall, all three parts of this study resulted in data that provides a base for future plastic reduction at Boston College. Understanding both the economic and psychological aspects of Boston College plastic use will aid in the creation of project that solves the problem of unnecessary use of plastic on campus.

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It is a commonly accepted fact that plastic is harmful to our planet, yet tons of plastic products are used daily in the United States. College campuses are no exception. Because of the high financial and environmental costs of plastic, this study took a closer look at plastic consumption in campus dining halls by Boston College students. In taking a closer look at how much plastic is used/bought, student perceptions, and raw data, this study hopes to provide a deeper understanding of current plastic practices at Boston College, and thus, provide some insight into more sustainable alternative options. Finding more sustainable alternative options will not only cut down financial costs to Boston College, but to the environment and thus improve every person's quality of life.

Plastics and the Environmental Impacts

Single-use plastics are incredibly common in the daily lives of most individuals on this planet. Since their invention in the beginning of the 1900's, plastics (polyvinyl chloride and polyethylene) have become a staple in human life (Beaman et al., 2016, p. 13). However, this dependence on plastics is causing environmental issues. Plastics contain chemical contaminants such as phthalates, polycyclic aromatic hydrocarbons (PAHs), zinc, aluminum, cadmium, and organ chlorine pesticides (OCPs) (Beaman et al., 2016, p. 14). Nothing about plastics are organic. Therefore, when plastics end up in any type of ecosystem, their chemical makeup influences the environment. For example, chemicals leak from plastics when they end up in marine ecosystems. Toxic chemicals leak from plastics into the surrounding ecosystems (Beaman et al., 2016, p. 16). The chemical makeup of plastic is harmful. However, one of the most environmentally damaging qualities of plastic is that it is not biodegradable. A substance is biodegradable if it can be decomposed by bacteria, fungi, or other living organisms. Plastic, is a synthesized substance compounded through chemicals and non-organic materials. Since the mission of plastic is to be low cost but long lasting, modern day plastics take thousands of year to break down (Brock et al, 2012, p.79). The benefit of plastic's low production cost and versatility comes at a price to the many ecosystems to which it is exposed. Most plastics can last up to 500 to 600 years intact. This means that it will remain discarded in the environment for that period of time (Brock et al, 2012, p.79). All of the plastic that is created, used, and thrown away is going to stay on this planet for the next couple of generations. According to the Environmental

Protection Agency government report, the amount of plastic produced in the world increased from 1.7 million ton in 1950 to 311 million tons in 2014 (Beaman et al., 2016, p. 13). Since plastic has such a long lifespan, governments, companies, and households all over the world must find something to do with this plastic waste. A large part of it, 4.8 to 12.7 million metric tons (in 2010), of plastic waste end up polluting our oceans and their ecosystems (Beaman et al., 2016, p. 13). This pollution is damaging natural environments.

A common misconception for most people when they think of pollution is that it is large pieces of plastic floating around the ocean or sitting on patches of land, this is not the case. Although plastics don't disintegrate, they break up into smaller pieces over time. These small bits of plastic are called microplastics and can't always be seen by the naked eye. According to the EPA, plastics that are less than 5mm in diameter are classified as microplastics. Primary microplastics are microplastics that were the primary product, and secondary microplastics are microplastics that were the result of the breakdown of larger plastics (Beaman, 2016, p. 22). When looking at satellite imagery of the ocean for example, you don't see individual pieces of plastics floating in the water. However, millions of particles lay stagnant. Studies on microplastics and the ocean have found that 90% of plastic found in the sea were microplastics (Beaman, 2016, p. 22). The microplastics residing in the ocean can make the water in some areas appear as a murky. This murky, thick, water is intermixed with many larger items. For example, fishing gear, shoes, and bottles have all been found in marine ecosystems (TG et al, 2009, p. 17-19). The most successful killers of oceanic ecosystems are these abundant, long-lasting microplastics, building up in marine organisms until they die from poisonous ingestion.

While lying in landfills or floating in the ocean, plastics are constantly exposed to the sun. This constant sun exposure breaks down the plastic into smaller and smaller pieces until they are considered secondary microplastics. This process is known as photo-degradation. For example research has shown that when PVC, polyethylene, and polypropylene are exposed to the sun and its ultraviolet rays, the plastics increase their “sorbtive capacity” (Beaman, 2016, p. 17). Increasing sorbtive capacity means that the object is more capable of attaching to other substances (Beaman, 2016, p. 17). As these microplastics are exposed the the ultraviolet light, they become more and more sorbtive to the molecules and substances around them. Scientists have collected up to 750,000 bits of microplastic in a single square kilometer in heavily polluted areas of the ocean; to put these numbers in perspective, that’s about 1.9 million pieces per square

mile (Floating, 2015, p. 17-19). Most of this debris comes from plastic bags, bottle caps, water bottles, cups, utensils and straws. All of these are popular items in any dining hall around the country. High demand of plastics have led to a high supply of them. This high supply of plastics ends up in our oceans, and they are polluting these ecosystems.

The continuous production and use of single-use plastics has posed as a serious environmental threat to a multitude of ecosystems, in particular the ocean. Boston College, proudly no more than 5 miles from the Boston harbor and a few hundred yards from the Charles River, acts as a serious potential offender to the plastic pollution epidemic. Boston College's proximity to the river and the ocean means that their plastic waste can harm these ecosystems. The plastic waste that is created by students at the dining halls, using hundreds of thousands of single-use plastic items each year, is bound to make its way to the ocean. This waste finds it way into the rivers and the ocean, and it continues to pollute the water and kill the marine organisms. One marine organism that is directly impacted by plastic pollution is the loggerhead sea turtle. Loggerhead sea turtles often mistake plastic bags for jellyfish, their preferred prey and an important part of their diet (Floating, 2015, p. 18-21). Jellyfish and plastic bags almost look identical in the water to a sea turtle. Eating plastic bags can damage a sea turtle digestive system and become an obstruction in their throat. Albatrosses often mistake plastic resin pellets for fish eggs and feed them to chicks. These chicks then die of starvation or ruptured organs (Floating, 2015, p.18-21). This fatal mistake can ultimately result in lower species numbers for the Albatross and sea turtle populations in their habitats.

These serve as prime examples of how pollution can affect an ecosystem and target cornerstone species. Photo-degradation of microplastics are affecting the seabirds that rely on the ocean as well (Ferguson et al, 2010, p.511). Seals and other air-breathing, apex marine animals are harmed by these types of plastics that fill parts of the ocean. They often consume fish that have been feeding on bits of plastic, mistaking it for food. The plastic infested fish now carry highly poisonous chemicals in their bodies. These fish are then consumed and processed by these seals, and the seals then get sick and die. As pollution builds on the surface it will continue to be more and more hazardous to the ecosystem around it. Aside from ingestion and toxicity, the collection of trash on the sea surface can and will block sunlight from reaching organisms like photosynthetic plankton and algae. Both Plankton and Algae are a vital role in the food web of their ecosystem. They require sunlight to live, as they produce their own nutrients through a

combination of sunlight, oxygen and carbon (Ferguson et al, 2010, p. 511). When algae and plankton, the primary producers of the marine ecosystem, are in low numbers it affects the rest of the ecosystem.

