Planning for the Next Generation: Composting in New York City

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By

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Abstract

Growing significance of environmentalism in today's culture has given way to the environment-conscious young generation rising up with youth-led movements and initiatives. While the realization of practical actions may vary from one urban area to another, New York City, with its 2030 Zero Waste goal, can capitalize on this momentum to widely execute the program's key initiative: composting. To that end, this research seeks to identify the factors that New York City's residents face when attempting to compost and explores possible interventions the City can implement to bolster community engagement. With the young generation's demonstrated responsibility and sensitivity to trending environmental issues, the research aims particularly at those aged 20-39 to be effective conduits of the social movement. Online survey responses were collected from those identified as the target group via popular social network platforms. The quantitative data was further complemented by in-person interviews of the City residents, volunteers and staff at relevant organizations. The findings suggest that the low participation rate in composting programs can be overcome by addressing the following prominent barriers: *lack of access* to composting sites, *limited knowledge and interest* on the topic, and *perceived inconveniences*. Starting with the City's young people, the concept of "nudging" can be employed to influence their proactive behavior and allow their participation in the composting program to be the source of inspiration to other age groups in realizing the 2030 Zero Waste goal.

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Table of Contents

List of Figures and Tables

Introduction

Waste management has emerged as a key societal concern as efforts towards environmental protection and climate change mitigation gather greater momentum throughout the world. Food waste, in particular, has been a big problem in America where its environmental costs have been documented to be staggering if accounting for overall carbon emissions collected from producing, harvesting, transporting and packaging of the goods.

In New York City, it was reported in 2017 that 14 million tons of trash were generated annually (New York City Department of Sanitation [DSNY], 2017). In 2015, in an effort to reduce the amount of landfill waste, the City introduced “Zero Waste Challenge,” which aimed for sending zero waste to landfill by 2030 (New York City Mayor’s Office of Sustainability, n.d.). The compost program was introduced as a key element in this challenge, under which the city would pick up organic refuse and turn it to use. Discarded food scraps, tree leaves and other yard waste, for example, would be converted into high-quality organic fertilizer or energy. But despite the City’s multifold efforts to compel New Yorkers to engage in composting behaviors, its resident participation has been long lacking. Increasing effectiveness of the program, therefore, vitally depends on understanding the determinants of composting behaviors.

In general, people are sensitive to waste management issues and typically have a positive attitude toward environmental programs (Taylor & Todd, 1997). Urban residents tend to be even more attuned to waste management modalities in their communities and generally hold a positive view toward environmental programs (Berger

& Corbin, 1992). Interestingly, the younger generation has been observed to be more concerned over the impacts of climate change than their older counterparts.

With conversations around the issue of climate change becoming more heated around the globe, a growing number of climate-conscious individuals have begun committing themselves to taking action. While some commitments were carried out on personal levels, ripple effects of sustained activities across population groups have shown potential to build momentum and ultimately ignite a movement. An example of such undertaking among eco-conscious young people is composting. Especially among those falling in Generation Z and Millennial categories, their sense of social responsibility and sensitivity to trending issues have led many to act against increasing landfill waste. The world has seen countless examples of what masses can do that individuals cannot, and thus harnessing the momentum of synergy to achieve great results is vitally important. For New York City, in particular, their potential impact would be significant if considering that 31.9% of its population is made of Millennials and Generation Z in their young adulthood, aged 20 through 39, at the time of writing (U.S. Census Bureau, 2018). It is crucial to ponder upon various ways to foster the young people's environmentally-conscious attitude into more practical and tangible approach, like composting. With adequate involvement, even seemingly small behavior changes can have a big aggregate impact on the environment (Linder et al., 2018).

Experts of environmental psychology and behavioral economics have noted that insights from behavioral sciences have not been utilized enough to promote environmentally friendly behaviors (McKenzie-Mohr, 2000, Thaler & Sunstein, 2008).

Meanwhile, the concept of “nudging” has gained popularity among policymakers to achieve desired objectives among their subjects. This method employs positive reinforcement and indirect suggestions as ways of influencing individuals’ behavior and decision-making. With growing interest in environmental matters among young people, “nudging” can be used to reinforce environment-conscious attitudes and suggest composting as an adaptable lifestyle for those who seek to translate their will into action.

To that end, this research attempts to identify the factors that New York City's residents face when attempting to compost. These barriers are likely applicable to the majority of New Yorkers regardless of their individual demographics. But the young people’s proactive approach in environmentalism and tendency to ride on trends is something the City can capitalize on to base its starting point for improvements. The research segment employed both quantitative and qualitative surveys in order to ascertain barriers that the city’s residents face. The quantitative survey includes an online questionnaire sent to a random sample of New York City residents via popular social network platforms. The survey was particularly aimed at young people who fit in the Millennial and Generation Z categorization. The qualitative analysis consists of interviews with City residents, volunteers and staff at relevant organizations. In addition to identifying small interventions that the authorities can implement to bolster active composting participation, this study intends to shed some light on possible “nudging” strategies that New York City can implement, with which planners can attempt to

strengthen those initiatives already in place while establishing a new framework to enlarge the City's capacity to combat waste reduction.

Background

Food Waste Problems

According to the United States Drug Administration (USDA), food waste is estimated to take up approximately 30-40% of the food supply in the country. Meanwhile, the food that goes to the landfill and rots releases methane, a strong greenhouse gas that is more potent than carbon dioxide, which contributes to temperature rise and climate change. It was reported in 2017 that in New York City, residential entities alone produce about 3.1 million tons of waste each year (DSNY, 2017). Only about 20% of the garbage gets transferred to a waste-to-energy plant while the remaining 80% is transported to a final landfill destination that is sometimes as far as 600 miles away (Galka, 2016). In a 2017 New York City Department of Sanitation (DSNY) study, it was shown that about 68% of all New York City curbside waste could be diverted from going to landfills; 34% are recyclables comprised of metal, glass, plastic and paper; and another 34% are organic waste comprised of food scraps, yard waste and food-soiled papers (Figure 1). The latter group of items are organic waste, deemed suitable for composting. In the United States, overall, composting could reduce the amount of waste sent to landfills and incinerators by at least 30% (Frontier Group & U.S. PIRG Education Fund, 2019). Given such large volumes of waste that could be diverted from going to landfills, composting presents a viable solution in helping achieve food waste reduction.

As part of organic recycling, proper composting yields many environmental benefits. This method of organically decaying biodegradable substances is known to put

food waste into good use by creating high-quality organic fertilizer. Returning nutrients to soil revitalizes it, and healthy soil, in turn, serves a good substrate in agriculture. Use of compost as fertilizer also prevents soil from erosion while reduced amount of landfill waste as a result of natural decomposing ultimately reduces greenhouse gas emissions and thereby improves air and water quality.

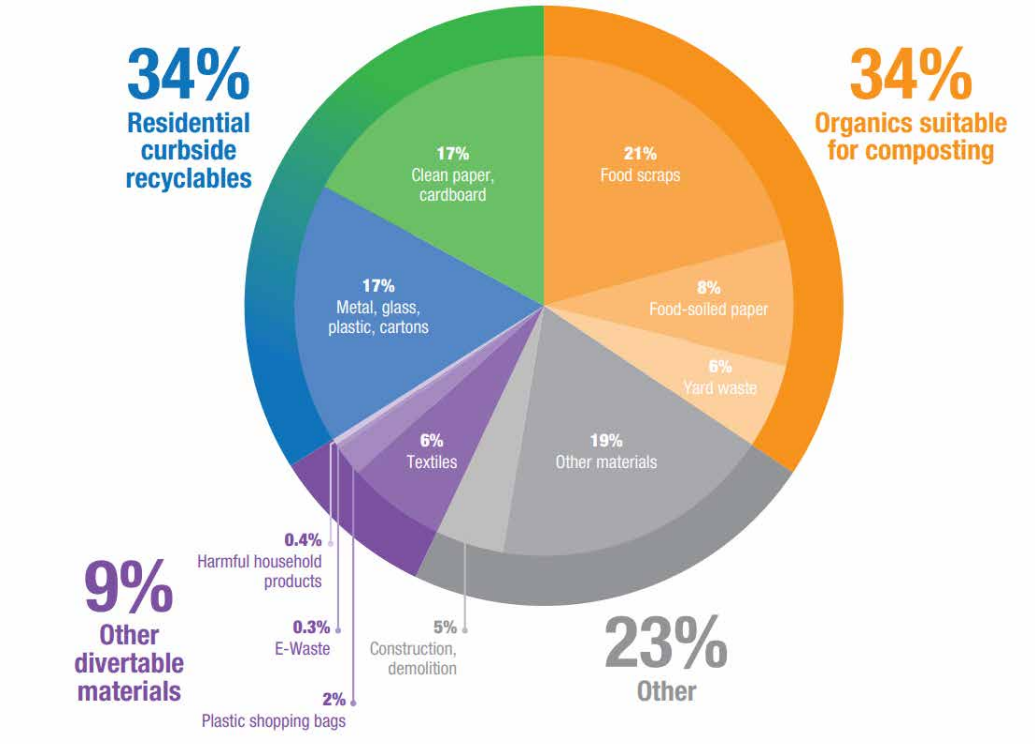


Figure 1: NYC Residential Waste Profile [source: DSNY]

Composting in New York City

As a resident in New York City, there are mainly two ways you can participate in composting. One way is to drop off your food scraps at dozens of Greenmarket, Youthmarket, Fresh Food Box, and Compost On-The-Go locations city-wide. History of drop-off composting in New York City goes back to 1994, when the Lower East Side

Ecology Center started accepting residential food scraps at the Union Square Greenmarket. By 2011, the number of households dropping off the waste that is suitable for composting grew so significantly that seven additional greenmarkets began managing and accepting food scraps (Goldstein, 2014). Since then the number of food scrap drop-off sites grew every year, and currently, as of March, 2020, there are 240-plus food scrap drop-off sites in the five boroughs (DSNY, n.d.).

