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PUBLIC PERCEPTIONS OF SINGLE-USE PLASTIC BANS IN RHODE ISLAND

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PUBLIC PERCEPTIONS OF SINGLE-USE PLASTIC BANS
IN RHODE ISLAND

BY
KASIE COSTA

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE
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OF

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2020

ABSTRACT

Single-use plastic debris is becoming more abundant in the ocean, and is having adverse impacts on the environment and human health. According to Pennington (2016), it is predicted by 2050, there will be more plastic debris in the ocean than there are fish. Some in Rhode Island seek to have a series of statewide single-use plastic bans to be implemented in the near future to lessen Rhode Island's role in creating plastic debris. The objective of this study is to gain attitudinal knowledge of the residents of Rhode Island, towards the single-use plastics initiative and to gain insight on what single-use plastics residents would support banning to create a potential road map for the state to use when looking for the next step towards the state's goal on banning single-use plastics.

Anonymous surveys were distributed using online forums and news media sources with questions driven to learn about resident's attitudes, behaviors and knowledge of single-use plastic bans and plastic pollution as a whole. Residents were grouped into municipalities with and without plastic bag bans already in place to determine if there was a relationship between resident's behaviors and policy support and living in a municipality with a plastic bag ban. 586 residents representing 36 of the 39 municipalities in Rhode Island participated in this study providing input on their support towards a variety of potential single-use plastic bans statewide. The use of reusable alternatives and views of statewide bans were statistically significant based on self-identification of being environmentally friendly/cautious, which could be seen in behavioral and policy spillover effects.

Based on public perceptions on the various single-use plastic bans, the state of Rhode Island should first ban plastic bags statewide then plastic bottles second, after that it is inconclusive what the respondents want based on the results of this study. Knowledge intervention is necessary to break barriers for pro-environmental behaviors and policies to help cope with plastic pollution mitigation. More research should be conducted looking more in depth at other potential variables to determine the driving factor behind respondent's views and behaviors that were not incorporated in this study.

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CHAPTER 1

INTRODUCTION

Plastic pollution is becoming more abundant in the ocean, and is having adverse impacts on the environment and human health globally. In the 1940s, plastic changed the life of modern industrialization because of the inexpensive cost. This also meant that human manufacturing was “not restrained by the limits of nature.” (Science History Institute 2019). However, with the rise of plastic manufacturing during World War II, the use of plastic exploded into everyday items used to this day. Although the creation of plastic polymers was revolutionary, plastic takes a very long time to break down, so it is considered to last in the environment forever (Ryan 2015). It was estimated in 2014 that there were more than 5 trillion pieces of plastic floating in the ocean worldwide causing negative impacts to marine life and people (Eriksen et al 2014). According to the Ocean Conservancy, 8 million metric tons of plastic is added to the ocean every year on top of the 150 million metric tons that is already in the ocean (Ocean Conservancy 2020). If the disposal of plastic continues to follow this trend, by 2050 there is the potential for more plastic debris in the ocean than there are fish (Pennington 2016).

Single-use plastic is a large contributor of plastic pollution in the ocean because their purpose is to be used once and then disposed of for convenience. Plastics that are classified as single-use include plastic water bottles, plastic straws, plastic shopping bags, to-go cups, plastic cutlery, cigarette filters, and plastic plates; the list

goes on. Plastics that are intended for single-use are typically the more abundant items found floating onto local beaches that humans tend to turn a blind eye too (Xanthos and Walker 2017). As waste issues have risen globally, more people are trying to stand against plastics because they now see the negative impact the plastics are causing. Globally, more single-use plastic bans are being implemented, varying from straws and utensils to plastic shopping bags. The United Nations and the European Union recently passed a policy to ban 10 single-use plastic items by 2022 (Tamkin 2019). United Nations Environment Program will be the leader for this banning initiative and is working with various governments, local NGOs, civil society and other UN entities to carry out this ban (Weller 2018). In the United States, states like California have been leading the forefront to statewide single-use plastic bans on plastic bags and plastic straws. Currently, there are 8 states that have plastic bag bans in place, and Rhode Island is considering joining them.

Some Rhode Island municipalities have already taken the initiative to ban plastic bags in their town or city to help lessen their plastic waste, but some residents wanted more. The Governor of Rhode Island Gina Raimondo created a Taskforce to Tackle Plastics in 2018, which provided recommendations to her on what the state should do to cope with its plastic waste. Plastic bags were said to be the first statewide plastic ban to be implemented in Rhode Island since it would be the easiest to ban since many municipalities already had a plastic bag ban in place.

Although many recommendations were made by the Taskforce, the Governor is pushing for the S0410 Plastic Waste Reduction Act, which implements a statewide plastic bag ban to provide uniformity for all municipalities in the state of Rhode Island

(Nixon, personal communication 2019). The taskforce also discussed not only just banning plastic bags, but to progress to other various single-use plastics in the near future, by using the statewide plastic bag ban as a foundation. In June 2019, the Senate passed the Plastic Waste Reduction Act; however, the House did not pass it due to inconsistencies in the Act, leaving the public unsettled. The proposed bill was revised due to discrepancies found between the Senate and House versions in defining the standards of a reusable bag and was sent back to the Senate as of January 2020 and will be up for vote again.

The objective of this research is to understand how the residents of Rhode Island feel about banning various single-use plastics statewide. This research hopes to gain insight on what single-use plastics residents would support banning to create a potential road map for the state to use when looking for the next step towards their goal on banning single-use plastics. This research will look at the relationship between municipalities with a plastic bag ban and ones without to see if living in a community with a plastic bag ban influences support for other plastic policies. The hypotheses this research will support are 1) “according the residents, a statewide plastic bag ban will be the best way to set the foundation for Rhode Island’s single-use plastic policy,” and 2) “the people who live in a town with a plastic bag ban will be more accepting of a statewide ban on single-use plastics.”

The second chapter will provide detail on the history of plastics and negative effects of plastic pollution on marine species, and humans. This chapter will also include detail about what is currently being done globally and locally to help mitigate the negative impacts of plastic pollution. The third chapter will present the

methodology of this study, and the fourth chapter will present the results of the study followed by a discussion of the findings and implications for future policy in the state of Rhode Island. The information gathered from this research can help policy makers understand the views of the residents on banning various single-use plastics and which items the residents would be more for or against banning to help assess the next steps the state of Rhode Island should take to help mitigate plastic pollution. By doing this in a small state like Rhode Island, this study could help set an example for plastic policies to be implemented in larger areas to help lessen the negative effects of plastic pollution on a larger scale.

CHAPTER 2

REVIEW OF LITERATURE AND BACKGROUND

2.1 The Dirty Truths Behind Plastic Pollution

Plastic debris in the ocean was first observed in the 1960s, after the mass production of plastics in the 1940s (Science History Institute 2019). During the 1970s, when the United States started becoming more aware of environmental damages caused by humans, plastic's reputation decreased, however the production did not stop. Plastic pollution comes in many forms that fall into two categories: microplastics and macroplastics. Microplastics are plastics that are less than 5 millimeters in length and tend to be too small to see in the ocean (NOAA 2020). Macroplastics are any item 5 millimeters or greater in length and tend to be the plastic debris that is most known about and advertised in photographs.

No matter the size, plastics have negative impacts on the environment, affecting marine and coastal species as well as humans. According the Eriksen et al (2014), there are more than 5 trillion pieces of plastic floating in the World's oceans causing negative impacts to marine wildlife and humans. Plastic waste is negatively affecting biodiversity and ecosystems in both freshwater and the ocean and is providing more space for sessile invasive species, causing shifts in species distribution (Sigler 2014). Plastic debris in the ocean is believed to harm fish, marine mammals and seabirds (Pereira, 2019). Plastics tend to look similar to the types of food that some species consume, so it is easy for a species to consume plastic thinking it is their

food. For example, microplastics tend to resemble phytoplankton, so the species that eat phytoplankton end up eating plastic (Sigler 2014). Another example is a sea turtle eats a plastic bag because it resembles a jellyfish, which is a turtle's favorite food source. Large marine mammals like whales suffer from both plastic consumption and entanglements. Whales have the ability to find their food source through echolocation, however if the food source is surrounded by plastic (Ryan 2015), they will ingest the plastic as well. Due to their size, marine mammals tend to become entangled in plastic; however, fishing gear poses the largest threat of entanglement (Ryan 2015).

Seabirds are also affected by plastic and are notoriously photographed with plastic in their stomachs because they mistake plastic for food. Moser and Lee (1992) found that the amount of plastic ingested by seabirds could be used as an indicator of plastic accumulation in a specific area. They conducted a study using North Atlantic shearwaters, that showed an increase in rate of plastic consumption from 1974-1978 compared to 1976-1984. Those time periods correlate to the increase of plastic waste in the ocean. Another study supporting this was done by Auman et al. (1997) looking at albatross in the North Pacific. They found that out of 251 individual autopsied birds, only 6 did not contain any ingested plastic, showing that with the increase of plastic in the ocean the more ingestion occurs in seabirds causing an increase in death. The amount of plastic found in the bird's stomach determined the causes of death to be related to plastic consumption. However, Auman et al (1997) determined that there could be other causes that were not focused on during the autopsies since the focus of the study was primary on how much plastic the birds consumed and how that related to the increase of plastic debris in the bird's habitat.