Apex predators feed off fish and turtles. Those fish and turtles feed off plankton and algae, as the cycle of marine life is dependent on one another. The breaking of the cycle also poses threats for humans as well. Humans would feel the impact of the loss of sea life. If there is a lower supply of fish, then the price humans must pay will increase. These consumable fish will also be riddled with chemical contaminants from plastic waste. The dangers stem from the chemical makeup of plastics, leaching out colorants and chemicals such as biphenyl A (BPA), a chemical that has been linked to environmental and health problems all over the world (TG et al, 2009. P. 17-19). Chemicals like BPA and others leak out into the sea water and infiltrate the marine life and ecosystem, affecting plankton and algae the most. As stated before, plastic waste increases its capacity to attach to other substances when it is exposed to sunlight. Ingesting toxic fish is incredibly harmful to humans. Human survival is dependent on the health of the ocean. The overproduction and consumption of plastic is deteriorating the health of the ocean. Reducing our plastic waste is a priority.

Not all plastic ends up in the ocean. There are current waste management practices for disposing of plastics. Current waste management practices involve the use of landfills, incineration, and "microbial degradation and conversion into useful materials" (Ilyas, Ahmad, Khan, Yousaf, Khan, & Nazir, 2017, p. 384). However, there are downsides to these practices. For example, the land designated as a landfill is ruined for any future productive use. This land becomes useless, as it is not being used for other purposes. Landfills become filled with all different types of plastics, and this leads to the degradation of certain types of the plastic. This plastic "biodegradation" leads to the release of methane, a greenhouse gas (Ilays et a., 2017, p. 397). Another disposal method is incineration. Incineration involves the burning of plastics. The burning of plastic causes pollution through the emission of the chemical pollutants: "polyaromatic hydrocarbons, CO2" and dioxins (Ilyas et al., 2017, p. 384). Recycling is a very popular method of disposal for plastics. It is advantageous because it reduces the amount of plastic waste and minimizes the release of greenhouse gases. However, it can be hard to convince facilities to recycle because there is less of an economic incentive (Ilyas et al., 2017, p. 397). Additionally, it is not actually reducing the total amount of plastic on the earth. It is just

reusing the plastic already produced. The by-product of plastic production is also polluting our environment. Water is a resource used in the creation of plastic. This leads to to an end product of wastewater. When this wastewater is not disposed of properly it can leak into land and water sources. This leaking pollutes groundwater and it releases a foul and harmful odor (Ilyas et al., 2017, p. 397). Both the waste created during production and disposal of plastics are incredibly harmful to ecosystems and their inhabitants, including humans. Reducing the demand of plastic would reduce plastic waste along with plastic production.

While Boston College is a very small proportion of the total world population, every population's plastic-use behavior has an impact. Therefore, reducing the amount of single-use plastic waste that a small population produces is necessary. There are three different strategies for plastic reduction. Education is one strategy. People may know plastics are not the best product for the environment, but most individuals do not know just how damaging this chemical compound is. Additionally, people may think plastic-use does not impact them, as they are removed from the build-up of the waste. However, there are impacts that are not visible to the human eye. As stated above, these impacts include chemically-polluted waters, polluted fish, decreased marine organism populations, etc. Making individuals aware of this is important in plastic use production. Secondly, making plastic-use more costly than alternatives. Examining the cost-benefit between the use of plastics and reusable china on college campus' can provide a base for convincing college administrators to move away from buying and providing single-use plastics. Lastly, understanding the psychology behind consumer behavior can be effective. It is effective in both creating productive programs and changing student behaviors. Overall this project is exploring how these three strategies can be related to Boston College's plastic use and student behavior regarding plastic.

Sustainability: Economic and Environmental

In order to achieve any type of true long term prosperity (whether a school, firm, or nation), all decisions must be made with special consideration to sustainability. To be sustainable is to achieve continuing economic prosperity while protecting the natural systems of the planet. This will ensure a high quality of life for all people. Understanding how economics and finance impact decisions and choices can lead to strategies that both improve finances and care for the environment. A study by Gowdy and Howarth (2007) explored how using benefit-cost analysis can help improve upon sustainability measures taken. Their literature review focused on the

benefit-cost analysis (BCA) model and how it has been used overtime to evaluate public policies. This literature review also pointed to a study done by Soderqvist et al. (2014) which discussed how a cost benefit analysis can be a useful part of sustainability assessment. To begin, they derive and explain an indirect utility function. This function includes indirect utility, prices for market goods, prices for inputs, income, sum of profits, lump-sum tax, and the non-market good of environmental quality (Soderqvist et al. p. 268). They then go further to discuss how an individual's marginal utility of environmental quality relates to choices and outcome. Lastly, they note that if a market is well-functioning, prices should adjust so that demand of products and inputs are equal to supplied quantities. At equilibrium these two will converge to zero. This means that a project will result in an improvement of environmental quality that is socially profitable if the direct compensating variation is greater than zero (Soderqvist et al. p. 269).

In their review they used a cost benefit analysis to enhance their sustainability assessment of remediation alternatives for contaminated land. They were studying how many more dwellings could be produced if there was a marginal increase in the amount of clean land. To create this cost benefit analysis they used variables such as, price of a dwelling, amount of dwellings sold, price of land, amount of land, price of fixed costs and so on. They performed this for three different categories and then experts reviewed the findings. Due to the cost benefit analysis they were able to suggest that a marginal increase in the amount of clean land would increase property values on site, and reduce non-acute health risks (due to decreased concentration of DEHP and PAH-H in soil). Furthermore, it would impact other types of improved health due to decreased anxiety, increase recreational opportunities and decrease the provision of ecosystem services outside the site (Soderqvist et al. p. 272). Their study proved that a cost benefit analysis based on theoretical cost benefit rules can be applied to environmental cases (such as remediation of contaminated land), and thus help determine the best socially profitable solution.

This model of analysis could help other firms understand all of their long term options. By looking at the financial outcomes and costs over time, a firm can chose the most sustainable course of action. That being the option that achieves the most continuing economic prosperity while protecting the natural systems of the earth, and of course provide a high quality of life for people (Gowdy and Howarth 2007). Infinite economic growth based on consumption will never be possible on a planet with finite resources. However, using the resources that are available in a

sustainable way will allow for both the growth of economies and prosperity for future generations. Generating a cost benefit analysis can therefore provide decision makers with the necessary tools to make these critical decisions.

At a place like Boston College, a place of learning and growth, with a mission of teaching students to be the best version of themselves, achieve financial success and help others, long term sustainability is critical. Boston College simply cannot achieve its goal without all those goods provided by the environment. Nor can students achieve their best if basic needs are not met. It is therefore in everyone's interest, to make decisions that care for the environment. Boston College consumes and disposes of tons of plastic products per year through the various dining halls on campus. This immense consumption not only produces a significant amount of environmental waste, but also costs the university thousands of dollars. Employing a cost benefit analysis on Boston College's consumption of china and plastic products in dining halls can provide insight on the current strategies in practice, and offer alternative strategies that will be more cost efficient and environmentally friendly in the long run. Because of the immense value a cost benefit analysis can provide, this research study conducted and generated a cost benefit analysis that shows a large discrepancy in spending by Boston College.