The household food scraps that get collected at these drop-off sites are transported to one of several New York City compost sites and get transformed into a fertile soil for use on local urban farming and gardening projects. In 2011, the annual food scrap collection was 318,216 million pounds. By 2019, it was 3,213,148 million pounds (GrowNYC, n.d.). There are seven New York City compost sites that are part of the NYC Compost Project which was created by DSNY in 1993. The project works to rebuild the City's soils by providing its residents with the knowledge, skills, and opportunities they need to produce and use compost locally (DSNY, n.d.). The NYC Compost Projects are carried out by teams of DSNY-funded staff at these seven partner organizations:

- Big Reuse (Brooklyn and Queens),
- Brooklyn Botanic Garden (Brooklyn), Earth Matter NY (Governors Island)
- LES Ecology Center (Manhattan)
- Queens Botanical Garden (Queens)
- Snug Harbor Cultural Center & Botanical Garden (Staten Island)
- The New York Botanical Garden (Bronx)

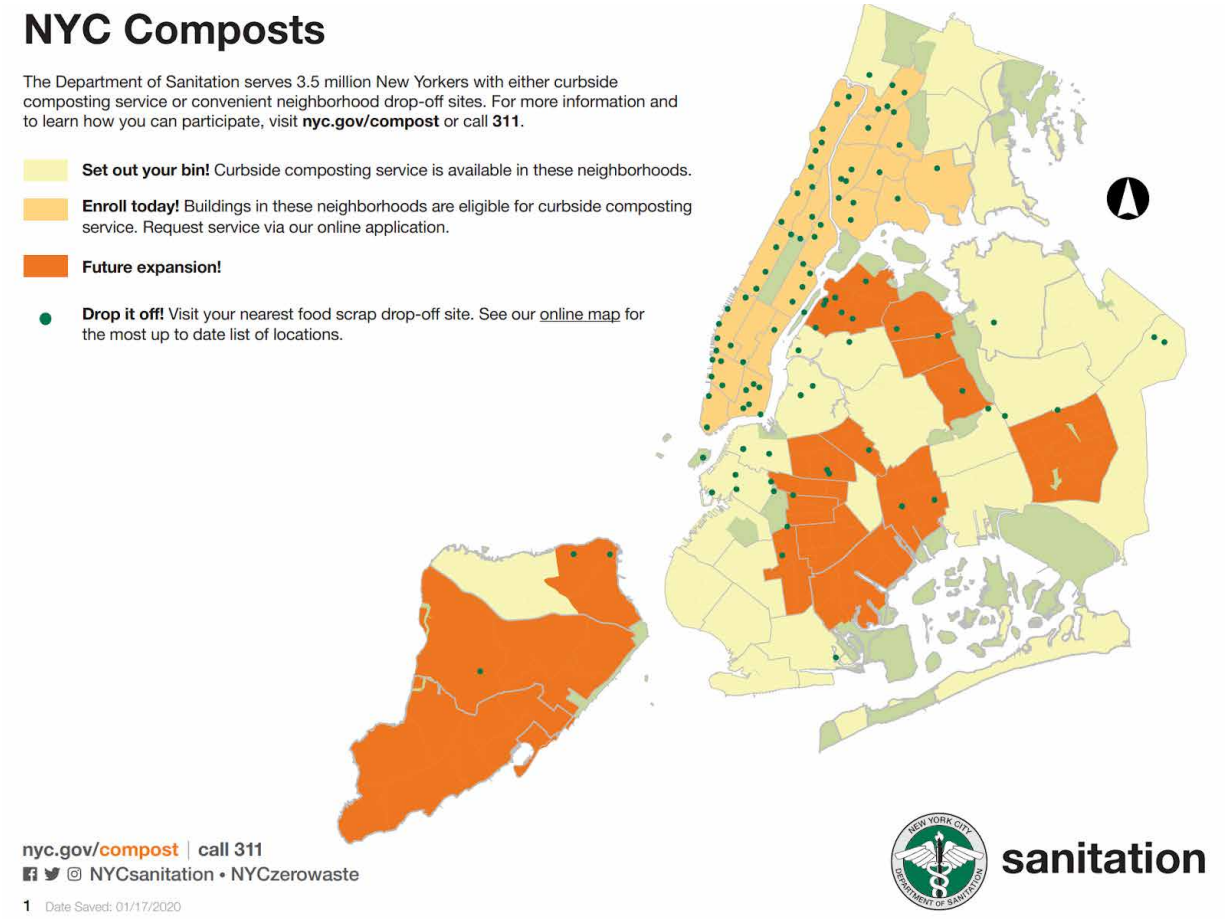


Figure 2: NYC Composts Map [source: DSNY]

The second way to participate in composting is through the curbside composting collection program. In 2013, DSNY rolled out a voluntary weekly curbside collection program for food scraps and yard waste. This program, which currently, as of March 2020, serves 3.5 million residents in all five boroughs of New York, helps convert the city's organics into both compost and clean energy (DSNY, n.d.). The program is reported to be the largest compost program in the country (Rueb, 2017). By 2017, more than 3.3 million New Yorkers were served by the twice-weekly curbside organic

collection program. However, despite the steady increase in the amount of organic refuse which indicated a substantial decrease in landfill waste, the DSNY in 2018 halted an expansion of the program because of the low participation rate. The operational cost for the organic collection service was too high compared to the value of scraps collected. There was a fixed base cost — as related to collection truck maintenance, fueling and employee salaries — and at least 10-12 tons of waste had to be collected in a single route for it to be cost-effective. But with not as much resident participation in certain neighborhoods, it became financially risky for the city to consider expanding to other areas. While the low participation rate stemmed from a lack of advertising and education on the issue, there was no guarantee that expanding this voluntary system to more neighborhoods would necessarily make the operation financially worthwhile.

Case Studies

Over the years, many cities have implemented mandatory composting programs as a solution to solid waste management. Seoul, South Korea and San Francisco are two such cities with effective composting programs that have been in operation for over a decade. With its land area of 233.7 mi^2 and population density of 42,901 per mi^2, the urban scale of the former is comparable to that of New York City. By scrutinizing how a mega city like Seoul has successfully implemented a city-wide mandatory composting program, New York City can explore the feasibility on its homeground. San Francisco, on the other hand, though of a much smaller scale than New York City, shares similar urban fabric and culture than an East Asian capital. It can shed light as a successful case in the U.S.

Table 1. Area, population, and population density comparison in three cities

City		Area (mi^2)	Population	Population Density (population/mi^2)
Seoul[1]		**233.7**	**10,025,927**	**42,901**
San Francisco[2]		**46.87**	**883,305**	**18,846**
New York[3]	**City wide**	**302.65**	**8,398,748**	**27,751**
	Bronx	42.1	1,432,132	34,017
	Brooklyn	70.82	2,582,830	36,470
	Manhattan	22.83	1,628,701	71,340
	Queens	108.53	2,278,906	20,998
	Staten Island	58.37	476,179	8,158

[1] Land area is from 2010 data. (The Seoul Research Data Service, n.d.). Population is from 2019 data (Seoul Metropolitan Government, 2019).
[2] Land area and population as of 2019 (U.S. Census Bureau, 2019b)
[3] Land area and population as of 2019 (U.S. Census Bureau, 2019a)

Seoul, South Korea

Seoul's population of 10 million (Seoul Metropolitan Government, 2019) is comparable to New York City's population of 8.4 million (U.S. Census Bureau, 2019a). Introduced in 2005, its organic composting program is over 15 years old. Ten years prior, in 1995, South Korea introduced a new waste management policy, which would begin to charge citizens a fee for garbage disposal where the levy would be equivalent to how much they discard. Recycling materials were picked up free of charge, but all other refuse had to be discarded using the government-designated bags. This drove an increase in recycling.

Seeing the positive change, the government in 2005 introduced a similar measure effectively banning food scraps from being sent to landfills. Then in 2013 the government introduced a mandatory food waste recycling policy under which citizens were separately charged for the amount of food waste they threw out. Consequently, the amount of food waste compost dramatically increased from less than 2% in 1995 to 95% today. The recycled food waste is turned into compost to be used as fertilizer, or animal feed. Residents of Seoul have three different ways to throw out their food waste: 1) they can purchase designated bags; 2) purchase a chip and attach it to a reusable collection container; or 3) throw out in automated bins (RFID bins), equipped with scales that weigh and charge residents per kilogram of organic waste (see Figure 3). These bins helped the city reduce food waste by 47,000 tons in six years (Broom, 2019).

		
Designated Bag	Chip Sticker	RFID

Figure 3. Three ways of food waste disposal in Korea

The main reason for the success of this new policy is that residents did not produce as much food waste as before because the more they create waste, the more they have to pay. The RFID bin scheme was especially successful in encouraging people to be careful about how much waste they generated. When one drops off food waste, the machine displays the weight of the organics and the charge based on weight – about 13 cents/ kg (6 cents/lb). Although it may not sound like costly, having to pay influenced one to watch how much waste he/she creates. One blogger noted that before the policy was implemented he used to get billed a flat fee of $1.10 per month for the food waste by the apartment management. After the policy he realized that it only costs him about 35 cents a month. An interesting behavior change to note here is that, although it costs him now less than before, he feels the need to reduce waste to save money.

Having a waste disposal fee scheme also encouraged home composting. The number of urban farms or community gardens in Seoul increased sixfold since the implementation in 2013. The government supports them by providing about 80% of the

start-up cost. The proponents of the urban farms testify that they bring people together in an urban setting, as well as providing fresh produce.

San Francisco, United States

San Francisco was the first city in the United States to establish a large-scale food composting program, starting in the 1990s. In 2009, the City of San Francisco adopted a Mandatory Recycling and Composting Ordinance which mandated recycling and composting a requirement for all businesses and residences. The City has a municipal solid waste diversion rate of 80%.

The city's residential compost collection program was piloted in 1997. After experimenting with various collection and storage techniques, the city partnered with a private company to roll out a city-wide, voluntary curbside compost collection in 2000 (Pollans, 2012). By the time the city mandated composting in 2009, many had already been compositing for years. Each resident is given three bins – a blue bin for recyclables, green bin for compostables, and black bin for landfill-bound materials. Residents are to properly sort recycles and compostable materials and place them in appropriate bins. The City conducts extensive door-to-door outreach to residents and businesses and also checks residential curbside bins throughout the city to ensure compliance. The City imposes fines on repeat offenders.

When the mandatory composting ordinance was first proposed in 2008, critics raised concerns about enforcement. The original proposal called for fines of up to $1,000 for households that failed to comply. It was first met by hostility as communities

feared that “Big Brother” would be peeking into people's trash cans. Now, most of the fears have faded. The City attributes its success to the approach focused on outreach and education, and not on penalties. The City also offers readily-available resources like easy-to-use apps and websites where residents and businesses can find information on recycling and composting.

Literature Review

We live in a rapidly changing society, in the age of information, where common values, beliefs and political views constantly evolve. As social norms diverge from one generation to the next and societal changes give way to an inevitable generational divide, it is important that cities stay agile to provide a livable urban environment relevant to the demands of the next generation.

Compared to their older counterparts, the young people of this era, those aged 20 through 39 at the time of writing, are more cognizant of lasting impacts of environmental sustainability. Their lifestyle choices and consumer behaviors proactively demonstrate their climate-consciousness. To that end, grasping the young generation's attitude towards their present and future environment would hold a key in helping the City achieve the 2030 Zero Waste goal. Accordingly, the notion of generational divide will be examined in the first section of the literature review.

In the next section, delving deeper into the idea that one's environmentally-conscious attitudes shape one's consequential behaviors, environmental psychology will be reviewed. This field of study decodes the relationship between humans and their surrounding environment, both built and natural (Bell et al., 1996). But while it is crucial to identify the factors that help shape people's attitudes towards environmentalism, some researchers argue that possessing attitude alone is not sufficient in leading one to an environmentally-conscious action.