With the amount of plastic in the ocean currently, there is a strong chance that most if not all the seafood we eat has some plastic in it and that plastic is being biomagnified through the food web, which directly affects larger consumers like humans. Seafood feeds about 3 billion people worldwide with approximately 20% of that being the only source of animal protein intake (Wright & Kelly 2017). Increased knowledge and awareness of plastics affecting our seafood is a concern especially when many countries rely on seafood as a main source of protein. The consumption of shellfish poses the largest health issue to humans because we ingest the whole body of the shellfish, gastrointestinal track and all. This means we eat whatever the shellfish eats, including plastic waste. The consumption of fish causes less of a concern because we eat the muscles of the fish not the gastrointestinal track. However, plastic chemicals could leech into the muscles during breakdown, which could negatively affect humans. There is currently no information in the literature regarding the impacts to humans from consuming plastic, but research needs to be done regarding this issue in the very near future.

The effects of plastics on human health is not yet known, however it can be expected to be negative. Theoretically, if plastics don't break down in an animal's gastrointestinal track, it seems very unlikely that plastic would break down in a human. It could be assumed that all the negative affects plastic has on species when they ingest plastic, could correlate to the effects of plastic ingestion on humans to determine how severe the negative impacts are towards humans. Bioaccumulation will play a big role as to the severity of the impacts; however, if plastic waste rates do

continue to increase it might not be many years until we see the first case of human death caused by plastic pollution (Cressey 2016).

Waste water management is one of the primary pathways of plastic pollution globally (Wagner 2017). Dependent on the efficiency of the plant, microplastics less than 5 millimeters tend to be the plastics that are able to get through all the pumps in the treatment plant and end up in the ocean (Conley et al 2019). However, that is not the only way plastic gets into the ocean, there are many instances of plastic litter getting in the ocean without passing through a waste water treatment facility through run-off. Single-use plastics frequently are not recycled or make it to a landfill. An advocacy group notes, 32% of the 78 million tons of single-use plastic goes straight into the ocean through poor waste management (Earth Day Network for the End Plastic Pollution Campaign, 2018). Single-use plastics also have adverse impacts on waste management facilities, including plastic bags and straws becoming lodged in the gears of machinery, causing financial hardships to fix the machinery. Wagner (2017) states that local governments like cities and towns have the primary responsibility for managing municipal solid waste. Plastic bags are known to impair stormwater treatment mechanisms by blocking drains and other input sources causing financial burdens on municipalities, thus driving certain municipalities to want to pass a plastic bag ban. Plastic straws also pose an issue for waste management because of their small size. Straws tend to fall off the belts very quickly in recycling plants and end up making their way into landfills and water ways (Stockton, 2018).

Plastic waste is also left on the beaches or not properly disposed of in a recycling or trash bin providing another pathway for plastic to get into the ocean through wind

energy (Cressey 2016). Littering of any waste in general is bad for the environment because it takes a while to break down, but plastic litter will essentially last in the environment forever causing infinite impacts on the environment. When the wind blows, the littered items move around and can get blown directly into the ocean due to human negligence and natural processes (Cressey 2016). Plastic waste on beaches also have a negative impact on social variables like tourism, causing economic hardships for coastal areas, who thrive on their tourism industry (Xanthos and Walker 2017). If nothing is done to intervene in the pathways of plastic pollution, the amount of plastic getting into the ocean is only going to grow and there will be an increase of negative impacts to ecosystems, including humans.

Consumer behavior is also one of the leading causes of plastic pollution especially single-use plastic pollution. Single-use plastics are favored by consumers, based on convenience. The demand for single-use plastic stems from the ease of buying an iced coffee for example. That coffee is given to a customer in a plastic cup, with a plastic lid and a plastic straw; once the customer finishes that coffee, all of that plastic is disposed of without the thought of where all that plastic might end up. There are many alternatives to single-use plastics that include reusable shopping bags, metal or reusable plastic straws, reusable water bottles and reusable coffee cups. However, these alternatives require more effort before or after use as opposed to single-use plastics because you can just throw it out. In a study conducted by Wagner and Toews (2018), they discussed plastic straw consumption and deemed that plastic straws are a highly avoidable product and their use is controlled solely by consumer preference and not necessity.

2.2 Plastic Pollution Policies

In the plastic pollution policy realm, the intended solutions tend to be structured around the use of taxes/fees or bans. Taxes and fees are used to allow consumer choice, but for a charge; bans don't allow for the same choice to be made. The charge for a product is intended to drive people away from using that product or promote an incentive like recycling in the case of a bottle tax (Wagner 2017). For example, if a town bans plastic bags, the goal is for consumers to use reusable bags and not single-use bags; however, consumers go for the option of paper bags instead. The action of using paper is out of convenience because the consumer forgot their reusables or they do not have reusable bags. Policy makers then implement a tax on paper bags to drive people away from single-use bags, whether they be paper or plastic, to reach their intended goal of consumers using reusable bags. Studies have shown bans and taxes/fees have been effective with other products, so it is reasonable to believe the issue of single-use plastic use could benefit from these methods (Wagner 2017).

Single-use plastic studies have recently become more popular with the increase of environmental awareness, and the increase in single-use plastic bans worldwide. Currently, many countries and cities worldwide have some type of single-use plastic ban in place. These bans span from plastic bags, to-go containers, utensils, plastic bottles and straws to plastic microbeads (Calderwood, 2018; Earth Day Network, 2018). In the United States, California is the leader in single-use plastic bans, having a statewide plastic bag ban and multiple municipalities banning plastic straws.

There is a lack of a clear definition for what a single-use plastic is, making it challenging for writing policy. However, a single-use plastic is known as a ‘disposable plastic’ which typically has a one-time use and then is disposed of. Globally, approximately 300 million tons of plastic is produced annually with about 50% being disposed of after a single use (Xanthos and Walker 2017). According to the United Nations single-use plastic guide, the most common single-use plastics are plastic drinking bottles, plastic bottle caps, cigarette filters, food wrappers, plastic grocery bags, plastic straws and stirrers, foam take away containers and plastic lids (United Nations Environmental Program, 2018). In response to this study, the United Nations and the European Union decided to ban ten single-use plastic items that will be in effect starting in 2021. Those ten items include plastic bags, bottles, plastic cotton swabs, straws, cutlery and plates, as well as oxo-degradable plastics and food containers and expandable polystyrene cups (European Parliament 2019). The UN Environment program will be the leaders for this banning initiative and is working with various governments, local NGOs, civil society and other UN entities to carry out this ban (Weller 2018). Globally, there are multiple countries from six continents that have either a plastic bag ban or a tax on plastic bags, to help combat the plastic pollution issue (Riskey, 2017). Plastic bag bans are highly effective at decreasing environmental impacts with limited factors effecting the policy’s effectiveness, making it easily passable (Wagner 2017, Touhey 2019). Some countries do not have country-wide bans, some are statewide and others are at the municipality level; however, no matter what the scale of the ban or tax, those people are doing their part to help combat plastic pollution.

Nationally in the United States, eight states have implemented statewide plastic bag bans. In 2016, California was the first state to enact the statewide plastic bag ban derived from many municipalities implementing their own bag bans (Clack, 2020). California also has multiple municipalities having bans on plastic straws, which may soon turn into a statewide ban similar to the statewide plastic bag ban. The other states include Hawaii, Delaware, Maine, Vermont, Connecticut with the two most recent additions being Oregon and New York. Many other states are looking at the potential to also pass similar policies to help do their parts in combatting the issue of plastic pollution. However, currently many municipalities nationwide have passed plastic bag bans, and those areas are the driving force to push state legislations to be passed.

2.3 Rhode Island's Single-Use Plastics Initiative

The Governor of Rhode Island is looking to join the eight other states by attempting to pass a statewide ban on single-use plastic bags to set the foundation for their single-use plastic reduction initiative. Currently, 17¹ municipalities in Rhode Island have their own single-use plastic bag bans (Figure 1); however, they are not all the same.

¹ During the course of this research, 3 municipalities passed a plastic bag ban bringing the number of towns with a plastic bag ban from 14 to 17. Due to effective start dates and the data collection time period, those 3 municipalities are considered as towns without a plastic bag ban for this study.

Figure 1. Map of Rhode Island sectioned into municipalities with a plastic bag ban (blue) and municipalities without a plastic bag ban (green).

Governor Gina Raimondo created a Taskforce to Tackle Plastics in 2018, which provided recommendations to her on what the state should do to cope with its plastic waste. This issue is a big topic in waste management because if waste production continues to progress at the current rate, Rhode Island's landfill will reach capacity in approximately 22 years (Tempera, 2017).

Many topics were brought up by the Taskforce like bottle taxes, fees for paper bags, effects to hospitality companies and more (RI DEM 2019). However, the Governor is pushing for a statewide plastic bag ban to provide uniformity for all municipalities in Rhode Island (Nixon, personal communication, 2019). The name of the act looking to be passed is the Plastic Waste Reduction Act and was passed by the Senate in June of 2019, but the act did not make it through the House of Representatives due to terminology discrepancies over the definition of a reusable bag.