While understanding the value of a cost/benefit analysis on purchasing single use plastic for Boston College dining halls is valuable to this study, it is also important to understand student behavior and preferences. As stated above, demand drives supply, meaning if students like to consume single use plastic, Boston College will provide it. Understanding the psychology behind choices will provide a greater insight into future methods that can be employed to decrease plastic use in Boston College dining halls.

Psychology of Plastic Use and Reduction

Even though humans can seem quite irrational at times, most behaviors can be broken down and understood. The behavior behind using plastic is one of them. Understanding the root of this behavior can lead to strategies that focus on these psychological roots. A study by Ari and Yilmaz (2017) explored the psychology behind the use of plastic vs. cloth bags. Their literature review focused on the Theory of Planned Behavior (TPB). This is a model that focuses on the psychological forces behind environmental awareness and the resulting recycling behavior (Ari & Yilmaz, 2017, p. 1220). Tonglet et al. (2004) (as cited in Ari & Yilmaz) explain that beliefs toward recycling, attitudes toward recycling, and prior recycling behavior, "play an important

role in shaping intention," and this influences waste minimization (Ari & Yilmaz, 2017, p. 1221). This model is describing and analyzing factors that predict waste minimization. One factor that predicts waste minimization and recycling is the perceived effectiveness and presence of a recycling program or facility (Ari & Yilmaz, 2017, p. 1221). Therefore, knowledge of Boston College recycling programs and facilities may be a factor impacting student plastic use on campus. Analyzing how this type of knowledge impacts daily or weekly plastic consumption is a fundamental aspect of this research project. This study also demonstrates how previously held beliefs on the environment and environmental awareness impacts one's decision to use plastic instead of a reusable option.

Living on a college campus can lead to unnecessary plastic use. Dining halls provide reusable options for students. However, students still choose to use plastics over alternatives. For example, Addies, a Boston College dinner location in Lower Live, gives the option to have food served on reusable china instead of a non-reusable container. Addies' workers ask students if they are eating in Lower or taking the food "to go". Addies' workers ask this question in order to reduce the amount of unnecessary plastic use. This is an environmentally-friendly strategy. If a student answers that they are eating in Lower, they are handed china dishware. However, if a student answers that they are taking the food "to go", they are given a non-reusable plate or bowl. While many students may be honest, it appears that a significant section of the population of Boston College students may be telling Addies' workers they are eating "to go" for the "to go" containers, and these students are actually eating in Lower Live. Some students are going out of their way to give the Addie's worker false information in order to use a type of dishware that is not environmentally sustainable. The degree to which this is occurring at Addies is unknown. Is asking students where they are eating reducing the quantity of unnecessary plastic use? Additionally, do students feel too uncomfortable lying to a worker, and instead, do they choose to use the reusable, but less preferable, option? Understanding the psychology behind that behavior is an important step in changing that environmentally unfriendly behavior. If the act of asking a student where they are eating is not an effective strategy in reducing plastic waste, then another strategy must be developed. This information can be used as a scientific-base for creating and executing plastic reduction projects on college campuses.

Intervention strategies utilize human psychology to understand how to promote environmentally friendly behavior. A study by Rubens et al. (2015) completed an experiment at a

Parisian supermarket, and they measured the the effect that committing to not using plastic bags had on deciding to take free plastic bags (Rubens et al., 2015, p. 3). Their results showed that participants who committed to not using plastic bags by signing a poster were much less likely to take free plastic bags. Therefore, individuals who commit to a cause through a verbal or physical act are more likely to stand by that commitment compared to those who did not have to (Rubens et al., 2015, p. 11). In the same study, researchers examined the role of cognitive dissonance and the hypocrisy paradigm. Cognitive dissonance is the psychological discomfort that occurs when an individual either holds two contradictory beliefs or acts in a way that is contradictory to this behavior. This is an uncomfortable feeling, so it motivates people to change one of the inconsistent beliefs (Rubens et al., 2015, p. 5). Therefore, cognitive dissonance can act as a behavioral change, especially in regards to environmental-related behavior. In this cognitive dissonance condition, participants signed the poster about plastic use and then answered questions about their plastic bag use. Ruben et al. found that cognitive dissonance does not lead to behavioral change regarding plastic use because participations may be trivializing their contradictory behavior (Rubens et al., 2015, p. 11). In this case, the question of eating location is acting as the root of the cognitive dissonance for those student who are lying. Boston College students may be feeling this cognitive dissonance when lying to Addies' workers and harming the environment. Nonetheless, students may trivialize their action and not feel the desire to change their behavior in the future. Under other conditions, students may not lie and use reusable materials because they feel as if their answer is acting like a commitment. Relying on cognitive dissonance, which is the current Addies' strategy, may not be a strong enough tactic in this context.

Analyzing the psychological factors that drive unnecessary plastic use is important in reducing Boston College's plastic waste. This projected attempted to determine which of these factors may impacting overall plastic-use. These factors include age, environmental awareness, and knowledge of Boston College recycling behavior. Addies is one dining hall that has attempted to use a a vocal strategy to reduce plastic use. This project will assess if the strategy of cognitive dissonance is strong enough in preventing unnecessary plastic use.

The presence of plastic on this planet is ever increasing, and human dependence on this polluting chemical compound is growing with it. Boston College is a small section of the earth's total population, but it is still important to understand our plastic-use in order to reduce our

campus plastic footprint. This was the exact purpose of this project. There were three objectives of this research project. The first objective of this project was to complete a cost-benefit analysis of Boston College's plastic use and reusable china. This analysis allows for an economic understanding of our plastic behavior. We also wanted to understand student behavior and beliefs of plastic use on campus. This involves understanding which factors are affecting individual plastic consumption. Exploring whether there is a difference between academic classes in weekly plastic consumption will show if Boston College is educating incoming classes more effectively. Lastly, our project was designed to explore the use of non-reusable "to go" containers at Addies dining hall in Lower and the prevalence of unnecessary plastic-use. This objective includes analyzing whether the current cognitive dissonance strategy used as Addies is effective.

Methods

Cost-benefit Analysis

Part 1 of this project required calculating the quantity of plastic utilized on Boston College's campus. A sustainability intern, Jacob Ricco, was contacted by email. Mr. Ricco sent a PowerPoint that contained quantitative data on the number of china items bought for Boston College dining halls. This PowerPoint included the amount of china lost each semester and the amount of money spent on replacing lost china each semester (Dining Services). This data was used in a cost-benefit analysis of plastic and china use in dining halls. Additionally, Ms. Julianne Stelmaszyk was contacted for the amount of plastic bought and used on Boston College's campus. These numbers were also included in the cost-benefit analysis. This included an excel document with the amount of individual units of plastic purchased/used in different buildings across campus (Sustainability Team).

Boston College is unable to release the cost of the plastic they purchase. Since Boston College cannot release unit prices of plastic or total cost of plastics, research was conducted to create an average cost for each subcategory of plastic. For example, Boston College purchased 218,700 compostable burrito bowls in 2018. Based on research it was determined that for a pack of 400 compostable burrito bowls, the average cost is $66.91 (Biodegradable Bowls). The average cost for a pack of 1,000 equal exchange coffee cups is $69.51 (Equal Exchange). The average cost for a bulk of 1,000 black plastic forks is $36.31 (Dixie). This was done for every sub-category of plastic purchased by Boston College for dining halls.