Therefore in the last section, the theory of behavioral economics will be discussed. This idea states that human behaviors are strongly influenced by ways in

which a set of choices are presented to them. Thereby considering the presentation method to be an effective influence vehicle, the two particular techniques of framing and norm-creation will be explored as possible tactics to foster environmentally-friendly behaviors among the young people.

Generational Divide

"Generation gap" refers to a difference of opinions between one generation and another concerning general beliefs, political stance or values ("generation gap", n.d.). This divide can manifest in many aspects of an individual's life, whether through display of work ethics (Smola & Sutton, 2002), demonstration of purchasing power via consumer choices (Farris et al, 2002) or through pursuit of sustainable practices (Hersch & Viscusi, 2006). Generational divide occurs because different eras experience changes in values, motivations, preferences and attitudes with passing of time (Inglehart, 1997; Mitchell, 1998).

In particular, cities have been rapidly changing as the makeup of the urban landscape has become progressively younger in recent decades. This is due to a growing number of young adults — particularly those who belong to the so-called "Millennial generation" and "Generation Z"— choosing to spend their adulthood in urban areas to a greater extent than their preceding generations did. (Cortright, 2017). This research designates "young people" as those born between the years of 1981 and 2000, inclusive. This captures the Millenials, those born in the years 1981 through 1996, as well as the older tier of those in the Generation Z category (birth years 1997 through

2012) in line with the Pew Research Center's definition (Dimock, 2019). The terms "young adults" or "young generation" will be used interchangeably to refer to the study's target group. These young adults make a significantly more educated, and racially and ethnically diverse generation that wields a growing influence on urban forms and dynamics in America today (Bialik & Fry, 2019; Dimock, 2019). According to Sheahan (2005) "this young generation is more conscious socially, culturally and environmentally" (Sheahan, as cited in Hume, 2010).

Much more connected to diverse ideas and resources than their older counterparts, the young generation is more opinionated yet more idealistic and altruistic in their ways. They have a great impact on cities through their decision-making, especially as those in highly urban areas develop a certain lifestyle with economic influence: prioritizing living quarters located closer to transit and action over bigger spaces with longer commutes; and being willing to trade their material consumption and ownership over intangible possessions such as experiences and skills (Moos et al., 2017). These mostly thirty-somethings are also seen to be prominent today, just as their parents, who mostly belonged to the Baby Boomer generation, were during their prime time of influence. (O'Donnell, 2006). As the most populous generation and now a majority of the workforce, they will soon surpass their parents as the biggest group of eligible voters, thereby directly influencing politics and policies. And the trend of America towards getting younger and more diverse most definitely applies to its metropolitan areas (Alter, 2020).

Studies have shown environmental sustainability as one area where the young generation have displayed a more decisive, coordinated standpoint and sensitivity than older generations (Straughan & Roberts, 1999; Lee, 2008). According to the Pew Research Center, the majority of Americans of all age groups, have acknowledged solid evidence that the temperature of the Earth is rising (Pew Research Center, 2018). Among them, younger adults were more likely to admit this reality and link human activity to rising temperatures as a primary cause. They were also more prone to lend support to climate change-related activism and policy-drafting because they believed such proposals would have a direct impact on their lives (Hersch, 2006). As observed in research, a greater number of young people were willing to pay higher gasoline prices, for example, to help slow the climate crisis (Hersch, 2006). Further, masses of young people mobilizing and pouring into the streets for weekly climate protests on every continent during 2019 showcased the extent of their commitment. Organizers estimated the turnout to have been around four million in thousands of cities and towns worldwide. Many called it the first of such protests on a grand scale (Sengupta, 2019).

The young generation has spurred enormous social movements. “Collectively, they are pushing toward a more comprehensive vision of social justice [while] their intuitive use of social networks has given them a fresh understanding of how individuals work within systems.” (Alter, 2020) Researchers ascribe the use of technology and connectivity via social network services to be the key factor behind young people’s ability to quickly mobilize and act. Stepping away from the top-down approach, the exchange of information becomes free in this decentralized model, with each participant

having a greater sense of ownership in the overall movement. (Kanchanapibul et al, 2014). With a significant amount of information digitalized and easily accessible online, resources are vastly more available, ranging from news articles to research papers and science journals (Hersch, 2006).

The young generation's choice of lifestyles and consumer behavior also tend to be more climate-conscious. According to a global marketing survey conducted by Nielsen in 2015, millennials and generation z are more willing to pay higher prices for sustainable goods compared to their older counterparts (Nielsen, 2015). The reason for the stark difference in consumer choice, as Heaney (2006) explains, is due to different generations and consumer groups being exposed to:

(a) different social and economic opportunities and barriers;
(b) different types of technology activities;
(c) different social perceptions and community norms; and
(d) different life experiences and events (as cited in Hume, 2010).

Researchers argue that there is a political polarization between young people and their seniors (Moos et al, 2017). Consequently, this divide creates an unpleasant urban experience for the former as the decisions made by their government, which is largely run by senior lawmakers, are not in their favor. But the young generation would soon be in full charge, and the cities run by them will surely look different than the boomer-built and -shaped landscape (Alter, 2020).

Understanding the generation gap is important in policy establishment as related to composting. As mentioned earlier, the young generation is comparatively more

interested in environmental issues. They are more likely to lend support to climate change-related activism and policy-drafting because they believe such proposals would have a direct impact on their lives. Therefore, this willingness could effectively be translated into a practical approach, such as composting, if they realized its positive, lasting impacts. They may also be more receptive to "nudges[4]" – various indirect suggestions used to influence an individual's behavior and decision-making – as they are easily influenced by social factors. If used wisely and strategically, nudging could start among the young generation and potentially spillover to other age groups of New York City residents. Thus, a thorough analysis of environmental behavior of this soon-to-be-in-charge generation is warranted to better understand their needs.

Environmental Psychology

Attitude is an important driving factor behind one's behavior. While researchers believe that most events can be preempted and dominated by strong attitudes (Chaubey et al., 2011), a certain framing of mind can also serve as a key determinant in the execution of one's environmental behavior. Therefore, focusing on intentions merits strong considerations as they prompt a higher probability of action and successful goal attainment (Hamid & Cheng, 1995).

Within the particular context of environmental psychology – where the interplay between individuals and their surroundings is observed – attitudes are what translates to people's willingness to partake in or fulfill ecological objectives (Tsen et al., 2006). A

[4] Refer to the "Behavioral Economics" section for more information.

study by Taylor and Todd (1997) experimented with three models to seek which best described human composting behavior, and concluded that one's own attitude was a key determinant behind behavioral intention. It thereby offered significant insight into the factors that influenced composting behavior. Thus, before attempting to understand how interventions can be taken to induce environmental behavior, it is crucial to observe the motives and values on which individuals' environmental attitudes are based. In carrying out the literature review of work done by renowned researchers previously, this research intends to build on their findings and delve deeper into the motives and values of individuals that form one's environmental attitudes.

The first factor that has an impact on one's environmental attitude is one's *knowledge* about the environmental matter. In their studies, Liere and Dunlap (1980) found that the younger generation who grew up with continued exposure to alarming environmental issues were left with an indelible imprint and thus were most likely to be involved with environmental actions. Additionally, separate research findings have indicated that there is a positive correlation between one's ecological knowledge and purchasing of green products (Kanchanapibul et al., 2014). Moisander (2007) noted that green consumption is typically linked to environmentally responsible consumption where consumers consider the environmental impact of purchasing, using, and disposing of various products, or using various green services. Environmentally responsible purchasing is vital as unplanned purchasing of goods can severely damage the environment. This is especially more so per Grunert's (1995) reporting that consumer household purchases were responsible for 40% of environmental damage, concluding

that consumers possessed the capability to prevent or decrease environmental damage by purchasing green products. Other researchers, too, found that considerable ecological knowledge was a significant factor in motivating people to learn more intensely (Straughan & Roberts, 1999; Chan & Lau, 2000).

Second is the *social influence* factor. Scores of studies have elaborated on human desire to fit in and tendency to conform to the behaviors of those around them. To leverage this motivation, stronger reinforcement of social norms can be implemented within social groups as to what constitutes acceptable and encouraged behavior (White et al., 2019). This notion of social norms are especially more strictly followed in East Asian countries, often characterized by their collectivistic cultures, as opposed to America's individualistic culture (Low et al., 2013). The collectivist cultures, such as those rooted in China, Korea, and Japan, emphasize a group's common goals and achievements over an individual's needs or desires. To that effect, individuals that make up a collectivist society are found to be more diligent in performing dutiful recycling than those proclaimed to be individualists (Kim & Choi, 2005). In another instance concerning green purchasing behavior, a study on young consumers' purchasing behavior in Hong Kong further validated social influence as the top predictor component (Lee, 2008).

Research conducted in Canada also showed that people were influenced by family and friends on environmental behaviors such as recycling (Todd & Taylor, 1997). In the United States, Homeowners' decisions to install solar panels was predictable by whether their nearby neighbors had done so (Bollinger & Gillingham, 2012). Therefore,

harnessing the power of social influence is one of the most effective ways to elicit pro-environmental behaviors.

Rightly fitting with youth being more influenceable, informing undergraduate students who shop online that others were buying eco-friendly products led to a 65% increase in making at least one sustainable purchase (Demarque et al., 2015). Another research showed that telling university commuters that others were ditching the use of their personal cars in favor of more-sustainable modes of transportation led to a dramatic result. The use of sustainable transport by students increased five-fold compared to those who were simply given information about alternatives (Kormos et al., 2015). This goes to show that peer influence even builds on knowledge.

Third factor is *perceived environmental responsibility*. Hopper and Nielsen (1991) discussed how people's attitudes were positively influenced by society's relative advantage while negatively influenced by personal relative advantage and complexity. Environmental responsibility is shown to be most significant when an individual believes in the efficacy of one's own pro-environmental behavior and where the self is perceived to be a responsible agent compared with other social agents (Eden, 1993). This means that people engage in environmental behaviors largely for altruistic reasons. The higher the levels of an individual's perceived environmental responsibility, the more likely that he/she would foster environment-friendly attitudes and behaviors that subsequently translate into relevant action. (Paço & Rodrigues, 2016)

But as Eden (1993) points out, it is important to note that in reality, the translation of environmental responsibility into consistent behavior proves to be complex, and is

dependent upon the individual's social context as well as organized environmentalism in one's surroundings (Eden, 1993). Therefore, though attitude may be important in shaping one's willingness to get involved in an environmental behavior, that alone is not sufficient to lead to action (McCarty & Shrum, 1993).

While exploring green purchase behavior, for example, many studies reported a discrepancy between consumers' expressed favorable attitudes and actual purchasing practices (Chen & Chai, 2010). Hughner et al. (2007) found that about two-thirds of consumers (67%) showed a positive attitude towards purchasing organic food items, yet only a fraction of those consumers (4%) actually purchased organic products. The organic foods' high prices were found to be the main obstacle in making the purchase decision; many consumers were willing to pay some level of premium for organic goods, however, not as much as the current market's premiums (Hughner et al., 2007). Meanwhile, Rokka and Uusitalo (2008) claimed that even consumers with the highest level of environmental consciousness did not always purchase green products; rather, their buying choices depended on both ecological perspectives and evaluation of product attributes. The researchers concluded that environmental attitudes may not be the sole predictor in green purchasing behavior, but nevertheless underscored the importance of understanding multi-attribute product choices (Rokka & Uusitalo, 2008). Therefore, it is vitally important to understand the holistic behavioral determinants.