The act has been revised once again and is being sent to the Senate again as of February 12, 2020 (Faulkner, 2020). The Governor also is discussing passing an ‘ask first-straw law’, which will require restaurants to only distribute single-use straws based on request (Faulkner, 2020). Some restaurants in Rhode Island have already begun to practice this request-only idea for plastic straws. This seems to be very effective in decreasing straws use (Wagner and Toews 2018) and compostable straws are given instead of plastic straws when a straw is requested, which shows there are alternatives to plastic in the hospitality area as well. Based on prior research, residents of Rhode Island seem to have varied attitudes towards the idea of a statewide plastic bag ban (Touhey 2019; Pereira 2019). However, it is unknown about their attitudes towards other single-use plastics that the Governor is looking at banning in the near future, which is what this study will attempt to answer.

2.4 Behavioral and Policy Spillover Effects

Pro-environmental behavior is defined as behavior that actively seeks to decrease the negative impact of one’s actions on the environment (Kollmus and Agyeman 2002). Human behavior is one cause of the problem of plastic pollution, and behavioral intervention is an important part of the solution.

Spillover effect proposes that engaging in one pro-environmental behavior will affect the probability of engaging or disengaging in a second pro-environmental behavior (Nilsson et al 2016). Based on this, there are two types of spillover effects; one being positive spillover effects and the other being negative spillover effects. Positive spillover means that one pro-environmental behavior increases the probability of participating in another pro-environmental behavior. Negative spillover means that

one pro-environmental behavior will prevent or decrease a second pro-environmental behavior from happening (Nilsson et al 2016). Lack of knowledge can also create a barrier in pro-environmental behavior, which can either positively or negatively affect spillover effects (Schultz 2002).

Behavioral responses to environmental policies, also associated with spillover effects can also be described as behavioral consistency for positive effects and behavioral inconsistency for negative effects (Poortinga et al 2013, Nilsson et al 2016). In the case of plastic bag policy, when consumers switch from single-use shopping bags to reusable bags, they may see themselves being more pro-environmental and are more likely to make other pro-environmental decisions (Poortinga et al 2013). This would be an example of behavioral consistency because one pro-environmental action is leading to another pro-environmental action. If a plastic bag policy is implemented and consumers switch from single-use shopping bags to reusable bags, but then stop recycling because they don't want to be forced to act pro-environmentally, this would be an example of behavioral inconsistency. The literature shows evidence of positive behavioral consistency for pro-environmental behaviors; however, most of the behavioral spillover effects are based on correlational evidence rather than statistical significance (Poortinga et al 2013). It is important to understand the potential effects of behavioral spillover on environmental policies because governments want to know that the proposed policy will be a valuable tool used to solve environmental concerns broader than just the original intent of the implemented policy (Thomas et al 2016).

Although there is a limited amount of statistically significant research concerning plastic bag policies and behavioral spillover to other single-use plastic behaviors, there is a considerable amount of research about spillover related to bag behavior. One study focused on the phasing out of single-use plastic bags in light of a plastic bag ban and the change in consumer behaviors before and after the ban. Sharp et al (2010) states that it is unclear whether shoppers who are forced to stop consumption of plastic bags will develop negative attitudes towards the plastic bag ban or simply comply with the new behaviors. During the phasing out period, plastic bags were still provided; however, they were not advertised at checkout causing customers to ask if they would like to use plastic bags. Taking away the option of having plastic shopping bags readily available encouraged the use of reusable bags. Reusable bag usage increased during the phasing out period and continued after the ban was officially started. The results of this study suggested that shoppers may be resistant to the idea of a plastic bag ban when they have not experienced its effects before; however, they will be less resistant once they adjust their behaviors to the new ban (Sharp et al 2010).

Policy spillover is similar to behavioral spillover effects, but policy spillover explores the effects of an implemented pro-environmental policy causing support for another pro-environmental policy. A recent study conducted by Thomas et al (2019) examines policy spillover through studying the effects of a plastic bag charge in the United Kingdom. The researchers found that individuals who had supported a plastic bag fee were more likely to support a fee on plastic bottles as well as unnecessary packaging. This demonstrated that the support for a plastic bag fee predicted increased

support for policies of similar size and scope (Thomas et al 2019). It was noted by the authors that there may be limits to effectiveness of policy spillovers. This means that the spillover is controlled by the original policy sphere in question, which in this context is single-use plastic. It was also noted that when or if behavioral spillover occurs, the performance of behaviors is restricted to the policy's context because the conceptual connections are stronger among similar behaviors and situations. Based on that, environmental policies not only have the potential to influence more pro-environmental behaviors, but they also could be a catalyst for increased support of environmental policies as a whole (Touhey 2019).

2.5 Research Questions and Hypotheses

The goal of this research is to take into account how the residents feel about the idea of single-use plastic bans in Rhode Island since the state is already in the process of attempting to pass a statewide plastic bag ban. The main question this research considers is “since a statewide plastic bag ban is processing through state legislation, what is the public response to present and possible future bans of single-use plastics in Rhode Island?” Spillover effects have the potential to explain the answer to this main research question. Both behavioral and policy spillover effects could shine a light on this study and raise more questions. From this main question, some sub-research question arose:

Is a statewide plastic bag ban, according to the residents, the best way to set the single-use plastic policy's foundation in Rhode Island?

Are people who live in a town with a plastic bag ban more in favor of banning other forms of single-use plastic?

What single-use plastics do residents support banning?

Based on the literature reviewed, the hypotheses for this study are:

H1: According to residents, a statewide plastic bag ban will be the best way to set the foundation for Rhode Island's single-use plastic policy.

H2: The people who live in a town with a plastic bag ban will be more accepting of a statewide ban of single-use plastics.

This study seeks to answer these questions and provide a road map for the state of Rhode Island to follow when further pursuing their goal to tackle single-use plastic waste.

CHAPTER 3

METHODOLOGY

3.1 Research Design

An online survey was distributed using online forums to multiple municipalities in the state of Rhode Island to gain insight on the public's perceptions of single-use plastic bans. Qualtrics was used to generate and distribute the anonymous survey that only tracked IP addresses. The data compiled in Qualtrics was exported into the statistical software SPSS. Analyses were conducted on the demographic variables, usage of reusables, and views on statewide plastic bans and taxes to explore the potential patterns within the dataset.

The survey consisted of 21 Likert Scale and structured questions to test knowledge, behaviors and attitudes towards plastic pollution and various single-use plastics (Appendix A). The survey included demographic questions to determine town of residence, age, gender, income and highest level of education. Participants were also asked to self-identify if they considered themselves environmentally friendly or cautious to see if there was a connection between their self-identification and their behaviors and attitudes towards the single-use plastic bans. At the end of the survey, participants were given the opportunity to add any additional comments about their views on plastic pollution to further gauge their attitudes.

3.2 Data Collection

The sampling plan of this study is classified as a convenience sample to gain knowledge of the bigger population, but it is dependent on who has access to the survey. The general characteristics of the study population included year-round residents over the age of 18 years. The survey took 5-10 minutes to complete and was anonymous. It was distributed through online forums for town residents from North Kingstown, Barrington, Exeter and Smithfield. The survey was shared by members of the pages to help increase the number of respondents. The survey was also posted on the Rhode Island Reddit page as a way to increase responses. Data collection occurred from November 1, 2019 to January 1, 2020 to allow for ample participation time.

The intent was to collect data from two municipalities with a plastic bag ban already in place and two without a ban were selected to participate in the study. However, an 'other' category was also added in case residents of other municipalities wanted to participate in this study. Once a week the survey would be reposted on to each of the pages as a way to gain more participation and an online news outlet publicized the survey as well to gain responses. Once the survey was publicized response rate increased and the scope of respondents shifted from 4 municipalities to 36 broadening the sample to encompass the whole state of Rhode Island. 586 individuals responded from 36 of the 39 municipalities in the state of Rhode Island allowing for a more general analysis rather than focusing on specific towns.

3.3 Data Analysis

The data was exported from Qualtrics into an SPSS dataset to conduct statistical analysis. The dataset was edited to remove any partial responses and responses from

the same IP address to ensure only one response was recorded per participant. Time of completion was used to determine which IP address was removed from the dataset; only recording the first round of responses for each of the duplicated IP address. Qualtrics coded all the data when exported, but labels were changed to be more user friendly. Due to a substantial number in responses from ‘other’ towns, another variable was coded using a ‘1’ for municipalities with a plastic bag ban and a ‘2’ for without a plastic bag ban to allow for a general analysis of overall trends in the data rather than focusing specifically on the initial four towns. Linear regressions and t-tests were run to look into the trends for the general statewide analysis resulting from the broadened scope of the sample.

CHAPTER 4

RESULTS

4.1 Demographic Results

For this research, 586 residents of Rhode Island responded to the survey providing many different views on the issue of plastic pollution. Figure 2 shows the representation from each of the municipalities throughout Rhode Island and the number of participants from each municipality. The total number of participants resided in a town with a plastic bag ban in place was 356 and 230 participants residing in a town without a plastic bag ban. Table 2 provides an in-depth demographic breakdown of the participants for this study.

Figure 2. Total number of survey responses from each municipality represented in the study.