As seen above, these costs were used in a series of calculations in order to provide the best educated guess for the cost of these various plastic products. Since we had the amount of individual units of plastic, we were able to calculate an educated guess on cost the Boston College's plastic purchased. For a majority of these products, an average price for a plastic product pack (pack being for 1,000 units) was found. This cost was then multiplied by the number of packs that would have been bought by Boston College (which was determined from the individual unit amount provided by Boston College dining services). Following the research and data collection, an excel sheet was created in order to execute the cost-benefit analysis. Additionally, a separate table was generated to account for only the plastic items that had a direct alternative in china. This was generated in order to create a more equal comparison between student's real options in the dining hall.

Psychology of Plastic Use and Reduction

Part 2 assessed student plastic-use on campus. A survey was created using the survey software Qualtrics. Survey questions assessed weekly behavior in regards to plastic use (see Appendix for survey). Participants, N = 99, completed the survey, but N = 23, had to be excluded due to failure to complete the survey. Participants, N = 76, answered questions regarding their weekly plastic-use date at both the on-campus dining halls and coffee shops. Demographics, such as graduation year, were collected to examine age trends. Plastic-use behavior questions included, "if you were to estimate, how many plastic items (each individual unit of plastic) did you use this week?". Participants were also asked questions about their beliefs, such as "does environmental awareness factor into your decision when choosing reusable?" and "do you think Boston College typically recycles?". Additionally, the survey had participants answer their behavior with Addies' "to-go" versus reusable plates. Specifically, students were asked, "do you tell Addies' staff that you are eating "to go" when you are actually eating in the dining hall?". The survey was distributed using Boston College class Facebook pages. Each academic year was surveyed. A link of the survey was also sent to other groups on campus. Any data that indicated the participate was living off-campus was deleted. Off-campus participants were excluded from this study due to the confounding environmental variables. SPSS software analyzed student plastic use behavior. The survey was open for participants to complete for two weeks. This analysis involved examining differences in plastic use behavior between underclassmen and upperclassmen. Analysis will also include examining class

frequency in regards to plastic use with coffee shops on campus. This analysis is important in determining whether awareness on plastic waste is leading to a decrease in use of plastics. Additionally, analysis is examining the impact that one's belief on Boston College's recycling behavior has on plastic use. There were three groups (Yes Boston College recycles, No Boston College recycles, and Maybe Boston College recycles). Lastly, the relationship between taking environmental issues into account when choosing silverware and amount of plastic used per week was analyzed. All of these analyses were important in examining what effects student plastic use on campus.

Addies: Dishware Preference

Part 3 of this project executed an observational study. 7 observations took place over the course of one month. Three observers, Olivia Meyer, Natalie Saul, and Colton Cardinal, spent 45 to 70 minutes observing outside of Addies' servery. The day of the week and time varied in order to try and control for any day or time variables. A total of seven observations were completed. Observers would sit outside the sole exit of the servery and monitor what dishware people were leaving with and where they were going. N = 395 data points were collected over the course of the seven observations. Observers noted the number of individuals taking reusable plates to-go, reusable plates to stay, to-go plates to-go, and to-go plates to say. It was evident when students take "to go" plates to stay. For example, observers could see student stay on the second floor and sit down. After each observation session was completed, observers recorded notes on a shared Google Excel spreadsheet. The data was grouped into three categories. One category involved students who used reusable plates and stayed to eat in lower (Stay:Stay). Another category involved students who used "to go" dishware and took their food "to go" (To go:To go). The last category was students who used "to go" dishware and ate in the dining hall (To go:Stay). We were most interested in examining the number of "To go:Stay" students and "Stay:Stay" students. The data was used to calculate the number of students falsely stating they are taking food "to go" when they are indeed eating in the dining hall. The number of reusable plates and bowls were noted. Observers made sure to check that Addies was using reusable plates at the time of the observation. Reusable plates were present at each observation.

Results

Cost-benefit Analysis

For part one of this project, a comprehensive analysis of Boston College dining services data on annual china and plastic purchases was conducted. Data collection from Boston College dining services and subsequent independent research, resulted in an extensive cost benefit analysis on Boston College's china and plastic usage. The data results show that 10,243,052 units of plastic dining products were purchased in a single year (represented in the tables as FY18), costing the college a total of $1,976,262.03 dollars in FY18. In contrast, Boston College purchased 24,450 additional units of china to replace those that were stolen, costing the College $34,375.00 dollars.

The data was also broken down in order to provide a more detailed and holistic analysis. Table 1 shows how much china Boston College purchased in year 2018 per type of china and cost. The table indicates that Corcoran Commons Dining Hall undergoes the most theft of china products with 15,900 units of china needing to be replaced in 2018. Both Stuart and McElroy Dining Halls only losing 5,4500 and 3,100 units of china respectively. Furthermore, the table indicates that $16,000 dollars worth of the total cost spent by Boston College dining on replacing plates was just for Corcoran alone. It is worth noting that this is not the first time Boston College has spent $16,000 dollars in one year to replace lost plates, in fact it happened in 2017 as well. Additionally, Boston College Dining Services spent $8,250.00 dollars to replace lost china bowls on campus. $8,000 dollars of that sum was spent on replacing the bowls in Corcoran alone. The data presented in this table thereby shows that Boston College has a significant problem in regards to the theft of china, most specifically in the Corcoran Dining Hall, and spent over $34,000 dollars on replacing such items.

Table 1. China Purchases by Dining Hall and Cost

China					
	Purchased FY18	**Stuart**	**McElroy**	**Corcoran**	**Total Cost FY18**
Plates	3,750	750	600	2,400	$23,000.00
Bowls	2,200	200	0	2,000	$8,250.00
Forks	7,500	2,000	1,000	4,500	--
Knives	5,500	500	1,000	4,000	--

Spoons	5,500	2,000	500	3,000	--
TOTAL Utensils	18,500	4,500	2,500	11,500	$3,125.00
TOTAL China	**24,450**	5,450	3,100	15,900	$34,375.00

Plastic product usage was also examined. Research based on plastic type, quantity, and cost was conducted and compiled into Table 2. Table 2 shows the thousands of plastic single use items used in a year at Boston College. A total of 10,243,052 units of single use plastic items are bought/used, and cost the College around $1,976,262.03 dollars in 2018 (FY18). With plastic forks being the highest in consumption. Furthermore, it should be noted that one plastic utensil at Boston college is composed of twice the plastic weight as Boston College's black pasta bowls. Because Boston College does not use recyclable plastic utensils this means that more dense plastic will enter the landfill each year from Boston College dining waste.

In sum, by comparing both tables it is clear that Boston College spends more on plastic dining products than on replacing china. However, china products are also stolen at increasing rates each year (see appendix graph 1).