In their efforts to understand the determinant factors of composting behavior, Taylor and Todd (1997), looked into other cognitive and psychological variables

postulated to influence environmental behavior. Key variables studied can be organized into five categories:

a) Perceived benefits of the behavior; both personal and societal
b) Knowledge to perform and the difficulty associated
c) Social influence
d) Barriers and facilitating conditions
e) Perceived effectiveness of performing the behavior

In the analysis section of this paper, these variables will be revisited to examine whether they are relevant to New York City residents' composting behavior patterns.

Behavioral Economics

We live in a world where values, lifestyles and our ways of thinking are constantly shifting. Once upon a time in an era where the state led and its citizens followed, commands given by the authorities and incentive-based policies were, for the most part, effective. However, as societies become atomized and non-deferential, different tools and ways of thinking are required (Thaler & Sunstein, 2008, Moseley & Stoker, 2013). Thus, it is essential that we look into how policies can be designed to promote certain behaviors and/or bring about behavioral changes.

Much of classical public policy was based on rational choice theory. It stated that all actions by individuals were fundamentally "rational" in character and that people made decisions by calculating the likely costs and benefits of any action prior to choosing the best option that maximized their expected benefits (Browning et al., 1999). Rational choice theory may be partly applicable in some instances, but it does not

always hold true as people's behaviors are not always in alignment with their intentions (Parkinson et al., 2014). Humans are not fully rational beings; that is, people will sometimes act in ways that are not in their own self-interest, even when they are aware of it (Kosters & Van der Heijden, 2015). Much of the old policy tried to predict human behaviors as economic problems, as if they were a math formula to be solved with predictable variables. However, as Thaler and Sunstein (2008) describe it: "Unlike econs, humans predictably err" (p7). They challenge this rationalist understanding of human behavior and present a new theory of "nudge," which proposes positive reinforcement and indirect suggestions as ways of influencing an individual's behavior and decision-making (Thaler & Sunstein, 2008). Nudging can influence people by altering the environment so that an individual's cognitive processes would be triggered to achieve desired outcomes without infringing on their freedom to choose.

The concept of nudging has garnered immense popularity in many fields over the last decade, and also among policy makers (Linder et al., 2018). Nudging approaches have additionally been applied in promoting pro-environmental behaviors, such as – limiting the consumption of water and paper (Egebark & Ekström, 2016), and reducing food waste from restaurants (Kallbekken & Sælen, 2013).

Nudging turns to cognitive psychology to understand human behavior. Cognitive psychology looks at what the human mind focuses on and blurs out when in an active decision-making mode. Per Moseley and Stoker (2013), listed below are repeated themes of cognitive psychology used by behavior economists:

a) Prospect theory: when people feel that they may be in a position to lose something, they become more inclined to do something to prevent the loss
b) Psychological discounting: people are likely to place more weight on a short-term outlook than on long-term effects when facing either threats or opportunities
c) Maintaining the status quo: most people do not change their habits unless they are confronted by pressing reasons to do so
d) Cognitive consistency: when one's beliefs and behaviors clash, people are more prone to alter their beliefs than reset their behavior (Moseley & Stoker, 2013).

Further to the above, two additional theories to be appended based on the literature review of the book "Nudge" by Thaler and Sunstein are:

e) Automatic system over powering reflective system: at times, people rely on their intuition over rational thinking
f) Temptation: people tend to consume more in a "hot" state than in a "cold" state

According to Smith (2010), there is a large volume of promising research on how to promote pro-environmental behavior both within environmental psychology and behavioral economics; however, little crossover behavior occurs. Using the cognitive inner world mentioned above, the next sections will talk about how social influence and moral convictions have been used to change people's behaviors. Two interventions that will be discussed are: *framing* and *norm-creation* interventions.

Framing

In policy-making, framing means packaging. It refers to the process of presenting an issue in such a way that would encourage a certain interpretation by its subjects,

overwriting any conflicting perception one might have had on the particular issue. By laying out a problem in a particular way, an underlying goal would be to draw out a certain response. Therefore, institutions can decisively zone in on an angle of an issue and affect people's reaction and subsequent behaviors.

As Thaler and Sunstein explain it, a doctor telling a patient,"Of one hundred patients who have this operation, 90 are alive after five years," may bring a different reaction from "Of one hundred patients who have this operation, 10 are dead after five years." The two phrases are, in fact, based on an identical piece of information (Thaler & Sunstein, 2008). Framing employs an aforementioned concept – prospect theory – according to which, a loss seems more significant than the equivalent gain.

As for an example of where "framing" technique was successfully used to change people's behaviors: when environmental sustainability was framed as a patriotic act, participants displayed greater willingness to take on pro-environmental behaviors as compared to when no framing was used (Feygina et al., 2010).

Norm-creation

Social influence is another factor that prompts an individual's behavior change within a certain culture. One's perception of how others see him/her, especially by one's peers – it matters. Social context matters because it provides understanding about whether a particular behavior is acceptable. And it ushers in a sense of belonging. Studies have shown that, in general, there is a positive correlation between various social influences and environmental behavior (Taylor & Todd, 1997). Research suggests

that we are most influenced by people we trust (Druckman, 2001), such as family and friends (Taylor & Todd, 1997) as well as subject experts with established credentials. A study done in Canada showed that visits by household recycling experts improved participation rates in noticeable measure as people trusted expert opinions (McKenzie-Mohr, 2000).

Young people are especially susceptible to social influence across societies. As such, younger consumers' green purchasing behavior, too, was observed to be driven largely by social influencing (Lee, 2008). Sense of visibility and acknowledgement mattered to them. Thus, being able to distinguish individual contributions within an overall scheme of a given activity was effective in increasing total contributions (McKenzie-Mohr, 2000). Social context is another element to be factored in as society tends to gauge the appropriateness of an activity within the context of its surroundings; when we are uncertain whether something is the "right thing to do," we look to others for validation or disapproval (Cialdini et al, 1990). In other words, a greater level of participation by the society-a-large, creates a framework for a social norm. These norms are shaped by approval and disapproval by others in the community (Elster, 1989).

One of the behavioral change interventions that have shown positive results in encouraging people to support sustainable practices is the norm-creation method. Norms are unwritten rules of behaviors or shared expectations of what is deemed to be appropriate in a certain situation. If a certain behavior becomes a social norm, the likelihood of the non-participants of the activity joining in the activity becomes higher.

For example, increasing visibility of individuals who participate in backyard composting to neighbors, by placing a decal on the side of their waste container indicating that they composted, increased the number of composters in the community (McKenzie-Mohr, 2000); or having consumers compare their energy consumption rates with their neighbors effectively reduced energy consumption (Schultz et al., 2007). Using the descriptive norm[5] messages have been one method proven effective in creating a social norm. Messages such as “Join your neighbors in conserving energy” was more effective than the more commonly used injunctive normative message of environmental protection “Protect the environment by conserving energy” or even messages of self-interest “Save money by conserving energy”(Nolan et al., 2008). “Grasscycling” program in the city of Calgary in Alberta, Canada was met by a low initial adoption rate by homeowners. The following messages were left on residents’ doors: *“Your neighbors are grasscycling. You can too”* and *“Most people are finding ways to reduce the materials that are going to the landfill—you can contribute by grasscycling.”* This simple intervention, in weeks, resulted in almost the double amount of residential grasscycling (White et al., 2019). Another study found that having descriptive norm messages such as “Join your fellow guests in helping to save the environment” to ask hotel guests to reuse their towels was more effective than just saying “Help save the environment” (Goldstein et al., 2008).

[5] Descriptive norms are typical patterns of behavior, generally accompanied by the expectation that people will behave according to the pattern (Cialdini et al., 1990).

Despite proven effectiveness of nudging in social contexts, some argue that its implementation on a policy-level may not be as straightforward as the scholarship suggests (Moseley & Stoker, 2013). Transforming insights into intervention, therefore, necessitates a thorough grasp of political and social dimensions. Accordingly, policies aimed at inducing behavioral change that would benefit the environment may need to combine economic incentives with information and education to change beliefs (Turaga et al., 2010).

Despite New York City's years-long efforts to prod its residents to participate in the composting program, the number of active participants has not grown much. While there is no simple solution to a complex urban problem when it comes to dismantling pre-existing barriers and replacing them with incentives, the aforementioned argument of soliciting young people's participation may hint to an increased overall participation in the long run. With a fresh outlook on society and a sense of responsibility for their own future in the making, the young adults are more prone to demonstrate environment-friendly behaviors. However, environment-conscious attitudes alone cannot be referenced as the sole determinant or motivator behind their decision to compost. It is thus important to recognize the many reasons behind their inactivity and devise a fit-for-purpose strategy that would effectively promote composting. To that end, this thesis raises the following questions: Why do New York City residents compost? What are the challenges encountered by composters? How can the composting experience be improved? Or for those not in active participation, what would encourage them to start?

Methodology

This thesis strives to identify what factors would encourage New York City residents to compost and what planners can do to make food waste recycling an achievable reality for millions of City households. After substantive study and engagement with the public-at-large, it was found vital to understand some common causes or obstacles that, respectively, spur or prohibit New Yorkers from actively participating in composting. Therefore, both quantitative and qualitative aspects were employed for research; surveys and interviews were conducted concurrently online and in-person at greenmarkets. Additionally, informational interviews were conducted with industry experts and representatives of select nongovernmental organizations to gain macroscopic-level knowledge of the city's pre-existing initiatives.

Online Surveys

The world's two most popular social network services – Instagram and Facebook – were utilized for recruiting survey subjects. According to the Pew Research Center, as of February 2019, 72% of adults in the US used some type of social media. The use of social media was especially prevalent among the younger generation, with 90% of people aged 18 to 29, and 82% of those 30 to 49, maintaining some sort of social media presence (Pew Research Center, 2019). Because the research focused on understanding the younger generation's composting behaviors, an educated guess was made that these two particular social media platforms would be the best and most obvious place to recruit respondents. It was also taken into consideration that people

are more prone to sharing honest responses in virtual spaces. The invitations to an online survey were given out to randomly selected individuals whose accounts identified them as being based in New York City.