The predominant responses were from participants ages 35-64, and there is a statistically significant difference in age between municipalities ($p=0.006$) with a bag ban ($m=4.04$) and without ($m=3.71$). In the survey, (see appendix A) the scale for this question is 18-24 years old, 25-34 years old, 35-44 years old, 45-54 years old, 55-64 years old, 65-74 years old and 75+ years old. All other demographics were not statistically significant between municipalities with a bag ban and municipalities without a bag ban, but there were some notable trends. The gender ratio was skewed with 451 responses from females, 131 responses from males and 4 responses self-identifying as other. The income of participants leaned more towards a higher income, but all income levels were represented in this study. According to the 2018 census for Rhode Island, 39% of the population's household income was under \$50K, 29% was \$50K-\$100K, 24% was \$100K-\$200K and 7% was over \$200K (Census Reporter 2018). The education level of participants was skewed to higher education predominately Bachelor's, Graduate or Professional degree. According to the 2018 census for Rhode Island, 34% of the population has a Bachelor's, Graduate or Professional degree (Census Reporter 2018). Participants also self-identified themselves to be more environmentally friendly/cautious ($N=433$) or sometimes environmentally friendly/cautious ($N=147$) than not considering themselves environmentally friendly/cautious ($N=6$). A reference codebook for data collection and data analysis can be found in Appendix B.

Table 1. Demographic results of the participants of the total population (N=586) then broken down into participants from a town with a plastic bag ban (N=356) and participants from a town without a plastic bag ban (N=230). Results bolded show significance between municipalities with or without a plastic bag ban. There is an age difference between municipalities with a plastic bag ban and without a plastic bag ban with more participants being older in municipalities with a plastic bag ban and younger in municipalities without a plastic bag ban.

Variable	Frequency	Total Population		With a Bag Ban		Without a Bag Ban	
		Mean	SD	Mean	SD	Mean	SD
Age	586	3.91	1.406	4.04	1.393	3.71	1.407
18-24	18						
25-34	85						
35-44	130						
45-54	148						
55-64	122						
65-74	68						
75+	15						
Gender	586						
Male	131						
Female	451						
Other	4						
Income	584	4.92	2.008	4.94	1.993	4.90	2.035
Less than \$25,000	24						
\$25,000-\$49,999	61						
\$50,000-\$74,999	68						
\$75,000-\$99,999	81						
\$100,000-\$149,999	126						
\$150,000-\$199,999	81						
\$200,000+	60						
Prefer not to answer	83						
Education	584	4.01	0.977	4.04	0.943	3.97	1.030
Less than High School	1						
High School	59						
Associate's or Junior College	93						
Bachelor's degree	212						
Graduate or Professional degree	219						
Environmentally Friendly/Cautious	586	1.27	0.468	0.761	0.427	0.704	0.457
Yes	433						
Sometimes	147						
No	6						

4.2 Behaviors and Views of Statewide Bans in Rhode Island

4.2.1 Plastic Bags

This section focuses on the behavioral uses of reusable shopping bags and the views of a tax on paper bags and a statewide plastic bag ban. All variables are ratio variables, so there is no inclusion of zero. Plastic bags have been banned in many municipalities across the state, but reusable bag use was seen in most municipalities. Figure 3 depicts the trend of the participants' response to the question regarding if they used reusable bags when shopping, showing more people sometimes or always use reusable bags than never using reusable bags.

Figure 3. Distribution of participants' who use reusable shopping bags.

There was a statistically significant difference in reusable bag use (dependent) between municipalities with and without a plastic bag ban (independent) ($t(496.107)=4.780$; $p<0.001$). As expected, this shows that respondents from a town

with a plastic bag ban use reusable bags more than respondents from a town without a plastic bag ban. Table 2 shows the regression model looking at the demographics (independent) against the use of reusable bags (dependent) determined, age ($p=0.009$; $B=0.044$), gender ($p<0.001$; $B=0.194$), self-identification of being environmentally friendly/cautious ($p<0.001$; $B=0.387$) and if the town has a plastic bag ban ($p<0.001$; $B=0.193$) were all statistically significant predictors for the use of reusable shopping bags. However, the R^2 value is relatively low ($R^2=0.161$) meaning there are other factors driving reusable bag use. This shows younger generations use reusable bags more frequently than older generations. Females use reusable shopping bags more frequently than males. People who self-identified as environmentally friendly also adopt reusable bag use more frequently than those who do not self-identify in that category. Respondents from a municipality with a plastic bag ban also used reusable bags more frequently than respondents from a municipality without a plastic bag ban.

Table 2. Regression model for reusable bag use, views of a paper bag tax and views of a statewide plastic bag ban and the demographics reporting the R^2 value of the model and the unstandardized coefficient (B) and the p-value (p) for each demographic. The bolded values signify significance.

Variable	R^2	Age		Education		Income		Gender		Environ. Friendly/Cautious		Plastic Bag Ban	
		B	p	B	p	B	p	B	p	B	p	B	p
Reusable Bags	0.161	0.044	0.009	0.001	0.967	-0.017	0.166	0.194	<.001	0.387	<.001	0.193	<.001
Paper Tax	0.101	-0.073	0.070	0.174	0.003	-0.028	0.326	0.356	0.007	0.769	<.001	0.278	0.014
Statewide Plastic Bag Ban	0.084	0.013	0.693	0.054	0.242	-0.044	0.054	0.493	<.001	0.413	<.001	0.150	0.096

Participants' were asked how they would feel about a tax on paper bags in addition to a statewide plastic bag ban. Figure 4 shows the views of respondents

towards a statewide paper bag tax. Respondents from a municipality with a plastic bag ban oppose a tax on paper bags, more so than respondents from a municipality without a plastic bag ban. The t-test showed there was a statistically significant difference between the views on a paper bag tax (dependent) and municipalities with and without a plastic bag ban (independent) ($t(584) = 2.744$; $p = 0.006$). Respondents in a municipality with a plastic bag ban are more in favor of a paper bag tax than those in communities without a ban. A regression model ($R^2 = 0.101$) was conducted between the view of a paper bag tax (dependent) and the demographics (independent). Education ($p = 0.003$; $B = 0.174$), gender ($p = 0.007$; $B = 0.356$), self-identification as environmentally friendly/cautious ($p < 0.001$; $B = 0.769$) and if the town had a plastic bag ban ($p = 0.014$; $B = 0.278$) were found to be statistically significant when predicting the views of the paper bag tax (Table 2). This shows that people with a higher level of education, are more in favor of a tax on paper bags as well, as if the residents are females and consider themselves environmentally friendly/cautious. Respondents that live in a town that have a plastic bag ban already in place are also more in favor of a tax on paper bags than respondents from a town without a plastic bag ban in place. However, the R^2 value is low ($R^2 = 0.101$) meaning there are other factors driving respondents' views on a statewide paper bag tax.

Figure 4. Distribution of respondents views of a statewide paper bag tax.

Participants' were asked how they would feel about a statewide plastic bag ban. Figure 5 shows the views of respondents towards a statewide plastic bag ban. The respondents were more in favor of a statewide plastic bag ban in both municipal groups than against it. The t-test showed there was a statistically significant difference between the views on a statewide plastic bag ban (dependent) and municipalities with and without a plastic bag ban (independent) ($t(447.446)=2.132$; $p=0.034$). This shows that there is an association between municipalities with and without a plastic bag ban and their views on a statewide plastic bag ban. The overall trend shows that as a whole, more respondents are in favor of a statewide plastic bag ban. A regression model ($R^2=0.084$) was conducted between the view on a statewide plastic bag ban (dependent) and the demographics (independent). Only gender ($p<0.001$; $B=0.493$) and self-identification as environmentally friendly/cautious ($p<0.001$; $B=0.413$) were

found to be statistically significant when predicting the views of a statewide plastic bag ban (Table 2). This shows more females and people who identify themselves as environmentally friendly/cautious are more in favor of a statewide plastic bag ban. However, the R^2 value is low ($R^2=0.084$) meaning there are other factors driving respondents' views on a statewide plastic bag ban.

Figure 5. Distribution of respondents' views of a statewide plastic bag ban.

4.2.2 Plastic Straws

This section will focus on the uses of disposable straws and the views of a statewide ban on plastic straws. All variables are ratio variables, so there is no inclusion of zero. Participants' were asked if they use disposable straws since people can drink out of a glass/cup as an alternative to using a straw whether reusable or disposable. Figure 6 shows the respondents plastic straw use. This shows more

respondents from a municipality with a plastic bag ban use disposable plastic straws more often than respondents from a municipality without a plastic bag ban in place.

Figure 6. Distribution of respondents who use disposable plastic straws

The t-test showed there was a statistically significant difference between the use of disposable plastic straws (dependent) and municipalities with and without a plastic bag ban (independent) ($t(584) = 2.619$; $p = 0.009$). This shows that there is an association between municipalities with and without a plastic bag ban and the use of plastic straws. This trend is interesting regarding the upcoming new “ask-first straw” bill.

Table 3. Regression model for disposable plastic straw use, and views of a statewide plastic straw ban and the demographics reporting the R^2 value, the unstandardized coefficient (B) and the p-value (p) for each demographic. The bolded values signify significance.

Variable	R^2	Age		Education		Income		Gender		Environ. Friendly/Cautious		Plastic Bag Ban	
		B	p	B	p	B	p	B	p	B	p	B	p
Disposable Plastic Straws	0.103	0.045	0.009	0.033	0.194	-0.011	0.371	0.038	0.497	0.340	<.001	0.093	0.057
Statewide Plastic Straw Ban	0.126	0.098	0.008	0.024	0.660	-0.044	0.088	0.530	<.001	0.729	<.001	0.061	0.557

Table 3 shows the regression model ($R^2=0.103$) conducted between the use of disposable plastic straws (dependent) and the demographics (independent). Age ($p=0.009$; $B=0.045$), and self-identification as environmentally friendly/cautious ($p<0.001$; $B=0.340$) were found to be statistically significant when predicting the use of disposable plastic straws. This shows younger generations are using disposable straws more than the older generations. Respondents who self-identified as environmentally friendly/cautious also use plastic straws more frequently. However, the R^2 value is low ($R^2=0.103$) meaning there are other factors driving disposable straw use.