Table 2. Single Use Plastic Purchases by BC Dining and Cost

Single Use		
	FY18	**Total Cost FY18**
Plates	885,820	$214,368.44
Paper Containers	572,500	$35,609.50
Plastic Containers	130,126	$19,628.21
Plastic Forks	1,758,920	$63,866.39
Plastic Knives	916,440	$25,990.24
Plastic Spoons	838,680	$25,101.69
Burrito Bowl compostable	218,700	$36,577.58
Equal Exchange coffee cups	364,400	$25,329.44

Paper Cups (not incl. equal exchange)	1,119,400	$73,880.40
Plastic Cups	1,048,700	$69,497.35
Plastic Bowls	832,416	$1,370,489.70
Plastic straws	552,000	$3,867.71
Lids	1,004,950	$12,055.38
TOTAL Single Use Items	**10,243,052**	$1,976,262.03

Additionally, Table 3 was generated. Table 3 depicts a more equal representation of student's choices in the dining hall because it only includes single use plastic items that have a direct alternative in china. This table clearly indicates a strong usage of single use plastic products over reusable. In 2018 Boston College bought more single use bowls (1,051,116) than all china items combined. Under the assumption that students who use single use plastics do not on average use china, the numbers suggest a higher use of single use plastic. While the china represented in the table are the units which are bought to cover theft, the numbers do suggest a higher usage of plastic products.

Table 3. Quantity and Cost of Single Use Plastic Items that Have a Direct Alternative in China

	Purchased FY18	**Total Cost FY18**
China Plates	3,750	$23,000.00
China Bowls	2,200	$8,250.00
China Utensils	18,500	$3,125.00
Single Use Plates	885,820	$214,368.44
Single Use Bowls	1,051,116	$1,407,067.28

Single Use Utensils	3,514,040	$114,958.32

Student Plastic Use Behavior

For part two of this project, SPSS analysis provided results from the survey. An independent-samples *t*-test was conducted to assess the average plastic use between upperclassmen and underclassmen. Using an alpha level of $p < .05$, results found there was no significant difference between the groups, t(67) = -.93, $p = .36$. Figure 1 shows the results of the analysis. The average number of plastic items used per week was not significantly different between upperclassmen (M = 3.73, SD = 5.00) and underclassmen (M = 4.91, SD = 5.53). An independent samples *t*-test was also conducted to assess an effect of academic class on number of plastic coffee cups on straws. The results, t(73) = .19, $p = .85$, show that there was not a significant difference in average weekly plastic coffee cup and straw use between upperclassmen (M = 4.65, SD = 4.99) and underclassmen (M = 4.42, SD = 5.28). Figure 2 shows the findings of the analysis.

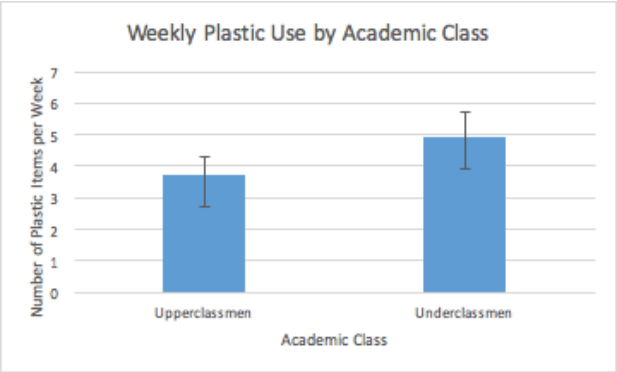

Figure 1

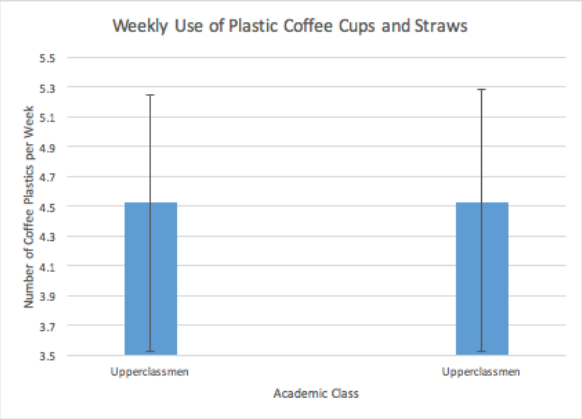

Figure 2

A 1 x 3 ANOVA (Maybe, No, and Yes) was conducted to determine whether there was a significant effect on one's belief of Boston College's recycling behavior on the amount of plastic coffee cups and straws used per week. The ANOVA results, [F(2, 66) = 2.45, $p = .094$], show that the the differences between belief groups are statistically significant. Figure 3 reports the survey results. Lastly, an independent samples *t*-test was conducted to examine the effect of environmental awareness on amount of plastic used per week. The results of this *t*-test were not statistically significant, t(66) = .56, p = .57. The Environmental Awareness group (M = 4.56, SD

= 6.02) and Non-Environmental Awareness group (M = 3.81, SD = 4.01) did not have statistically significant different weekly plastic use behavior. Figure 4 represents these findings.

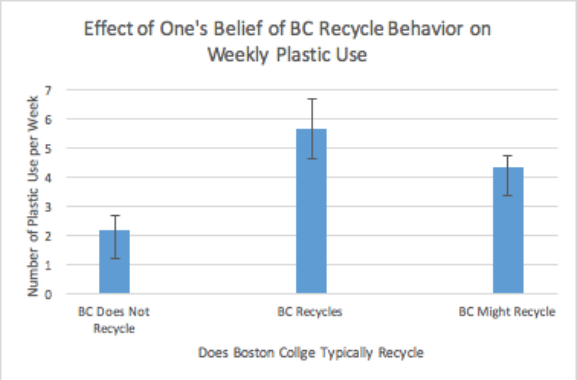

Figure 3

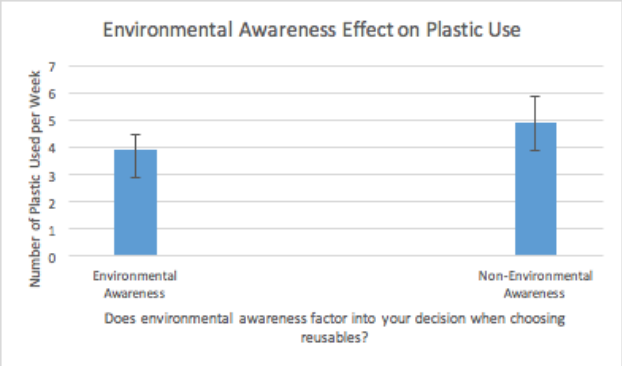

Figure 4

Addies: Dishware Preference

Part three of this project dealt with analyzing data from the observations at Addies. The 7 observations led to a total of N = 490 data collections: Reusable Plates N = 123, To Go-Stays N = 254, To Go-To Go N = 113. According to the results, 25.1% of students used reusable containers when asked by Addies staff and answering yes to eating in Lower. 51.84% of students said they were taking the food to go when they were actually eating in lower. 23.06% of students said they were taking the food to go and actually left the dining hall. The survey results on Addie's behavior reported different percentages. According to the survey results, 32% of respondents stated that they told Addies workers they were taking the food "to go" when they were actually eating in the dining halls. 68% of survey respondents stated that they never tell Addies staff they are taking the food "to go" when they are actually eating in the dining hall. Figure 5 depicts the breakdown of Addies observations, and Figure 6 depicts the results from the survey questions regarding Addies' behavior.