On Instagram, the survey respondents were pooled from those who followed governmental and/or nonprofit organizations that promoted environmental protection and sustainability. The assumption here was that those individuals who made a conscious choice to follow these organizations' accounts were likely to be more environment-conscious than their average peers. Accordingly, the following are the Instagram accounts whose follower lists were referred to to recruit survey participants: GrowNYC (27.1K followers), NYC Zero Waste (20.7K followers), NYC Sanitation (14.3K followers), and LES Ecology Center (2.7K followers).[6] The invitation to the survey was also posted under my personal profile section – on both Instagram and Facebook – to gather voluntary participation. Upon consent, the participants were given access to the survey questionnaire.[7] The survey started out by asking whether the respondent composted, participated in an organic waste collection program and/or dropped off food scraps at City-designated sites. The participant was then given an option to choose one answer among three multiple choices: 1) yes; 2) no; or 3) I used to, but not anymore. Depending on one's response, the participant was directed to a set of questions built to specifically address his/her composting behavior, or lack thereof. By designing a semi-customizable survey, the intention was to categorize respondents into the

[6] Follower numbers are as of March 2020
[7] See Appendix A for sample survey questions.

following three groups and come up with general findings that were representative of each behavior group:

Group A: people who compost
Group B: people who used to compost but then stopped
Group C: people who don't compost

(*For the purpose of this research paper, "composting" is defined to include participating in curbside organic collections programs and dropping off food scraps at participating sites).

Follow-up questions were posed to identify why people composted, what they found to be the most challenging aspect of composting, how their experience could be improved (at the City's cost), and what would encourage them to compost more diligently. At the end of the survey, the respondents were invited to leave their contact information if they were open to being interviewed for behavior-specific questions. Some of those who consented were approached with follow-up questions. In total, 48 sets of responses were collected via online survey.

Interviews with Residents

In-person surveys and interviews were conducted at greenmarkets to spur more in-depth conversation with New York City residents. Of the 240-plus food scrap drop-off sites located across the five boroughs of New York City,[8] 34 are situated within greenmarkets. Because these farmers markets that sell locally sourced produce are prone to draw more foot traffic than typical food scrap drop-off sites, which essentially consist of brown bins, they were selected as survey sites. Union Square Greenmarket in

[8] Data as of March 23, 2020 https://www.grownyc.org/compost/locations

Manhattan and Grand Army Plaza in Brooklyn were initially chosen as survey sites, with consideration given to such factors as the market size, number of vendors and amount pandeof foot traffic.

Eight individuals were interviewed at the Union Square greenmarket on March 4, 2020. Additionally, three resident volunteers were interviewed at the East River Park Compost Yard. The informal interviews were guided by pre-curated questions and talking points[9], then followed by open exchange that allowed the subjects to share their experience and opinions freely. As for the latter market survey, it was met by a setback as the City, along with the rest of the world, grappled with the coronavirus outbreak. The survey at the Grand Army Plaza was scheduled to be carried out on March 14, 2020, which was three days after the World Health Organization declared the spread of the novel coronavirus as a pandemic.[10] Federal and local authorities soon began to impose public gathering bans and restrictions on citizens' mobility. IRB also placed a ban on face-to-face interviews and interactions with subjects. As such, all research involving in-person contact had to be paused *in this unprecedented time*.

Interviews with Experts

In-depth interviews were conducted with local government representatives and staff at the city's reputable composting organizations. The objective of these one-on-one

[9] See Appendix A for sample survey questions.
[10] WHO Director-General's opening remarks at the media briefing on COVID-19 - 11 March 2020 https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19—-11-march-2020

sessions with industry experts was to gain knowledge and insight into the city's pre-existing initiatives and infrastructure. Hearing success stories that were direct results of proper education and volunteer programs were deemed valuable. The style of these interviews was formal at first, with specific predetermined questions, accompanied by follow-up questions that were less rigid. The informal, open-ended exchange allowed subjects to share their experience and opinions more freely. The interviews were conducted with individuals representing the broad spectrum of government agencies (such as GrownNYC, non-profit organizations that promote sustainability (such as Lower Eastside Ecology Center) and individual experts (See Appendix C).

Study Sample and Limitations

The data sample size consists of survey responses from 60 individuals: 48 collected from online sources and 12 by in-person interactions at the Union Square greenmarket and East River Park Compost Yard, both in Manhattan. Although 60 individuals were surveyed, some respondents did not meet the age requirement of 20 through 39. Thus, a total of 54 responses (males=24.1%, females=74.1%) were selected for analysis. Slightly less than half of respondents were White (46.3%), followed by Asian / Pacific Islander (31.5%). Their education levels were mostly high, with the majority having obtained an Associate or Bachelor's degree (51.9%) and most of the rest with a Master's degree or higher (40.7%). About two-thirds of respondents lived in Manhattan (64.8%), followed by Brooklyn (18.5%) and Queens (13%).

Limitations

The current study has a number of limitations. Firstly, the collected sample size of those deemed in-scope remains small (n=60) and generalizability cannot be assumed. As mentioned earlier, the coronavirus pandemic resulted in an unexpected termination of data collection as a survey scheduled for a later date at Grand Army Plaza in Brooklyn could not be carried out. Secondly, there is an issue of sampling bias or selection bias as prompted by self-selection of study subjects. The initial thought behind the use of social media to recruit study subjects was based on the offered ability to identify local organizations that promoted sustainability. The idea was to identify their followers who would likely be more environmentally-conscious than an average New

Yorker, and thus be more willing to participate in composting. But because the people who actively followed these types of organizations tend to be well-informed and highly educated, it resulted in a skewed sample group; over 90% had a higher education degree, with 40% even Master's or higher. Lastly, more than half of the subjects were residents of Manhattan because in-person surveys and interviews were conducted at sites within Manhattan.

While limited by sample size and sampling bias, this research nonetheless seeks to capture some of the common barriers to composting faced by its subjects: New York City's composters and non-composters alike. The survey findings are further complemented by insights garnered from a range of in-depth interviews. Such qualitative research provides a unique opportunity to evaluate existing modalities through the lens of both active and potential participants. Moreover, the findings of this research resonate with recurring concerns raised by other scholars, in the literature review, as common barriers to composting.

Table 2. Gender, Ethnicity, Education level, and Borough of residence of respondents

Gender	Male	24.1%
	Female	74.1%
	Nonbinary	1.9%
Ethnicity	White	46.3%
	Hispanic or Latino	7.4%
	Black or African American	7.4%
	Asian / Pacific Islander	31.5%
	Mixed race	3.7%
	Other	3.5%
Education Level	Some secondary education	3.7%
	High school graduate	1.9%
	Associate or Bachelor's degree	51.9%
	Master's degree or more	40.7%
	Prefer not to answer	1.9%
Borough of residence	Bronx	1.9%
	Brooklyn	18.5%
	Manhattan	64.8%
	Queens	13%
	Staten Island	1.9%

Findings & Analysis

Some general findings are listed below. Of the 54 individuals that were selected for analysis:

- 55.5% compost, 13% used to but no longer do and 31.5% never attempted to compost (Refer to Figure 4)
- Majority of survey subjects consider themselves environmentally-conscious (92.6%). People who do not compost consider themselves as environmentally-conscious as composters: 91.7% non-composters vs. 96.7% composters
- Among those who compost, 76.7% of the people go to a food scrap drop off site, and most come out to the composting site once a week (53.3%). 20% of the people have access to brown bin or organics collection bin in their residential buildings
- People compost because they want to reduce waste or for other environmental reasons such as to reduce methane gas emissions, to foster healthier soil or to be environment-conscious and practice sustainable living (Refer to Table 2).
- A small number of respondents acknowledge peer influence (e.g. roommates or friends) as the factor to have prompted their composting behavior

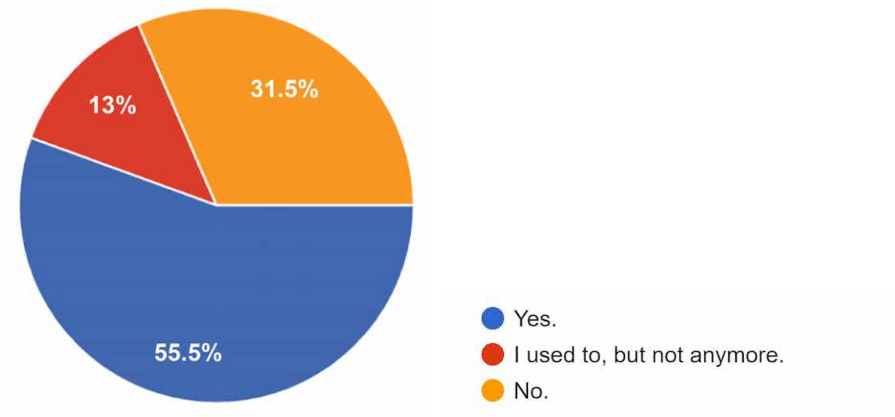


Figure 4. Participation rate in NYC composting program among respondents (n=54)

Table 3. Composting site accessibility in NYC (n=30)

Do you consider yourself to be environmentally conscious?	%
I go to a food scrap drop-off location	76.7%
There is an organics collection bin in building or street block	20.0%
I go to a neighbor's	3.3%

Table 4. Reasons for composting (n=30)

Reasons for composting		
● To reduce landfill waste ● For better waste is important ● To help city save money on waste management	Waste reduction	56.7%
● To fight climate change ● For healthier soil ● Trying to be eco-friendly ● Sustainable living	Environmental reasons	36.7%
● To interact with neighbors in a community space ● Vegan lifestyle	Other	6.7%

Barriers to composting

According to survey respondents, the following three categories were identified as the major barriers to developing a healthy composting life habit: *limited access* to drop-off sites; *lack of knowledge* about composting; and perceived *inconvenience* (see Tables 5 and 6).

Table 5. Barriers to composting (Identified by former and non-composters)

Summary of responses	Identified barriers	Former composters (n=7)	Non composters (n=17)
● No food scrap drop-off sites nearby ● Food scrap drop-off sites have limited schedule ● No access to organic bins in building or to organic pick up service	Limited Access	100%	17.6%
● Know nothing about it ● Do not know how to do it ● Never thought about doing it	Lack of Knowledge	-	47.0%
● Smells bad and would attract vermin ● Too busy/ no time for it ● Feel lazy	Inconvenience	-	23.5%
● Not required by law	Other	-	11.8%

Table 6. Barriers to composting (Identified by composters)

Summary of responses	Identified Barriers	Composters (n=30)
● Not having drop-off sites all year round ● Matching drop-off schedule ● Traveling to a drop-off site	Limited Access	46.7%
● Not having enough freezer space ● Not having enough kitchen space	Limited space	13.3%
● Keeping smell & bugs away	Smell	6.7%
● Knowing what to compost ● Being consistent	Other	13.3%
● Not difficult at all	Not difficult	20%

a. Limited Access

All of the individuals who stopped composting indicated that they discontinued the practice because they lost access to a composting site upon moving into a new neighborhood. Most of them moved to New York City from a city or country where composting was reinforced as a law or widely practiced norm (e.g. San Francisco, Korea or Canada); a few moved within the boroughs of the City (e.g. from Manhattan to Queens) where the new residence lacked access to composting sites. Here, respondents' definition of access limitations varied and can be grouped into three categories: accessibility within reachability (e.g. composting site in a walking distance); with a greater frequency (e.g. composting site open more than once a week); at convenience (e.g. composting bin within the building).