Participants' were asked how they would feel about a statewide plastic straw ban. Figure 7 shows the views of respondents towards a statewide plastic straw ban. This shows that respondents from a municipality with a plastic bag ban have high ratings towards implementing a statewide plastic straw ban. The t-test showed there was not a statistically significant difference between the views on a statewide plastic straw ban (dependent) and municipalities with and without a plastic bag ban (independent) ($t(584)=1.348$; $p=0.178$).

Figure 7. Distribution of residents' views on a statewide plastic straw ban.

This shows that there is not a definitive association between municipalities with and without a plastic bag ban and their views on a statewide plastic straw ban. However, the overall trend shows that as a whole, more respondents favored a statewide plastic straw ban. A regression model ($R^2=0.126$) was conducted between the view on a statewide plastic straw ban (dependent) and the demographics (independent) (Table 3). Age ($p=0.008$; $B=0.098$), gender ($p<0.001$; $B=0.530$) and self-identification as environmentally friendly/cautious ($p<0.001$; $B=0.729$) were found to be statistically significant when predicting the views of a statewide plastic straw ban. This shows that younger generations are more in favor of a statewide ban on plastic straws than the older generations. Females and residents who identified themselves as environmentally friendly/cautious were also more in favor of a statewide ban on

plastic straws. However, the R^2 value is low ($R^2=0.126$) meaning there are some other factors driving respondents' views on a statewide plastic straw ban.

4.2.3 Plastic Cups

This section will focus on the behavioral uses of reusable cups and the views of a statewide ban on plastic cups. All variables are ratio variables, so there is no inclusion of zero. Participants' were asked if they use reusable cups. Figure 8 shows the residents' reusable cup use. The t-test showed there was not a statistically significant difference between the use of reusable cups (dependent) and municipalities with and without a plastic bag ban (independent) ($t(584)=0.471$; $p=0.638$).

Figure 8. Distribution of respondents' who use reusable cups.

This shows that there is no association between municipalities with and without a plastic bag ban and the use of reusable cups; however, it shows more respondents' sometimes use reusable cups than never using them, which is a more positive environmental behavior. Table 4 shows a regression model ($R^2=0.036$) was

conducted between the use of reusable cups (dependent) and the demographics (independent). Gender ($p=0.004$; $B=0.192$) and self-identification as environmentally friendly/cautious ($p=0.001$; $B=0.216$) were found to be statistically significant when predicting the use of reusable cups. This shows females and residents who self-identified as environmentally friendly/cautious more frequently use reusable cups.

Table 4. Regression model for reusable cup use, and views of a statewide plastic cup ban and the demographics reporting the R^2 value, the unstandardized coefficient (B) and the p-value (p) for each demographic. The bolded values signify significance.

Variable	R^2	Age		Education		Income		Gender		Environ. Friendly/Cautious		Plastic Bag Ban	
		B	p	B	p	B	p	B	p	B	p	B	p
Reusable Cups	0.036	-0.005	0.823	-0.011	0.710	-0.012	0.398	0.192	0.004	0.216	0.001	0.011	0.851
Statewide Plastic Cup Ban	0.118	0.036	0.310	0.042	0.417	-0.034	0.177	0.424	<.001	0.790	<.001	0.078	0.431

Participants' were asked how they would feel about a statewide plastic cup ban. Figure 9 shows the views of respondents towards a statewide plastic cup ban. This shows that respondents were more in favor of a statewide ban on plastic cups than against it. The t-test showed there was not a statistically significant difference between the views on a statewide plastic cup ban (dependent) and municipalities with and without a plastic bag ban (independent) ($t(584)=1.514$; $p=0.131$).

Figure 9. Distribution of respondents' views on a statewide plastic cup ban.

This shows that there is a slight association between municipalities with and without a plastic bag ban and their views on a statewide plastic cup ban. However, overall trend shows that as a whole, more respondents are in favor of a statewide plastic cup ban. A regression model ($R^2=0.118$) was conducted between the view on a statewide plastic cup ban (dependent) and the demographics (independent) (Table 4). Gender ($p<0.001$; $B=0.424$) and self-identification as environmentally friendly/cautious ($p<0.001$; $B=0.790$) were found to be statistically significant when predicting the views of a statewide plastic cup ban. This shows that females and residents who self-identified as environmentally friendly/cautious are more in favor of a statewide plastic cup ban. However, the R^2 value is low ($R^2=0.118$) meaning there are some other factors driving respondents' views of a statewide plastic cup ban.

4.2.4 Plastic Bottles

This section focuses on the behavioral uses of reusable water bottles and the views of a bottle tax and a statewide plastic water bottle ban. All variables are ratio variables, so there is no inclusion of zero. Figure 10 depicts the respondents' use of reusable water bottles, which shows that most respondents always or sometimes use reusable water bottle than never using them. There was a statistically significant difference in reusable bottle use (dependent) between municipalities with and without a plastic bag ban (independent) ($t(584)=2.220$; $p=0.027$).

Figure 10. Distribution of respondents' use of reusable water bottles.

This shows there is an association between municipalities with and without a plastic bag ban and reusable water bottle use. Table 5 shows the regression ($R^2=0.156$) looking at the demographics (independent) against the use of reusable water bottles (dependent) determined, age ($p<0.001$; $B= -0.088$), education ($p<0.001$; $B=0.087$),

gender ($p < 0.001$; $B = 0.218$), self-identification of being environmentally friendly/cautious ($p < 0.001$; $B = 0.393$) and if the town has a plastic bag ban ($p = 0.023$; $B = 0.109$) were all statistically significant for the use of reusable water bottles. This shows that younger generations and the more educated participants more frequently use reusable water bottles. Females, residents who self-identified as environmentally friendly/cautious and residents of a municipality with a plastic bag ban already in place also use reusable water bottles more frequently. However, the R^2 value is low ($R^2 = 0.156$) meaning there are other factors driving reusable water bottle use.

Table 5. Regression model for reusable bottle use, views of a bottle tax and views of a statewide plastic bottle ban and the demographics reporting the R^2 value of the model and the unstandardized coefficient (B) and the p-value (p) for each demographic. The bolded values signify significance.

Variable	R^2	Age		Education		Income		Gender		Environ. Friendly/Cautious		Plastic Bag Ban	
		B	p	B	p	B	p	B	p	B	p	B	p
Reusable Bottles	0.156	-0.088	<.001	0.087	<.001	-0.020	0.089	0.218	<.001	0.393	<.001	0.109	0.023
Bottle Tax	0.096	-0.011	0.781	0.118	0.043	-0.045	0.115	0.424	0.001	0.791	<.001	0.081	0.468
Statewide Plastic Bottle Ban	0.103	-0.027	0.468	0.145	0.009	-0.048	0.074	0.418	0.001	0.763	<.001	0.086	0.421

Participants' were asked how they would feel about a bottle tax. Figure 11 shows the views of respondent towards a statewide bottle tax. This shows that respondents are more in favor of a bottle tax than against it. Also, respondents from municipalities with a plastic bag ban are also more in favor of the bottle tax than respondents from municipalities without a plastic ban bag. The t-test showed there was not a statistically significant difference between the views on a bottle tax (dependent) and municipalities with and without a plastic bag ban (independent) ($t(584) = 1.320$; $p = 0.187$).

Figure 11. Distribution of respondents' views of a statewide bottle tax.

This shows there is not an association between municipalities with and without a plastic bag ban and respondents' views on a bottle tax. However, respondents from a municipality with a plastic bag ban have higher ratings towards a bottle tax. A regression model ($R^2=0.096$) was conducted between the view of a bottle tax (dependent) and the demographics (independent) (Table 5). Education ($p=0.043$; $B=0.118$), gender ($p=0.001$; $B=0.424$), and self-identification as environmentally friendly/cautious ($p<0.001$; $B=0.791$) were found to be statistically significant when predicting the views of a bottle tax. This shows that the more educated participants, females and residents who self-identified as environmentally friendly/cautious were more in favor of a statewide tax of 5 cents on plastic bottles. However, the R^2 value is low ($R^2=0.096$) meaning there are other factors driving respondents' views on a statewide bottle tax.

Participants' were asked how they would feel about a statewide plastic water bottle ban. Figure 12 shows the views of respondents towards a statewide water plastic bottle ban. This shows that all respondents are more in favor of a statewide plastic water bottle ban than against. However, respondents from a municipality with a plastic bag ban are more in favor of the statewide plastic water bottle ban than respondents from municipalities without a plastic bag ban. The t-test showed there was not a statistically significant difference between the views on a statewide plastic water bottle ban (dependent) and municipalities with and without a plastic bag ban (independent) ($t(584)=1.322$; $p=0.187$).

Figure 12. Distribution of respondents' views on a statewide plastic bottle ban.