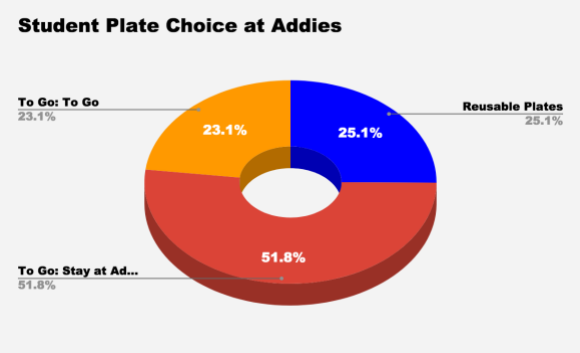

Figure 5

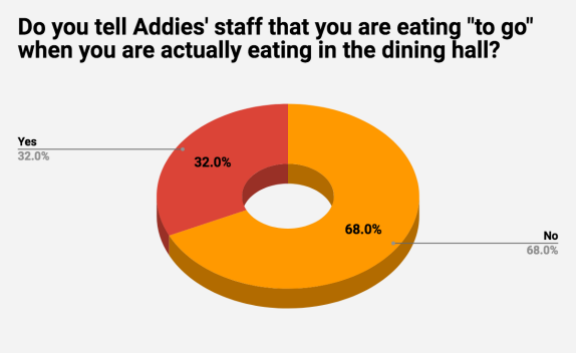

Figure 6

According to the results of the observation, the majority of students are using “to go” containers when they are eating in the dining hall. Of the students who were eating in the dining hall, 67.4% used “to go” containers from Addies, and 32.6% used reusable dishware. When asked why they ask for “to go” containers when eating in the dining hall, 20.1% of this group stated it was for sanitation reasons, and 45.8% of respondents stated they did this because of ease and feeling of the “to go” containers.

Furthermore, a survey of Addies dining hall was conducted during Green Week. In every other survey collection ordering the “to go” option and then dining in was the highest. However, during Green Week the results were very different. The number of individuals who requested reusable plates for dining in was N = 12. Only N = 11 individuals ordered “to go” containers and stayed to dine in, and N = 10 individuals ordered “to go” containers and took their meal to go. (See table 4).

Table 4. Addies Observation Data

Observation	Date: Time: Length	Reusable Plates	To Go: Stays	To Go: To Go	Total Observations:
1	3/13/19: 7:00: 45 minutes	10	32	17	59
2	3/18/19: 4:30-5:40: 70 minutes	7	29	19	55
3	3/27/19: 5:15-6:00: 45 minutes	28	54	9	91
4	3/21/19 7:00- 7:45: 45 minutes	16	34	13	63
5	3/23/19- 6:00-7:00: 60 minutes	36	62	29	127
6	4/10/19 5:00-6:00pm : 60 minutes	12	11	10	33
7	4/11/19 7:00 - 7:45 : 60 minutes	14	32	16	62
Total		**123**	**254**	**113**	**490**

Discussion

Cost-benefit Analysis

It is clear from the results section that Boston College spends a lot of money on dining hall products. Around 10,243,052 units of plastic were bought in 2018 and cost the College $1,976,262.03 dollars. This dwarfs the 24,450 units of china purchased to replace the stolen items, which cost the College $34,375 dollars. However, despite the clear cost differences, the 'true' values of the items are not represented in their cost, nor is cost the only factor to consider in such an analysis. Firstly, many students do take meals to go, which means Boston College cannot terminate the 'to go' dining products entirely, especially if there is no alternative. Secondly, it is important to remember health and quality control. In 2018 there was an outbreak of norovirus. In response to this, Boston College dining did not permit students to use china products while in the dining hall and only offered single use items. This was to prevent the spread of illness between students. When thinking about a plastic use on a college campus it is pertinent to include the costs of student illness (which not only include the costs incurred by health services, but also on the college's overall GPA averages, sports game outcomes and more). Including this into the analysis will help build a more comprehensive understanding that will reflect the true costs of plastic and china products.

Furthermore, the data shows how much china was purchased in 2018 due to theft. This number may not include those china items that were broken or purposely discarded by the College. The cost of the china in 2018 also only reflects the cost of purchasing new china. It does not include the shipping costs, the cost it takes to clean the china (which would include, in part, the salaries given to those who help wash the dishes), to put the china back in locations around the dining hall, and the cost of sorting the reusable items once placed on the dirty dish racks. The 'true' cost of china, therefore, would include the cost of maintaining, cleaning, sorting, of student illness (and the noted side effects listed above), and then the repurchasing damages/lost items. Because of this, it is difficult to say which items (plastic or china) truly cost more once the costs of maintenance are included into the analysis. However, based on the raw numbers provided in table 1 and table 2 it is evident that Boston College spends more on plastic single use items than on reusable items in the dining halls.

Lastly, there is a clear difference in china replacement per dining hall. Corcoran Commons has the highest level of theft, with McElroy having the least. Understanding the difference in behavior at the various dining halls can help determine different solutions that may vary per dining hall.

Student Plastic Use Behavior

Most of the results from the survey did not prove to be statistically significant. While there was not statistically significant differences in regards to academic class, there were some limitations of the survey that may have caused this. For example, the sample size of the Boston College population may not be representative of most individuals. While the sample sizes were even, a larger sample size of each academic class could produce a significant finding in the future. Additionally, due to limitations, our group was unable to consistently monitor a large group's plastic use behavior. Direct monitoring of plastic use may have allowed for more accurate numbers on plastic-use. However, it is important to discuss the statistically significant finding relating beliefs on whether Boston College recycles or not. The results show that those who believe Boston College recycles have a significantly higher amount of reported plastic use per week. Further investigation into this belief could shed light on how to either reduce plastic use or properly educate people on plastic's lifespan. If individuals think it is alright to use more plastic when it gets recycled, a organization promoting recycling may be sending individuals the message that it is not as environmentally damaging to use plastics. While recycling is the best way to dispose of plastic, it does not reduce the amount of plastic being used. Reducing use is the outcome needed most for earth's health. As stated earlier, the Theory of Planned Behavior is a model that focuses on factors that influence behavior, and it can be used in understanding and predicting behavior regarding environmental choices. Recycling is a factor that influences waste minimization (Ari & Yilmaz, 2017, p. 1221). Therefore, Boston College would be able to utilize the TPB to learn what aspects of recycling knowledge are negatively and positively impacting plastic use. Further studies may want to use TPB to explore the relationship between specific knowledge on recycling and plastic use.

Addies: Dishware Preference.

The observations at Addies reported that the majority of students are lying when Addies staff are asking if they are eating here or "to go". Of the students observed, slightly over half of the students told Addies staff they needed "to go" containers when they were eating in lower. These results show that there is a strong preference for non-reusable dining materials. The current strategy of asking students where they are eating is not reducing the amount of unnecessary plastic use. If those students who are lying feel any cognitive dissonance, they may be trivializing their behavior to get rid of the discomfort described earlier in the paper. Further

studies may want to utilize the commitment strategy to reduce plastic use in Addies. Having students sign a form or poster committing to not using “to go” containers when they are not need could be more effective than the current cognitive dissonance strategy. The survey results regarding Addies informs us why students are using “to go” containers when they are not needed.