One interviewee indicated that she moved to a new neighborhood in Queens where there were no nearby composting sites. After a few attempts at carrying food scraps on a commuter train to bring to a drop-off site, she deemed it inefficient and stopped the practice altogether. This type of access limitation as the most significant challenge was echoed by almost half of the composter respondents. While most of them routinely went to food scrap drop-off sites to discard their organic refuse, some had to walk 15-20 minutes or even take a train to reach the nearest compost site; the distance and time devoted to traveling, especially as they worried over possible spillage of waste and distasteful odors circulation, seemed unaccommodating. According to City data, Manhattan has 122 drop-off sites, compared to 41 in Queens, 40 in Brooklyn, 38 in the

Bronx, and six in Staten Island (DSNY, n.d.), but these are still far less than what would be ideally required.

Composting sites are also not accessible year-round, or everyday; a great majority (88%) of the sites are open only once a week. This limited schedule makes it difficult for composters, especially so during the summer months as food perishes quickly in warm temperatures. They would have to keep their food scraps in the freezer, and if they missed the drop-off day, it would be another week, at the least, before the freezer space can be emptied. To that end, but as a remedy, some of the survey respondents noted going to two different sites during the week but acknowledged the associated inconveniences. One Brooklyn resident, on the other hand, explained that she has access to a drop-off site on Saturdays from April to November, but not for the rest of the year.

Some former composters indicated that moving to a building that did not have an organic compost facility inconvenienced them, thereby leading them to abandon the practice. As mentioned before, New York City's organics collection program currently serves 3.5 million residents (DSNY, n.d.), which is roughly 42% of the City's population. As shown in Figure 2 (page 8), the curbside organics collection service, as of March 2020, is available in select parts of Brooklyn, Queens and Staten Island (shaded in yellow), and select buildings in Manhattan and the South Bronx that have made the request (shaded in light orange). However, in multifamily residences with 10 or more units, property managers must first agree to have bins stationed in their buildings, but many remain reluctant.

Those with access to curbside organics service or a composting bin in their residential building responded that they find “nothing difficult about composting.” One, in particular, noted that prior to living in her current building that is equipped with a brown bin, she rarely composted due to various inconveniences. Now with an accommodating set-up and no distance to travel, she says, “it is super easy. We keep a bin in the freezer and empty it into the brown bin whenever it is full.” The difficulties enumerated by composters are insightful because tackling those obstacles may be the starting point in strengthening the existing systems.

b. Lack of knowledge

Survey respondents who have never composted indicated a lack of knowledge on the practice (47%) to be the main reason behind their inaction. Non-composters lacked *general knowledge* about the subject matter. The majority of them noted that they did not know what composting was about and what benefits it brought on the environment. Some were not aware of the existence of the New York City compost programs. Lack of knowledge translated into indifference, as many responded that they “have never thought about it.”

Respondents also did not know how to participate. Some responded that they “wouldn’t even know where to begin.” Not knowing “where to start” or “what can go into the bins” was the most discouraging factor for those who have never previously composted but were willing to try. Without basic knowledge of the program, their perception was that composting “seemed too difficult.”

According to survey findings, the majority of non-composters (91.7%) considered themselves to be environmentally-conscious individuals. Some showed interest upon initial introduction. One of them commented, “I don’t know much about it. I want to learn about it.” Another noted, “Not sure [why I never composted]. But after looking it up, I would consider composting food scrap. I recycle but have never composted food. Something to consider!” When asked what may encourage them to begin to compost, 24% of the non-composter respondents alluded to “more information.” This shows that there is a potential to solicit greater involvement if enough information about composting were made available. One of the interviewees encountered in the Union Square greenmarket – a teacher at a nearby grade school – happened to be visiting the composting information desk. He explained that his fourth grade students developed interest in composting upon seeing information material on their way to school and wanted to learn more about it. He said that he had never thought about composting before – because he did not know much about it – but was now prompted to educate himself on the issue so that he may further spread the knowledge to others. This is a great example of how awareness can spur interests and action.

c. Inconvenience

Although some individuals understood the benefits of composting and had adequate knowledge to practice it, they found it demotivating without particular incentives. Feeling “lazy” or being “too busy” were the most frequent responses given by those individuals. A majority responded that they would consider composting if it was

easier (e.g. proper resources and access). A group of six college students encountered at the Union Square greenmarket shared that they make a weekly trip to the drop-off site after class as their food science professor offers extra credit for composting participation. When asked if they would continue the practice even after the semester has ended, one responded that she may personally consider if the process were made easier. Her preference for perceived convenience resonates with the findings of a survey done by the National Waste and Recycling Association, which showed that 67% of non-composters would be willing to participate in composting if it were more convenient to do so in their community (Cision, 2014).

For those who moved to New York City from other cities that mandated composting, aborting the organic food recycling practice was simply because it was no longer required as law. They noted that they felt “guilty” about not doing it at first, but became used to not doing it. Some indicated that because it is not enforced, they did not feel the need to go out of their way and compost.

Discussion

As discussed in the previous section, low participation in composting programs can be stimulated if the three barriers identified through surveying New Yorkers could be addressed: *lack of access* to composting sites, *limited knowledge and interest* on composting, and *inconvenience*. The availability of facilities is a factor that applies to all current and potential composters. However, it is also important to note that depending on a target group's awareness and voluntary involvement, a customized approach would be necessary to obtain the maximum desired outcome. Those who are already active composters need only basic encouragement to keep doing the good work, whereas those who have stopped the practice – for whatever reason – need a push factor. The nudge can be in the form of a reminder, improved accessibility or, perhaps, even an incentive. Then there are those on the other end of the spectrum who have never considered making composting a part of their garbage disposal routine. For them, an emotional or rational appeal for education's-sake should be the starting point; once that sparks interest among subjects, relevant education on how to practically compost is a must follow-up. Here, too, incentive may be a useful strategy.

Through successful outreach and education, if composting becomes a norm on a semi-voluntary level for the present generation of New York City residents, the City can potentially consider implementing a mandatory practice. For the subsequent generation born to or inducted into the practice upon moving, such would be the "new norm."

Accessibility Increase

Lack of accessibility has been brought up as a primary factor that hinders residents from actively composting. As most people do not live in a building where organic brown bins are available, having to travel to a food scrap drop-off site has been perceived by many as an extra hurdle. A majority of non-composters responded that they would be more prone to recycling their food waste if the sites were more easily accessible (e.g., in their residential buildings). Thus, the most desirable solution would be to provide compost bins in every residential building of a certain size so tenants can gain better access. This proposal would work in theory, as increased accessibility would have a positive impact on one's reach and consequent likelihood of participation. However, one's attitude towards a certain matter alone is not always sufficient to compel an action (McCarty & Shrum, 1993). The City's curbside organic collection program made it evident; despite the increased access, though the program only covered certain neighborhoods in certain boroughs, the participation rate nonetheless remained low.

Keeping up with limited resources, then, the implementation of compost bins must be strategically designed to achieve a maximal outcome. For example, most mid/high-rise apartment buildings in New York City have a trash chute on every floor but recycling and organic bins in one central location, like the basement. This poses a barrier to residents as they would have to travel more than a few steps in order to reach a food waste bin. So in San Francisco, a guideline was applied to new residential buildings, requiring new apartments to provide three separate chutes or a three-way chute diverter to accommodate recycling, composting and landfill waste. Following the

suit, implementing similar measures in New York City would considerably impact one's resolve to compost (SF Environment, n.d.). As for pre-existing mid/high-rises where installing a new infrastructure could become a costly, cumbersome project – and thus not favored by landlords – posting a sign near a regular trash chute to remind residents to use an organic waste disposal in a designated location would be recommended. A research carried out in Sweden of 474 households proved the effectiveness of proper signage and information. Between the 264 homes given leaflets containing food waste recycling tips and 210 who were given nothing, not only were the former more proactive in following the proper practice; the behavior still persisted after eight months (Linder et al., 2018).

Awareness Boost

As goes the saying "ignorance is bliss," people tend to care less about something they do not have much knowledge of. The survey results show that over 70% of those who do not compost have never even attempted it. Also a handful of New York City residents mentioned that the idea of composting never even occurred to them. Thus, raising awareness must precede any education, training or provision of resources, in order to transform ignorance into informed decision.

One effective technique is framing. As discussed previously, depending on how one presents certain information, the packaging can make the idea seem more desirable and yield a purposed outcome among intended subjects. Presently, the campaign slogans by DSNY read: "*We are counting on you!*" or "*Make compost, not*

trash."[11] This type of messaging may stir environmental responsibility in people's minds; an aforementioned study acknowledged that pro-environmental behaviors framed as an expression of patriotism received better participation (Feygina et al., 2010). However, this message is likely to be impactful only among those who already have a demonstrated interest in the program. Perhaps it may pull former composters who have since abandoned the practice back into action, but the messages of camaraderie and solidarity would not strike a chord with a general population. So it would have a very low impact on winning completely new "converts."

Survey results showed that many New Yorkers had little to no familiarity with composting: what it is, how it is done, and what its impact on the environment is. Introducing the waste problem in a way that sounds an alarm, with an element of emotional appeal, could be impactful in making people stop and think; to have them consider the repercussions of their inaction, or alternatively, positive consequences of how proper food waste recycling could divert masses of landfill. Many simply do not feel guilty about throwing anything into a black plastic bag and sliding down the chute because they do not have a visual recognition of what happens to their trash once it leaves their sight. But if one were to live with a view of landfill, and rotting odor, right outside one's living room window, he/she would most likely act more consciously and responsibly.

A government agency website currently shows such facts as, "New York City residents produce 12,000 tons of waste every day." It certainly sounds like a big

[11] Refer to Appendix D for the campaign pamphlet

problem but for an average New Yorker, such great volume is unfathomable. It also does not establish an immediate connection to how much it costs the city, the New Yorkers' tax money. So instead, the statistics can be presented in a more personally tangible manner: "New York City spends X dollars in waste management for every pound of waste produced by a city resident." This type of prospect theory is rooted in the idea that people tend to act when confronted by a possibility of losing something; in this case, tax money that could otherwise be allocated to a more productive cause.

Providing a large volume of information on sustainable behaviors and their outcomes can be persuasive to rational minds. But framing – packaging of that information – is as critical as the knowledge itself. Therefore, a right mix of emotional and rational appeals, coupled with local reference that focuses on local impacts, can be employed to leverage New Yorkers' indifference and spur them into taking action.

It is reported that all of the garbage thrown out in New York City in one day could fill the entire Empire State Building. So given that up to 30% of landfill comprises of compostable elements, this information can be interpreted as: "the food waste coming from the five boroughs is enough to fill roughly 130 Statues of Liberty – in a day!" This message communicates both the magnitude and urgency and creates visual representation.