This shows that there is not an association between municipalities with and without a plastic bag ban and their views on a statewide plastic water bottle ban. The overall trend shows that as a whole, more respondents are in favor of a statewide plastic water

bottle ban. A regression model ($R^2=0.103$) was conducted between the view on a statewide plastic water bottle ban (dependent) and the demographics (independent) (Table 5). Education ($p=0.009$; $B=0.145$), gender ($p=0.001$; $B=0.418$) and self-identification as environmentally friendly/cautious ($p<0.001$; $B=0.763$) were found to be statistically significant when predicting the views of a statewide plastic water bottle ban. This shows the more educated participants, females and residents who self-identified as environmentally friendly/cautious were more in favor of a statewide ban on plastic water bottles. However, the R^2 value is low ($R^2=0.103$) meaning there are other factors driving respondents' views of a statewide plastic water bottle ban.

4.2.5 What plastic item would the residents address first?

Participants were asked “if you were a policy maker in Rhode Island, what plastic item would you address first. The results from this question can be seen in Figure 12. The distribution of responses shows that plastic bags are the item residents favor to ban first and plastic bottles second. It is interesting to observe more respondents from municipalities without a plastic bag ban in place are more in favor of a statewide plastic bag ban than other plastic items. A chi-square test was run between which plastic item the respondents chose to address first and municipalities with and without a plastic bag ban. The results of the chi-square test showed that there is not a statistically significant difference between municipalities with and without a plastic bag ban and their views on which plastic item they chose ($\chi^2=5.849$; $p=0.211$).

Figure 13. Distribution of what plastic item respondents would want to ban first.

CHAPTER 5

DISCUSSION

5.1 Findings

The goal of this research is to understand how the residents of Rhode Island feel about banning various single-use plastics statewide. With Rhode Island already in the process of banning plastic bags statewide, many people were interested in this study because it is a very current issue. There are 586 surveys from residents representing 36 of the 39 municipalities in Rhode Island. The respondents provided a large variety of views on the potential statewide bans on various single-use plastic items. Based on the results, participants from municipalities with a plastic bag ban provided more support for statewide bans. Self-identification of environmentally friendly/cautious was a major predictor in all of the reusable behaviors and views of various statewide single-use plastic bans. It is common knowledge in the literature that if an individual self-identifies as environmentally friendly/cautious (see Table 1), there is a higher likelihood of also being in favor of pro-environmental behaviors and policies causing more spillover effects (Nilsson et al 2016). Since a majority of the respondents claimed to be environmentally friendly/cautious, it could be assumed that those individuals have a higher likelihood of engaging in more pro-environmental behaviors or are in favor of more pro-environmental policies. Since one municipal group had a plastic bag ban already in place and the other did not, this provides an interesting platform to look into spillover effects based on reusable behaviors and pro-

environmental policies, specifically Rhode Island's plastic policy initiative. Spillover effects and increased knowledge intervention can explain the phenomenon seen in the results of this study.

5.1.1 Spillover Effects

i. Behavioral Spillover

As noted previously, behavioral spillover proposes that engaging in one pro-environmental behavior will affect the probability of engaging or disengaging in a second pro-environmental behavior (Nilsson et al 2016). Municipalities with a plastic bag ban, are already promoting a pro-environmental behavior: reusable bag use. Respondents from these municipalities are participating in one pro-environmental behavior, and the probability of the respondents participating in another pro-environmental behavior did vary between the single-use plastic items of focus in this study. Since respondents from a municipality with a plastic bag ban are already participating in reusable bag use it is no surprise that reusable bag use is statistically significantly higher than reusable bag use from respondents from a municipality without a plastic bag ban (Figure 3).

Respondents' views from municipalities with a plastic bag ban already in place correlated with reusable bag use. The goal of plastic bag bans is to cause a change from plastic bag use to reusable bag use. Some plastic bag bans however, do not put a tax on paper bags causing people to just switch from plastic to paper instead of reusable bags This is not always the case. Middletown, Rhode Island's plastic bag ban provides a free paper bag alternative, but a recent study showed there was still a significant increase in reusable bag use (Touhey 2019). This could be considered

positive spillover because based on the results, respondents are ‘always’ using their reusable bags rather than using paper bags; however, since paper bag usage was not studied in this research, the conclusions could vary.

Reusable water bottle usage also provided a statistically significant relationship between municipalities with and without a plastic bag ban. Respondents from a municipality with a plastic bag ban in place resulted in having a higher usage rate of a reusable water bottle than respondents from a municipality without a plastic bag ban. This is interesting to see because in this example a successful positive spillover is seen. As mentioned previously, positive spillover effects mean that one pro-environmental behavior increases the probability of participating in another pro-environmental behavior (Nilsson et al 2016, Poortinga et al 2013). With a plastic bag ban in place, respondents engage in one pro-environmental behavior, which is using reusable bags, resulted in respondents engaging in another pro-environmental behavior, which is using a reusable water bottle. This follows behavioral consistency because if individuals consider themselves as environmentally friendly and live in a municipality with a plastic bag ban, based on spillover effect, it could be assumed those individuals would be consistent in supporting more environmentally friendly behaviors rather than negative behaviors (Poortinga et al 2013, Nilsson et al 2016). However, it is possible to follow behavioral inconsistency, which is seen in the case of plastic straw use.

Plastic straw use was included in this study over reusable straw use since there are many alternatives to straw use including opting out of using a straw. Based on the results of this study, disposable plastic straw use was higher in municipalities with a

plastic bag ban in place than municipalities without a plastic bag ban (Figure 6). This relationship was statistically significant between municipal groups, with respondents from municipalities with a plastic bag ban reporting higher usage of disposable straws. This depicts possible negative spillover effects or behavioral inconsistency (Poortinga et al 2013). Based on the literature surrounding negative spillover effects, respondents from municipalities with a plastic bag ban may think they conduct enough pro-environmental behaviors by using reusable bags. Respondents could see this as a trade-off saying they use reusable bags so if they want to use disposable plastic straws they can (Nilsson et al 2016). Or if respondents participate in using reusable water bottles in addition to reusable bags, maybe they think they conduct enough pro-environmental behaviors, they do not need to worry about plastic straw waste. Another potential could be they might lack knowledge on how plastic straws can affect the environment causing a barrier in pro-environmental behavior that is negatively affecting the spillover effect (Schultz 2002). This could open up a potential for knowledge intervention regarding plastic straw use because respondents might not even think about not using a straw. It has become so prominent in restaurant-hospitality culture to be served a straw with your drink that people might not think twice about using it (Wagner and Toews 2018). Through knowledge intervention, there could be the potential to knock down the pro-environmental behavior barrier placed on disposable straws to promote the continuation of behavioral consistency in municipalities with a plastic bag ban already in place; this could also create behavioral consistency for municipalities without a plastic ban bag in place.

Reusable cup usage also seemed to have a barrier blocking pro-environmental behaviors for both municipal groups. There was no statistically significant relationship between municipal groups, but even though there is no significance they are still related (Poortinga et al 2013). Based on the results, respondents from a municipality with a plastic bag ban had higher ratings of reusable cup use as opposed to respondents from a municipality without a plastic bag ban showing positive spillover effects; however, this trend can be seen through all grouping responses of never, sometimes and always (Figure 8). This could be explained by a knowledge barrier of what classifies as a reusable cup for both municipal groups or it could be a behavioral inconsistency; however, there is no way of knowing why this occurred because the data was not that in depth surrounding reusable cup behaviors. Based on this research, it can be inferred that behavioral spillover was seen between the respondents from municipal groups with and without a plastic bag ban in place. Respondents from a municipality with a plastic bag ban showed both positive and negative behavioral spillover through the usage of other reusable items focused on in this study. Overall, respondents from a municipality with a plastic bag ban showed more positive behavioral spillover than respondents from a municipality without a plastic bag ban.

ii. Policy Spillover

Policy spillover, as mentioned previously explores the effects of an implemented pro-environmental policy causing support for another pro-environmental policy (Thomas et al 2019). For municipalities with a plastic bag ban already in place, it could be assumed that those places will have a higher support of Rhode Island's plastics policy initiative. Based on the results, this is the case for some proposed bans

and taxes, but not all. Differences in respondents' views towards a statewide plastic bag ban were statistically significant between municipal groups (Figure 5). Based on the results of this study, respondents from a municipality with a plastic bag ban were more in favor of a statewide plastic bag ban, which can be considered a positive policy spillover. Since the respondents are already engaging in one implemented policy, this is causing support for another pro-environmental policy just on a larger scale.

Respondents were also asked how they would feel about a tax of paper bags, which showed to have a statistically significant relationship.. More respondents from a municipality with a plastic bag ban showed higher ratings in favor of a paper bag tax than respondents from a municipality without a plastic bag ban (Figure 4). This directly relates to Thomas et al (2019), regarding higher support for another policy based on policy spillover. Respondents already have a plastic bag ban in place and they also support charging for paper bags to promote the use of reusable bags rather than another form of single-use carry out bags.

As for the statewide bans on straws, cups and water bottles, and the statewide bottle tax there was no statistically significant relationship between municipal groups. Although there was no statistical significance, there is still a valuable trend that can be seen in all of the different single-use plastic products in this study. Similar to the two prior results, respondents from a municipality with a plastic bag ban are more in favor of other pro-environmental policies than municipalities without a plastic bag ban regarding statewide bans on straws, cups, water bottles and a statewide tax on bottles. These trends follow a positive policy spillover, meaning the respondents from the municipalities with implemented plastic bag bans are more likely to support the

banning of other related policies over respondents from municipalities without a plastic bag ban (Thomas et al 2019). Based on the results of this study, policy spillover could help advance Rhode Island's plastic policy initiative making it successful based on the observed trends of increased support.