When asked why they prefer the “to go” containers to the reusable, their responses fell into two different categories, sanitation and ease. Students stated that the plastic bowls and utensils seem cleaner and easier to carry. Additionally, students enjoy the feeling of knowing that they are able to leave with the food if they needed to. Interestingly, the survey responses did not match the observation results. The majority of survey respondents stated they never take “to go” containers from Addies when they are eating in the dining hall. However, the observations found the opposite results. The sample size of the survey may not have been large enough, so those results may be skewed due to random error. Students may also not want to admit to the survey that they are lying to staff in order to use the non-reusable containers. If participants knew this survey was working towards reducing plastic use, they may not want to admit they are part of the problem. It is also important to note that we could not entirely control for the behavior of Addies’ staff members. Observers would check to see if there were china bowls and plates in stock and being handed out. However, we do not know if every single Addies’ customer was asked if they were eating here or “to go”. Some staff may have forgotten for some customers. There are some design flaws that could be fixed if this study were to be replicated. Regardless of the limitations, the results of the study are still significant. The results show that there is an area of Boston College dining that can drastically cut unnecessary plastic consumption.

Furthermore, the data collected during Green Week was very telling. Out of all observations taken, those who ate at Addies during the Green Week observation used more china plates. Additionally, students used more “to go” containers to eat out rather than to dine in. Green Week was prominent at Boston College, with a lot of posters up around campus, extensive marketing, guest speakers, and environmental discussions between students. While more research would have to be done in this area, it is clear that there was a decrease in “to go” containers being used to dine in, which correlates to more students being more environmentally conscious while making decisions on campus dining halls. This could provide Boston College

with another solution for limiting plastic use around campus, and increase students awareness and accountability for their choices.

Additional Recommendations

The overall objective of this project was to create a better understanding of both the economic basis and student behavior behind Boston College's plastic use. Our results do demonstrate how Boston College can cut costs through reusable dishware and how different beliefs impact weekly plastic use. The observational study also showed us which areas of Boston College dining can be fixed in order to reduce the amount of plastic used. These results are important, but there were limitations stated earlier in this paper. We would like to highlight a few recommendations for future studies of this kind.

Several areas where information is lacking were highlighted in the literature review. This research lacks the resources to accurately analyze the vast majority of a large population of students using single use plastic in the dining halls. The lack of observational studies of plastic usage in the dining halls, coupled with insignificant data collection through the survey questions, made it difficult to produce an accurate representation of the population due to sporadic and overwhelming student activity. For example, future studies may design a primary source data collection from all the dining halls at Boston College. Researchers could directly observe which students choose single use plastic while sitting in the dining hall and those who decide to use the reusable option.

Future studies might also try looking at daily china usage in addition to single use plastic use. This would be beneficial in creating a ratio of daily china use to single use plastic. Because the only data provided on china was in terms of items replaced due to theft, it is hard to say how often china is used by the student population. Generating an average ratio of daily china to plastic use would further our understanding of student choices on campus. Additionally, future studies might benefit from looking into more cost effective and environmentally friendly alternatives to plastic and china. If a cheaper alternative to china is found Boston College may be open to switching. Researching projects to reduce the amount of lost china should be conducted.

Each dining hall may have a different solution that is most effective. Corcoran Commons had a much higher incidence of theft than McElroy. Therefore, the most cost effective and environmentally friendly solution for Boston College may differ from dining hall to dining hall.

Understanding the differences between dining halls may offer a more holistic range of solutions to be tested.

Analyzing trends and consumption habits within a small, diverse number of specific students could create a foundation for future studies. This would involve using a select number of students and observing how many times a week do they eat in the dining halls with single use items, how many times do they utilize the to-go option and exit the dining halls, and how many times do they eat in the dining halls with reusable items. This select number of students would serve as a microcosm of the Boston College student population's eating habits. In future studies, group limitations must be addressed, if the study continues with looking at all students who come in and out of particular dining halls, the size of the group must increase drastically. While the small, diverse number of specific students may not be generalizable, unique or significant trends could be used to create a new research question. As previously touched upon, directly monitoring plastic use would have granted our group a more accurate and efficient data analysis. This project focused on the use of plastics rather than the disposal method. This is only one half of the very grand cycle of plastic. A complimentary study could focus on the method of disposal of plastic. This would involve analyzing where plastic ends up and student motivation and beliefs. This study would provide more information regarding student plastic behavior. Similarly, this study opened a new area of research that deal with recycling and student perception.

Investigations of student perception on Boston College recycling behavior in the dining halls must be attempted for future studies. Through survey question results, statistics show that those who believe Boston College recycles, end up consuming significantly more reported plastic use per week. A more detailed analysis of beliefs on recycling and perceptions of Boston College's part in recycling must be executed to reveal its impact on quantity of plastic consumed by students. If students do believe they can use more plastic because their university recycles, Boston College could create educational programs that focus on the importance of reduction first and recycling when reduction is not as feasible.

Furthermore, Boston College offers sustainability incentives in the dining halls. For example, students can get a discounted price on dining hall coffee if they bring in their own reusable mug. More transparency and awareness between Boston College dining services and the student population could provide different results. Studying student behavior in the dining

halls after increased marketing on these cost saving dining hall options could provide a greater insight into what incentives work for students.

Many universities around the globe are coming up with new ways to promote the use of reusable materials over single-use plastics. To combat the convenience of single use plastics in the dining halls, universities such as Claremont University Consortium in California have implemented creative incentives to change student mentalities towards the issue. Claremont University Consortium uses a system known as the "greenbox" (Editorial, 2017). The simplistic system gives students the opportunity to pay $1 to check out a reusable container. These reusable containers include both boxes and cups. At meals students can use their meal swipe to fill up their box or cup with food from the dining hall and take their food to go without wasting any materials. This is a small fee to pay for a container that can be used repeatedly. These containers would also mimic the feel and ease of using non-reusable containers that Boston College students enjoy prefer. Additionally, this strategy would solve the problem of students being worried about sanitation. The university allows students to trade their box or cup in for one that has been cleaned in the industrial dishwashers provided in the dining hall (Editorial, 2017). This swap can be made at any point within the semester and can be traded at an unlimited capacity. Students may also choose to clean the container themselves. The $1 fee is refunded at the end of the semester to each student when the item is returned (Editorial, 2017). This is just one example of a how a university is attempting to make reusable material more appealing to their student population.

Reusable programs are seen at other universities. The University of Vermont offers a membership at the cost of $7.50 for the use of "EcoWare," a reusable box and utensil set. Students who use EcoWare get 15¢ off their to-go meal, which is approximately the price of a disposable container (Lavine et al, 2017, p. 1-3). This program even incentivized the use of reusable materials. As Boston College has attempted to remove straws at certain coffee shops on campus, this refunded $0.15 incentive could be built into these coffee shops. Students who bring a reusable straw to the coffee shops could get $0.15 off of their coffee. Instead of students being irritated for asking for a straw, they feel incentivized to bring their own every day.