Practical Knowledge Management

There is always a first time for everything. It was evident through the surveys that those who have never composted in New York City lacked practical knowledge: how to

participate, what is allowed in the brown bins, and where the drop-off sites are located. While DSNY has already established communication channels with City residents, more active engagement and follow-up can help spread best practices even more widely. Distributing brochures that describe what is allowed in composting bins, emailers indicating composting tips and sites, or social media posts showcasing an average New Yorker's journey to composting are all an effective way of keeping City residents engaged.

Implementing curricula on composting as part of science courses in public schools can also be a welcome initiative. It would equip younger aged students with proper composting methods and, if coupled with in-classroom plant raising, allow students an opportunity to observe a healthy ecology cycle. The younger the population, the more susceptible to changes and their openness to a new way of living. Children can also introduce their own families and caregivers to composting habits.

An interviewee at the greenmarket revealed that she first learned about composting when she was in middle school which, since then, has become a 10-year-long waste management practice. An industry expert, a composting guru who visits New York City schools to promote healthy composting patterns among youths, too, recalled initial days of compost program implementation. The kids, at first, were puzzled by the practice of sorting their lunch garbage into four parts and discarding accordingly: recycling, composting, solid waste and liquid. Over time, it became a norm for them, and those very students became ambassadors of the sustainable practice in

their own homes. Instilling values at a young age is not only received with less pushback but also has a lasting impact.

Norm-setting of Behaviors

It was interesting to note that non-composters considered themselves as environment-conscious as composters. They clearly understood the benefits composting had on the environment, yet it was the perceived difficulty of the actual practice that discouraged them from participating. The personal cost outweighed in their minds the common good to be gained. And they did not think their individual action, or lack thereof, would have a dramatic impact on the overall ecology anyway. A few survey respondents who identified themselves as former composters acknowledged their initial guilt when they stopped, but they soon got used to it. This type of attitude can be explained by one of the cognitive psychology theories discussed earlier: cognitive consistency. When one's beliefs and behaviors clash, people are more prone to alter their beliefs than reset their behavior. When hurdles seem bigger than perceived benefit, people tend to make excuses for not carrying out the action. So how can non-composters be motivated to take action?

Studies have shown that utilizing social influence is one of the most effective ways to stir pro-environmental behaviors. Social influence can happen at many different levels: macro, micro and nano. First for macro-influencing, there are many celebrity figures advocating sustainable actions through public media (e.g., actors, fashion designers and celebrity chefs). Then there are those at micro-level who are true industry

experts with a niche in a particular subject area (e.g., researchers, activists, bloggers). The general population looks to the former who can serve as spokespersons for a cause or an amplifier of a voice. But it is worth noting that while programs that rely heavily or exclusively on media advertising can be effective in carrying out broad-scope awareness campaigns, they are limited in their ability to foster behavior change. The power to instill knowledge lies more often within the micro-influencers, while the capacity to translate the information into action depends on the nano-influencers; they are the everyday folks like friends, family members, community leaders and educators. This is in line with proven social psychology; initiatives to promote behavioral change are often most effective when carried out at a community-level and involve direct contact with people (McKenzie-Mohr, 2011).

This idea is more relevant when we consider the power shift taking place in our developed world. In comparing the “new vs. old power models,” Heimans and Timms (2014) call attention to the ever-strengthening bottom-up approach. Borrowing their words, if old power was about “closed, inaccessible and leader-driven” approach, the new power, on the other hand, is “made by many; it is open, participatory, often leaderless, and peer-driven. Like water or electricity, it is most forceful when it surges. The goal with new power is not to hoard it, but to channel it” (Heimans & Timms, 2014). This new power taps into people’s growing capacity – and desire – to become active participants over passive consumerism (Heimans & Timms, 2014).

Among those heavily engaged with new power – particularly those in their 30s and under, which is more than half of the world’s population – participation and

collaboration emerge as a new theme. Thus for movements to succeed, the government must run more than just ad campaigns (Heimans & Timms, 2014). Leaders must be able to mobilize true believers and effectively engage with them. This is why partnerships with civil society and non-profit organizations like GrowNYC and Lower East Side Ecology Center are crucial.

Researchers have shown that community-based social marketing is more effective than information-intensive campaigns, and thus powerful in nurturing behavioral change. The idea introduced by McKenzie-Mohr presents community-based social marketing in four progressional steps:

- Select behaviors to promote;
- Design a program to overcome barriers to the selected behavior;
- Conduct a pilot program;
- Evaluate upon broad implementation
  (McKenzie-Mohr, 2011).

Prompts and Incentivization of Encouraged Behaviors

One effective intervention employed to encourage people into carrying out desired eco-friendly action was the use of prompts. Examples of prompts might include sending text messages to remind people of eco-friendly commute options, such as cycling or jogging (White et al., 2019) or pushing out notifications to alert shoppers to purchase only what they can consume, in an effort to minimize food waste. Prompts are best received when they are easy to understand. In one study, it was shown that placing prompts near recycling bins increased recycling by 54% (White et al., 2019). One easy

intervention might be posting prompts next to trash chutes reminding people to throw out organic materials separately. This may encourage people who responded that they consider themselves to be “environment-conscious” but “too lazy” to change their course of action.

Another suggestion would be to incentivize people through tangible rewards. In Washington D.C., the District incentivized residential composting by giving residents rebates for home composting or installing vermicomposting (worm) systems. As seen earlier, loss of access to a composting site was one primary reason people stopped composting. This low-maintenance tactic would not only allow people to keep composting but also invite new participants.

Alternatively, they can be encouraged to make their commitments to eco-friendly behavior public. For instance, asking hotel guests to indicate their willingness to reuse towels by hanging a card on their bathroom door increased towel reuse by 20%; in a comparable study, asking hotel guests to wear a pin demonstrating their commitment to an energy-conservation program increased towel reuse by 40% (White et al., 2019). In New York City, prior to banning stores’ use of plastic bags starting in March, 2020, the City distributed free reusable bags to those who took the zero waste pledge. Offering exclusive merchandise to those who pledge their participation would not only serve as a reinforcement and reminder of their commitment; but if put into an effective branding practice, it will also forge a sense of community that symbolizes collective behavior. White (2019) notes, however, that incentives should be used with caution, because if they were to be removed, the desired behavior, too, might diminish (White et al., 2019).

Mandatory Composting

American cities such as San Francisco, Seattle and Portland, Oregon have adopted a mandatory recycling ordinance that requires residents to separate food waste from general trash. Seattle in 2009 mandated that all its residents subscribe to organic waste collection or participate in backyard composting. Such progressive initiatives have indisputably led to waste reduction in their respective cities. But for New York City, implementing such drastic measures would certainly be met by significant pushback given the size of the world city. The combined population of the three aforementioned cities is still smaller than the borough of Brooklyn or Queens alone (Rueb, 2017). As for New York City and its 8.4 million residents, it will take some time to get everyone trained, equipped and fully on-board should such measures be implemented. It is still feasible, however, as such cities like Seoul, Korea – which is more comparable to New York in its population size – has been able to do so. To that end, some of the insights drawn from composting practices in Seoul and San Francisco were described in the previous section. In spite of opposition faced in the initial phases of the policy implementation, the citizens of respective cities gradually adapted themselves to the new norm, effectively incorporating it into their waste disposal routine.

Conclusion

This research aimed to identify the barriers that the New York City residents faced when composting and sought to explore ways the City can intervene to strengthen its existing modalities and bolster community engagement. While the focus of the study has been on the young generation, as the subtext alludes to planning for the next generation, the identified barriers pose invariable restrictions to all age groups. It is the young people's public concerns over the environment and their belief in campaigning for issues that bring about social change that shed light on their collective potential.

The three major barriers to composting were identified as: limited access to drop-off sites, lack of knowledge about composting, and perceived inconveniences. It must be acknowledged that additional barriers exist, though not mentioned in this paper, as this study identified a small sample set as part of its limitations. The borough representation among survey subjects was also skewed to Manhattan (61.7%), largely due to lacking voices from the residents of the other four boroughs. It is possible that those residing in other boroughs may place more weight on other barriers than Manhattanites. A follow-up research could be conducted, after easing of government lockdown measures post-pandemic, to obtain borough-specific data.

Perhaps the simplest solution to multiply the number of composters would be to station compost bins in every residential building so that all New York City tenants can gain better access. With its limited resources and budget, however, the City requires a

more complex strategy. So how to operate within existing resources yet reap maximal outcome?

The key lies in employing young people as a conduit to spur a social movement that would help achieve a common good. Nudging, more specifically, has a great potential to spark behavioral changes among subjects, and this can yield to a tangibly practical action such as composting. The young generation may be especially susceptible to “nudges” as they are more easily influenced by social factors. It is important to note, however, that nudging alone should not be taken as a sole approach. In urban areas, such as New York City, systems are more complex when accounting the cultural diversity, economic variation, and co-existence of lifestyles on dense geographical scales (Colding & Barthel, 2013). Thus, the recommendations outlined in this paper motivate further research in order to ascertain the effectiveness of these “nudges.” Relevant follow-up steps can be taken in the form of pilot projects.

The “nudges” can first be applied to New York City’s young generation. If used wisely and strategically, it can spur spillover effects among other age groups. But more importantly, as this thesis focuses on “planning for the next generation,” implementing curricula on composting as part of science courses in public schools would be a welcome initiative. This would empower young people with practical tools that are readily available in their reach while also putting the City’s programs to an effective use.

Epilogue

The novel coronavirus declared as a pandemic by the Word Health Organization on March 11, 2020 quickly changed the lifestyle of many, including the composting landscape for New York City residents. The DSNY announced its decision to suspend the curbside composting pick up until June of 2021 as impacted by budget cuts associated with the coronavirus recovery response (Pozarycki, 2020). The City's hundreds of food scrap drop-off sites also have been closed temporarily in observance of social distancing mandates. As a result, at the time of this writing, the City residents are not able to compost their food scraps. The measures implemented to mitigate the public health emergency have become, previously unforeseen but, the greatest barrier to composting. As an alternative, the DSNY has come up with recommendations for residents with appropriate space to make compost sites of their own in their backyards (Pozarycki, 2020). However viable, this recommendation certainly adds another layer of inconvenience to composters, and it would be interesting to learn post-pandemic how many would have actually followed the guidelines.

It is unclear when the New York City residents would regain access to the City's composting sites. Even when they do, it is debatable whether people would feel safe or compelled to immediately return to their composting behavior, after a prolonged time of inactivity. As it was raised in the findings section, subjects who abandoned the practice of composting, due to whatever barriers, acknowledged their initial guilt fading away over time. After all, people are creatures of habit, and this prolonged lockdown and inability to compost may reverse the habits among some. Only time will tell.

Appendix A: Survey Questions

Columbia University GSAPP
Survey: Composting in NYC

Do you compost, participate in the organic waste collection program and/or drop off your food scraps?