5.1.2 Knowledge Intervention

Knowledge intervention plays a big role in pro-environmental behaviors and policies, which plays a valuable role in spillover effects. The more knowledge and awareness people have on pro-environmental topics increases the probability of them utilizing more pro-environmental behavior, which sets the foundation for spillover effects to occur (Poortinga et al 2013). In a study done by Xanthos and Walker (2017), they studied international policies of single-use plastics to reduce marine plastic pollution. The major finding from this study turned out to be increased intervention of younger generations. They state that education and behavior change of children is crucial because they represent an important source of social influence amongst their peers, family and community (Xanthos and Walker 2017). A similar study done by Hartley et al (2015) found that with education intervention, school children improved their understanding for causes and negative impacts of plastic pollution. Intervention provides a platform for awareness to flourish and as awareness grows, negative behaviors decrease allowing for positive behaviors to take over (Xanthos and Walker 2017).

Since plastic pollution is going to be a hardship on future generations, it is important to provide knowledge intervention to younger generations on the effects of plastic pollution and what they can do to help mitigate those effects. By targeting

youth and other stakeholders (ie. citizens, government, non-governmental organizations or industry) this provides an effective way to promote positive change and increased awareness, which can lead to behavioral change (Xanthos and Walker 2017). This behavioral change could create behavioral spillover as well, and could potentially lead to increased policy implications at the municipal or state level. Increased knowledge intervention is necessary in promoting pro-environmental behaviors and policies because people need to care about the issues of plastic pollution because the effects are eminent and if there is anything that can be done to flatten the curve of plastic waste generation those steps should be taken. Plastic pollution policy can be challenging because it requires individuals to actively participate in pro-environmental behaviors which can always cause some push back due to lack of knowledge.

5.2 Limitations and Improvements

One of the big limitations of this study is the sample type. This study utilized a convenience sample, which is not the best way to generalize the population of Rhode Island residents. The survey was distributed on online forums initially, which limited the access to the survey to only the residents who were apart of the forums. Once the survey was publicized, that is when access to the survey increased; however, it is still a convenience sample. The gender skew of respondents was also a big limitation to the external validity of this study. The respondents were predominantly female with very little male input, which is not very representational of the general population of Rhode Island. The gender skew could be explained by the gender ratio for the forum pages that had access to the survey. Based on observation, it seemed that more females were

active participants on the forum pages, which could correlate to the gender skew as well. Another limitation to external validity is the amount of pro-environmental responses there were in this study. It could be assumed that the residents who participated in the survey had some pro-environmentalism in them, which is why they decided to participate in this survey. It is not conclusive if this is the case, but it is worth mentioning since responses were skewed towards being environmentally friendly/cautious.

After conducting this study, there were some aspects of the methodology that could have been improved upon. First, based on comments from respondents, there were a few respondents who wished there were more choices for the reusable use questions. By adding more choices like ‘almost always’ and ‘almost never’ in addition to ‘always, sometimes and no’ would provide a more accurate representation of the respondent’s behaviors surrounding reusable usage. Another improvement would be to gain more male input on their usage and views on statewide plastic bans. There is a gap in the research for male input and that could affect the results and conclusions made in this study, but would provide well needed information to fill the gap. The regression models in this study also have low R^2 values meaning there are some other driving factors, which are external from this study. Adding more variables might help uncover more driving factors in explaining pro-environmental behaviors and policy views. Lastly, based on the responses there is the potential for further research opportunities looking into the relationship between paper bag usage in municipalities with a plastic bag ban in place. The survey questions for this research did not incorporate paper bag usage in the survey, which could be a missing factor. It would

be interesting to see if there is a correlation to paper bag use or reusable bag use out of the act of convenience in a municipality with a plastic bag ban in place. This has the potential to add to behavioral spillover and policy spillover literature for consistency versus convenience, but a longitudinal study would be the best way to better understand spillover effects over time. It would even be interesting to look at a municipality without a plastic bag ban overtime to see if more people are switching to paper bags or reusable even though there is no plastic bag ban.

CHAPTER 6

CONCLUSION

This study investigated the attitudes and behaviors of Rhode Island residents towards various statewide plastic bans considered for Rhode Island legislation in the near future. Fourteen municipalities have taken the lead on mitigating plastic pollution by banning plastic bags, and during the course of this study three more municipalities banned plastic bags bringing the total number to 17. Residents of Rhode Island are currently being faced with a statewide plastic bag ban that will set the foundation for future single-use plastic bans statewide. Surveys were distributed to residents across Rhode Island using online forums.

The main research question this study attempted to answer was “what is the public response to present and possible future bans of single-use plastics in Rhode Island?” This study determined that respondents were in favor of statewide bans on plastic bags, plastic straws, plastic cups, plastic bottles and a statewide bottle tax. Hypotheses for this study were “according to residents, a statewide plastic bag ban will be the best way to set the foundation for Rhode Island’s single-use plastic policy” and “the people who live in a town with a plastic bag ban will be more accepting of a statewide ban of single-use plastics.” This study determined that residents who live in a town with a plastic bag ban were more in favor of banning other forms of plastic than residents living in a town without a plastic bag ban (Figures 5, 7, 9, 12). Responses indicate that, a statewide plastic bag ban maybe be viewed as setting a

foundation for the single-use plastic policy in Rhode Island (Figure 13). Based on these two determinations, both hypotheses held true for this study. Lastly, this study was consistent with respondent's support for banning plastic bags and bottles statewide, but it was inconclusive if respondents support banning plastic straws and plastic cups (Figure 12).

This study shows that a preponderance of respondents favor a statewide plastic bag ban (Figure 5). In theory this potentially means that when (or if) a plastic bag ban is passed by the state, push back from residents may be limited (to the extent that this sample of individuals is representative). Self-identification as being environmentally friendly/cautious was a significant predictor in both the reusable usage and the view of various statewide plastic bans. Pro-environmental behavior was shown to affect behavioral and policy spillover in municipalities with a plastic bag ban in place, which could explain increased support for the various statewide plastic bans. However, there were some potential knowledge barriers seen between municipal groups between behaviors and policies, which could explain the lack of support from municipalities without a plastic bag ban.

Increased knowledge could be utilized to break those barriers, to provide for more spillover effects to occur whether positive or negative. By providing educational programs for residents, this would allow for people to understand the negative effects plastic causes for the state of Rhode Island; residents might potentially gain more support towards the statewide plastic bans. Education can also play a role in enticing behavioral changes of the residents because they might not have known how bad the issue of plastic pollution had grown to and they want to make a change in their habits.

For policy makers in Rhode Island, based on public perceptions on the various single-use plastic bans, the state of Rhode Island should first ban plastic bags statewide and perhaps then plastic bottles. However, education programs should go hand in hand before each of the bans are enacted to help more residents have knowledge to encourage behavioral changes. This study created a potential roadmap for Rhode Island policy makers to look at considering statewide plastic bans. Single-use plastic pollution is a growing issue and more needs to be done in society today to make sure the environment and humans are safe for the future.

APPENDICES

Appendix A: The survey questions distributed to participants.

This survey is designed to look at participants' knowledge, attitudes and behaviors surrounding plastic pollution in a general aspect as well as plastic pollution policies in Rhode Island. By taking this survey you are providing input that could help shape how policy makers in Rhode Island progress on the global issue of plastic pollution

Section 1: These first questions ask about you level of concern and knowledge regarding plastics in the ocean.

1. Plastic bags break down in the ocean and are sometimes eaten by marine life
(Check one below)
 - ☐ Yes, I am aware and I think something should be done
 - ☐ Yes, I am aware but I don't know what I can do
 - ☐ No, I was not aware but something should be done
 - ☐ No, I was not aware and I don't have an opinion
2. Scientists predict that by 2050 there will be more plastic debris in the ocean than there are fish. (Check one below)
 - ☐ Yes, I am aware and I think something should be done
 - ☐ Yes, I am aware but I don't know what I can do
 - ☐ No, I was not aware but something should be done
 - ☐ No, I was not aware and I don't have an opinion
3. Plastic released into the ocean could be limited by better management of waste water treatment, plastic programs to encourage individual behaviors, taxes/fees on plastics or laws banning single-use plastics (ie. plastic cups, plastic straws, plastic utensils, plastic bags, plastic bottles) Which do you prefer? (Check one)
 - ☐ Ban various single-use plastics
 - ☐ Fix the management of waste water treatment centers
 - ☐ Encouraging plastic programs
 - ☐ Taxes/fees on plastics
 - ☐ I don't care
4. Are you aware that Rhode Island is looking at banning a variety of single-use plastics (ie. plastic cups, plastic straws, plastic utensils, plastic bags, plastic bottles) in the near future?
 - ☐ Yes
 - ☐ No

5. Are you aware that the first step in Rhode Island's plan to ban single-use plastics is to ban plastic bags state-wide?
- ☐ Yes
 - ☐ No
6. Does your town of residence have a plastic bag ban?
- ☐ Yes
 - ☐ No
 - ☐ Unsure

Section 2: The following questions are used to understand the participants' attitudes and behaviors surrounding single-use plastics.