Removing single-use plastics as a whole may be a different direction to take. Removing single-use plastics from college campuses could also bring awareness to this issue of single-use plastics. Lewis and Clark college is attempting this strategy. Their sustainability council created

a policy that would remove plastic bottles from their on campus dining halls, bookstores, and vending machines (Lewis & Clark, 2019). They are doing this in order to reduce the amount of straws, cups, plates, bottles, and silverware that students use. Removing the option can reduce the use of plastic. The Lewis & Clark Sustainability Council put together of schedule to help with the removal of single-use plastics. For example, they are installing water-filling stations, providing the bookstores with alternative reusable water bottles, and creating a communication program to explain the purpose to students. This plan is attempting to remove the problem while also giving students and alternative option. Students will also be educated on the importance of this policy, so it is more likely they will be in favor of the policy. Lewis & Clark college is making a change while also educating their students.

Lastly, psychology studies can act as a basis for plastic-reduction strategies. A study by Graffeo, Ritov, Bonini, and Hadjichristidis (2015) examined a strategy for behavior change. The focus of this study was to see if they could cause a change in the amount of electricity a household used through a comparison strategy (Graffeo et al., 2015, p. 1). Graffeo et al. varied the feedback that these households were receiving on their electricity usage. Their results showed that "social feedback about what comparable others do" acts as a "nudging technique" (Graffeo et al., 2015, p. 7). When households were told that their energy usage was about 10-20% higher than their neighbors, these households were more likely to reduce the amount of energy they used in the future. Additionally, it was noted that this comparison was the most powerful when it involved an in-group member (someone of the same neighborhood) (Graffeo et al., 2015, p. 7). The results of this "comparison strategy" can be instituted at Boston College. For example, there could be a program that monitors dorm building on their plastic output. Each student would then receive an email about how their individual dorm compared to others in regard to their plastic waste. A modified version could be set up in dining halls. Boston College students would be part of the Boston College in-group, an academic class in-group, or a dormitory in-group. This is just one of many examples of how psychology studies can design and test potential plastic reduction strategies.

Endeavors like this a have seen increased levels of environmental consciousness, as well as profitable solutions to the disposable and single use plastics epidemic. The levels of uncertainty associated with the estimation methods might be further investigated using data from additional universities within the area and beyond. In particular, the additional uncertainty that

arises when estimates are based on a small number of students would benefit additional investigation in order to determine how much these uncertainty bounds might vary for different universities, regions and dining hall practices.

Our investigations into Boston College's plastic use and student behavior regarding reusable dishware is just the beginning of instituting the proper programs at Boston College. There are ways in which Boston College can cut costs and purchase less single-use plastics There are significant costs to reusable china, but plastic is not cheap either. Understanding the psychology behind student plastic use, their preferences, and their decisions allows for future individuals to build programs and projects that cater to college students and specifically Boston College students. This project has found an area of Boston College dining which requires improvement. Addies has been attempting to reduce unnecessary use of non-reusable containers. However, our results show they are not effective. New strategies should be attempted to reduce plastic use at this dining location. Overall, we hope our project will allow future individuals to investigate deeper into our findings or utilize our findings to create new plastic-reduction programs.

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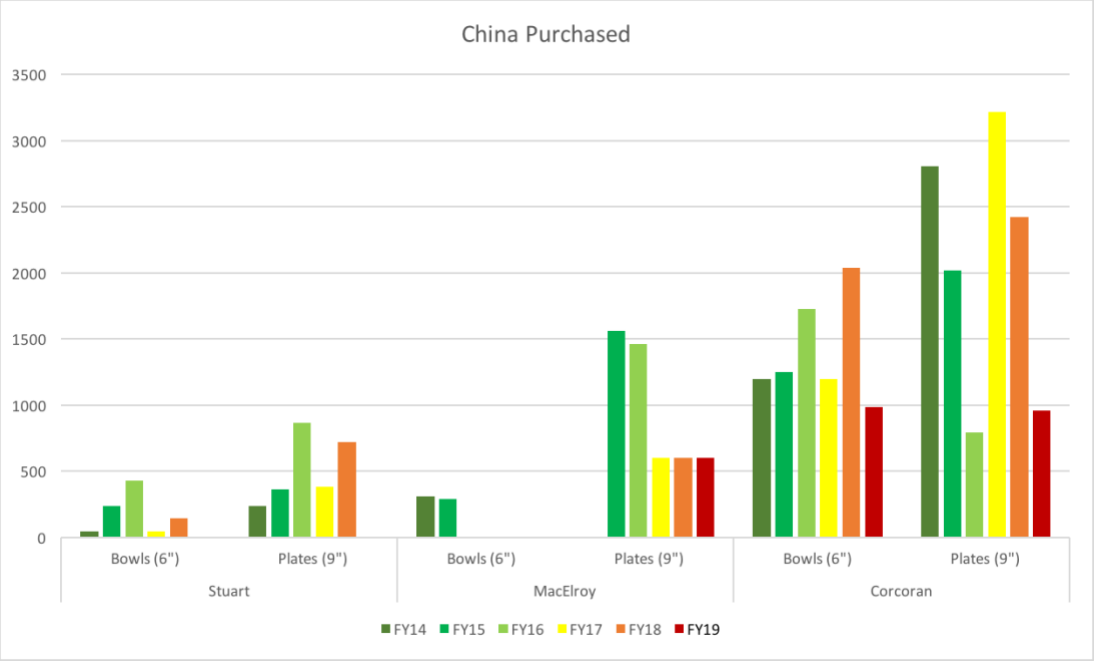
Appendix

1. Do you live on campus?
    a. Yes
    b. No
2. What graduation year are you?
    a. 2022
    b. 2021
    c. 2020
    d. 2019
3. How frequently do you eat at the dining hall?
    a. Sliding bar: 0-30
4. How often do you use plastic coffee cups and straws at on-campus coffee shops?
    a. Sliding bar: 0-26
5. Do you prefer plastic utensils or reusable utensils
    a. Plastic utensils
    b. Reusable utensils
6. Why do you not use the reusable utensils?
    a. Sanitation
    b. Ease
    c. Dining-out
    d. Other: Please specify
7. Do you think Boston College makes reusable material accessible?
    a. Yes
    b. Maybe
    c. No
8. Environmental Issues are important?
    a. Strongly agree
    b. Agree
    c. Somewhat agree
    d. Neither agree nor disagree

e. Somewhat disagree
f. Disagree
g. Strongly disagree

9. Do you think that plastic use is wasteful and harmful?
    a. Definitely yes
    b. Probably yes
    c. Might or might not
    d. Probably not
    e. Definitely not
10. Does environmental awareness factor into your decision when choosing reusables?
    a. Yes
    b. Sometimes
    c. No
11. If Boston College offered reusable coffee cups and straws for purchase, would you purchase and use the item?
    a. Yes
    b. No
12. Do you know you can bring your own mug to a dining hall to use instead of their plastic cups?
    a. Yes
    b. No
13. Do you recycle your plastic-ware?
    a. Yes
    b. Sometimes
    c. No
14. Do you think Boston College typically recycles?
    a. Definitely yes
    b. Probably yes
    c. Might or might not
    d. Probably not
    e. Definitely not

15. If you were to estimate, how many plastic items (each individual unit of plastic) did you use this week?
    a. Free response
16. Do you tell Addies' staff that you are eating "to go" when you are actually eating in the dining hall?
    a. Yes
    b. No
17. If yes, how often do you do this per week?
18. If yes, why do you prefer the "to go containers to reusable containers?
    a. Free response

Appendix Graph 1