7. Do you use reusable bags when shopping?
- ☐ Always
 - ☐ Sometimes
 - ☐ Never
8. What is your view on a Rhode Island state-wide plastic bag ban?
- ☐ Strongly For
 - ☐ Moderately For
 - ☐ Neutral
 - ☐ Moderately Against
 - ☐ Strongly Against
9. Do you approve of a tax on paper bags?
- ☐ Strongly For
 - ☐ Moderately For
 - ☐ Neutral
 - ☐ Moderately Against
 - ☐ Strongly Against
10. How often do you use disposable plastic straws?
- ☐ Always
 - ☐ Sometimes
 - ☐ Never
11. Do you use reusable straws? (ie. metal, washable plastic)
- ☐ Always
 - ☐ Sometimes
 - ☐ Never
12. How do you feel about a state-wide ban on disposable plastic straws?

- ☐ Strongly for
 - ☐ Moderately for
 - ☐ Neutral
 - ☐ Moderately Against
 - ☐ Strongly Against
13. How often do you use single-use plastic or styrofoam cups? (ie. Starbucks/Dunkin' cups, to-go cups)
- ☐ Multiple Times a Day
 - ☐ Once a Day
 - ☐ Once Every Few Days
 - ☐ Once a Week
 - ☐ Once a Month
 - ☐ Almost Never
 - ☐ Never
14. Do you use a reusable cup instead of a to-go cup?
- ☐ Always
 - ☐ Sometimes
 - ☐ Never
15. Are you aware if you bring a reusable cup to some places (ie. Dunkin' etc.) the price for that drink is cheaper?
- ☐ Yes
 - ☐ No
16. How do you feel about a state-wide ban on single-use plastic cups?
- ☐ Strongly For
 - ☐ Moderately For
 - ☐ Neutral
 - ☐ Moderately Against
 - ☐ Strongly Against
17. Do you purchase single-use plastic water bottles?
- ☐ Yes
 - ☐ Sometimes
 - ☐ No
18. Do you use a reusable bottle?
- ☐ Always
 - ☐ Sometimes
 - ☐ Never

19. How do you feel about a state-wide ban on single-use plastic bottles?

- ☐ Strongly For
- ☐ Moderately For
- ☐ Neutral
- ☐ Moderately Against
- ☐ Strongly Against

20. Bottle taxes are used to provide incentive to recycle bottles consumers buy. If a bottle tax is implemented the tax is charged when consumers buy water or soda bottles in hopes that the consumer will return the bottles to a bottle machine to obtain their tax back. How do you feel about a state-wide plastic bottle tax of 5 cents?

- ☐ Strongly For
- ☐ Moderately For
- ☐ Neutral
- ☐ Moderately Against
- ☐ Strongly Against

21. If you were a policy maker in Rhode Island, what plastic item would you address first?

- ☐ Plastic bags
- ☐ Plastic straws
- ☐ Plastic to-go cups
- ☐ Plastic bottles
- ☐ I would not pass a law to ban any type of single-use plastic state-wide

Section 3: These questions are standard demographic questions to gain some insight on the participants taking this survey.

22. Check the town/city of your residence?

- ☐ Barrington
- ☐ Smithfield
- ☐ North Kingstown
- ☐ Exeter
- ☐ Other
 - If other, please indicate your town of residence

How old are you?

- ☐ 18-24 years old
- ☐ 25-34 years old
- ☐ 35-44 years old

- ☐ 45-54 years old
- ☐ 55-64 years old
- ☐ 65-74 years old
- ☐ 75 years or older

23. What is your preferred gender?

- ☐ Male
- ☐ Female
- ☐ Other

24. What was your total household income, before taxes, last year?

- ☐ Less than \$25,000
- ☐ \$25,000 to \$49,999
- ☐ \$50,000 to \$74,999
- ☐ \$75,000 to \$99,999
- ☐ \$100,000 to \$149,999
- ☐ \$150,000 to \$199,999
- ☐ \$200,000 or more
- ☐ Prefer not to answer

25. What is the highest level of education you have completed?

- ☐ Less than high school
- ☐ High School
- ☐ Associate's or junior college
- ☐ Bachelor's degree
- ☐ Graduate or professional degree

26. Do you consider yourself environmentally friendly/cautious?

- ☐ Yes
- ☐ Sometimes
- ☐ No

27. Additional Comments Section:

Please voice your opinions on how you feel about Rhode Island's initiative to banning a variety of single-use plastics

[Insert text box]

APPENDICES

Appendix B: Code Book

Demographic Variables:

Age

Label: Age

Question: How old are you?

Coded Variables: 1,2,3,4,5,6,7

Variable Labels:

1= 18-24 years old

2= 25-34 years old

3= 35-44 years old

4= 45-54 years old

5= 55-64 years old

6= 65-74 years old

7= 75+ years old

Education

Label: Education

Question: What is the highest level of education you have completed?

Coded Variables: 1,2,3,4,5

Variable Labels:

1= Less than High School

2= High School

3= Associate's or junior college

4= Bachelor's degree

5= Graduate or professional degree

Environmentally Friendly/Cautious

Label: Environ_Cautious or DEnvCa (dummy variable)

Question: Do you consider yourself environmentally friendly/cautious?

Coded Variables: 1,2,3

Variable Labels:

1= No (dummy variable: 0= no and sometimes; 1= yes)

2= Sometimes

3= Yes

Gender

Label: Gender or DGender (dummy variable)

Question: What is your preferred gender?

Coded Variables: 1,2,3

Variable Labels:

1= Male (dummy variable: 0= male and other; 1= female)

2= Female

3= Other

Income

Label: Income

Question: What was your total household income, before taxes, last year?

Coded Variables: 1,2,3,4,5,6,7,8

Variable Labels:

1= Less than \$25,000

2=\$25,000 to \$49,999

3=\$50,000 to \$74,999

4=\$75,000 to \$99,999

5=\$100,000 to \$149,999

6=\$150,000 to \$199,999

7=\$200,000 or more

8=Prefer not to answer

Town has Plastic Bag Ban

Label: PBagBan or DPBagBan (dummy variable)

Coded Variables: 1,2

Variable Labels:

1=Town has a plastic bag ban in place (0=no bag ban; 1=bag ban: dummy variable)

2=Town does not have a plastic bag ban

Test Variables:

Reusable Bag Use

Label: Reusable_Bag_Use

Question: Do you use reusable bags when shopping?

Coded Variables: 1,2,3

Variable Labels:

1=Never

2=Sometimes

3=Always

View of a Statewide Paper Bag Tax

Label: PapBag_Tax

Question: Do you approve of a tax on paper bags?

Coded Variables: 1,2,3,4,5

Variable Labels:

1=Strongly Against

2=Moderately Against

3=Neutral

4=Moderately For

5=Strongly For

View of a Statewide Plastic Bag Ban

Label: View_Statewide_PBagBan

Question: What is your view on a Rhode Island statewide plastic bag ban?

Coded Variables: 1,2,3,4,5

Variable Labels:

- 1=Strongly Against
- 2=Moderately Against
- 3=Neutral
- 4=Moderately For
- 5=Strongly For

Reusable Straw Use

Label: Reusable_Straw_Use

Question: Do you use reusable straws?

Coded Variables: 1,2,3

Variable Labels:

- 1=Never
- 2=Sometimes
- 3=Always

View of a Statewide Plastic Straw Ban

Label: View_Statewide_PStrawban

Question: How do you feel about a statewide ban on disposable plastic straws?

Coded Variables: 1,2,3,4,5

Variable Labels:

- 1=Strongly Against
- 2=Moderately Against
- 3=Neutral
- 4=Moderately For
- 5=Strongly For

Reusable Cup Use

Label: Reusable_Cup_Use

Question: Do you use a reusable cup instead of a to-go cup?

Coded Variables: 1,2,3

Variable Labels:

- 1=Never
- 2=Sometimes
- 3=Always

View of a Statewide Plastic Cup Ban

Label: View_Statewide_PCupban

Question: How do you feel about a statewide ban on single-use plastic cups?

Coded Variables: 1,2,3,4,5

Variable Labels:

- 1=Strongly Against
- 2=Moderately Against
- 3=Neutral

4=Moderately For
5=Strongly For

Reusable Bottle Use

Label: Reusable_Bag_Use

Question: Do you use reusable water bottle?

Coded Variables: 1,2,3

Variable Labels:

1=Never

2=Sometimes

3=Always

View of a Statewide Bottle Tax

Label: View_BottleTax

Question: Bottle taxes are used to provide incentive to recycle bottles consumers buy. If a bottle tax is implemented the tax is charged when consumers buy water or soda bottles in hopes that the consumer will return the bottles to a bottle machine to obtain their tax back. How do you feel about a state-wide plastic bottle tax of 5 cents?

Coded Variables: 1,2,3,4,5

Variable Labels:

1=Strongly Against

2=Moderately Against

3=Neutral

4=Moderately For

5=Strongly For

View of a Statewide Plastic Bottle Ban

Label: View_Statewide_PWatBottleban

Question: How do you feel about a statewide ban on single-use plastic bottles?

Coded Variables: 1,2,3,4,5

Variable Labels:

1=Strongly Against

2=Moderately Against

3=Neutral

4=Moderately For

5=Strongly For

View of What Plastic Item Residents Would Address First

Label: View_What_PItemban_first

Question: If you were a policy marker in Rhode Island, what plastic item would you address first?

Coded Variables: 1,2,3,4,5

1=Plastic bags

2=Plastic straws

3=Plastic to-go cups

4=Plastic bottles

5=I would not pass a law to ban any type of single-use plastic
statewide

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