YES

1. How long have you been composting?
    a. Less than a year
    b. 1-5 years
    c. 5-10 years
    d. 10+ years

2. How often do you come out to the food scrap drop off sites?
    a. 2-3 times a week
    b. Once a week
    c. Once a month
    d. Other:

3. How accessible is the food scrap drop off site from your home?
    a. There is an NYC organic collection bin ("brown bin") in my building or on my street block.
    b. I go to a food scrap drop-off location.
    c. Other:

4. Why do you compost?

5. What is the most difficult part about composting?

6. How can the composting experience be improved? What do you think would influence more New Yorkers to compost?

7. Do you promote composting to your peers? (yes/no, why...)

8. Do you consider yourself to be environment-conscious?

Demographics:

1. What is your age?
    a. Under 18
    b. 18-24 years old
    c. 25-29 years old
    d. 30-34 years old
    e. 35-39 years old
    f. 40-44 years old
    g. 45-49 years old
    h. 50-54 years old
    i. 55 and older
    j. Prefer not to answer

2. What is your gender?
    a. Female
    b. Male
    c. Prefer not to answer

3. What is your ethnicity?
    a. White
    b. Hispanic or Latino
    c. Black or African American
    d. Native American or American Indian
    e. Asian / Pacific Islander
    f. Prefer not to answer

4. What is the highest degree or level of school you have completed?
    a. Some secondary education, no diploma
    b. High school graduate, diploma or the equivalent
    c. Associate or Bachelor's degree
    d. Master's degree or more
    e. Prefer not to answer

5. Which borough of NYC do you reside in?
    a. Bronx
    b. Brooklyn
    c. Manhattan
    d. Queens
    e. Staten Island
    f. I live outside of NYC

Columbia University GSAPP
Survey: Composting in NYC

Do you compost, participate in the organic waste collection program and/or drop off your food scraps?

I used to compost but no longer do…

1. For how long did you compost?
    a. Less than a year
    b. 1-5 years
    c. 5-10 years
    d. 10+ years

2. How often did you compost?
    a. 2-3 times a week
    b. Once a week
    c. Once a month
    d. Other:

3. Why did you compost?

4. What was the most difficult part about composting?

5. What made you stop?

6. How could the composting experience be improved?

7. What would encourage you to start composting again?

8. Do you consider yourself to be environment-conscious?

Demographics:

6. What is your age?
    a. Under 18
    b. 18-24 years old
    c. 25-29 years old
    d. 30-34 years old
    e. 35-39 years old
    f. 40-44 years old
    g. 45-49 years old
    h. 50-54 years old
    i. 55 and older
    j. Prefer not to answer

7. What is your gender?
    a. Female
    b. Male
    c. Prefer not to answer

8. What is your ethnicity?
    a. White
    b. Hispanic or Latino
    c. Black or African American
    d. Native American or American Indian
    e. Asian / Pacific Islander
    f. Prefer not to answer

9. What is the highest degree or level of school you have completed?
    a. Some secondary education, no diploma
    b. High school graduate, diploma or the equivalent
    c. Associate or Bachelor's degree
    d. Master's degree or more
    e. Prefer not to answer

10. Which borough of NYC do you reside in?
    a. Bronx
    b. Brooklyn
    c. Manhattan
    d. Queens
    e. Staten Island
    f. I live outside of NYC

Columbia University GSAPP
Survey: Composting in NYC

Do you compost, participate in the organic waste collection program and/or drop off your food scraps?

I've never composted…

1. Why have you never composted?

2. What would encourage you to begin to compost?

3. Do you know others among your peer groups who compost? If yes, how many?

4. Do you consider yourself to be environment-conscious?

Demographics:

11. What is your age?
    a. Under 18
    b. 18-24 years old
    c. 25-29 years old
    d. 30-34 years old
    e. 35-39 years old
    f. 40-44 years old
    g. 45-49 years old
    h. 50-54 years old
    i. 55 and older
    j. Prefer not to answer

12. What is your gender?
    a. Female
    b. Male
    c. Prefer not to answer

13. What is your ethnicity?
    a. White
    b. Hispanic or Latino
    c. Black or African American
    d. Native American or American Indian
    e. Asian / Pacific Islander
    f. Prefer not to answer

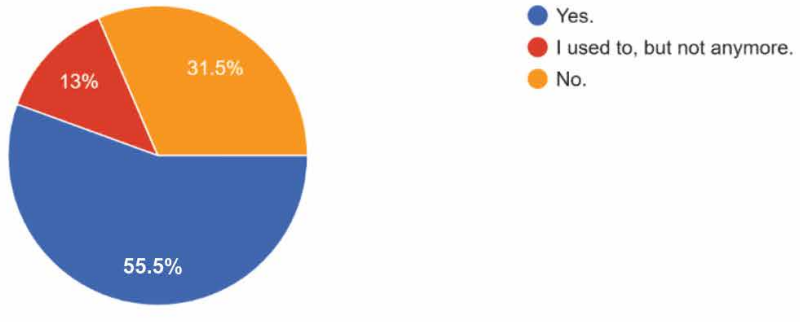
14. What is the highest degree or level of school you have completed?
    a. Some secondary education, no diploma
    b. High school graduate, diploma or the equivalent
    c. Associate or Bachelor's degree
    d. Master's degree or more
    e. Prefer not to answer

15. Which borough of NYC do you reside in?
    a. Bronx
    b. Brooklyn
    c. Manhattan
    d. Queens
    e. Staten Island
    f. I live outside of NYC

Appendix B: Survey Results

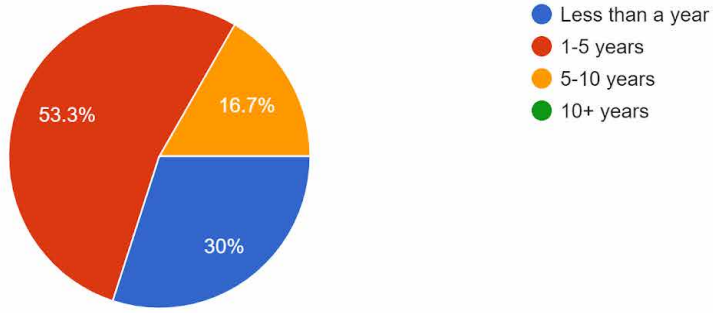
Do you compost, participate in the organic waste collection program and/or drop off your food scraps?

54 responses



How long have you been composting?

30 responses

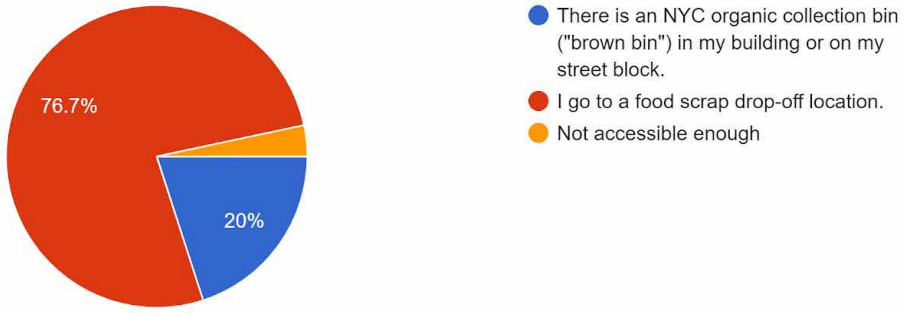


How often do you come out to the food scrap drop off sites?

30 responses

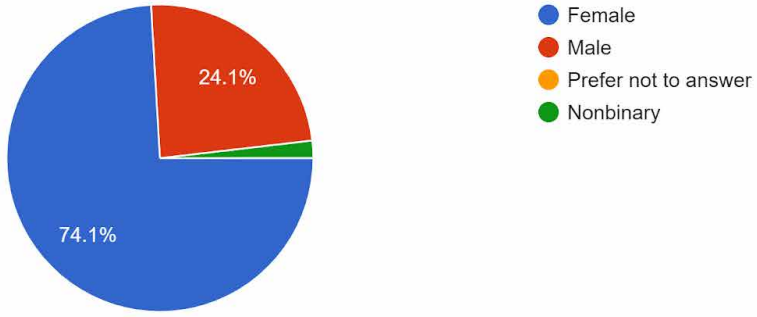
How accessible is the food scrap drop off site from your home?

30 responses



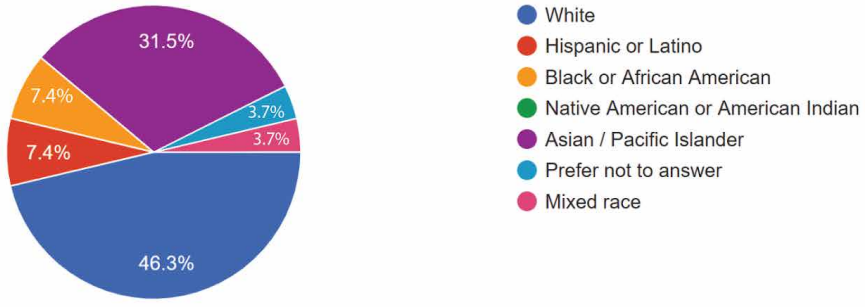
What is your gender?

54 responses



What is your ethnicity?

54 responses

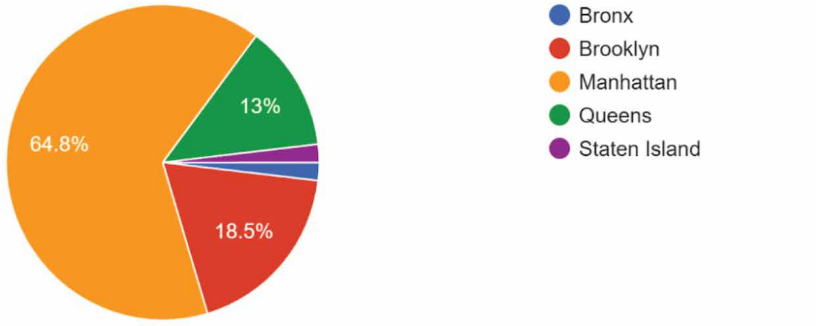


What is the highest degree or level of school you have completed?

54 responses

Which borough of NYC do you reside in?

54 responses



Appendix C: List of Interviewees (other than residents)

1	Government Agency: GrowNYC staff
2	Non-profit Environmental Group: Lower Eastside Ecology Center Staff 1
3	Non-profit environmental group: Lower Eastside Ecology Center Staff 2
4	Compost Project Employee
5	Industry expert: Environment Consultant

Appendix D: Materials from DSNY

General program flyer [source: DSNY]

Zero Waste pledge card [source: DSNY]

Bibliography

Alter, C. (2020, January 23). How Millennial Leaders Will Change America. *Time.* Retrieved on March 23, 2020 from: https://time.com/5770140/millennials-change-american-politics/

Berger, I. E., & Corbin, R. M. (1992). Perceived consumer effectiveness and faith in others as moderators of environmentally responsible behaviors. *Journal of Public Policy & Marketing*, *11*(2), 79-89.

Bialik, K. & Fry, R. (2019, February 14). *Millennial life: How young adulthood today compares with prior generations.* Pew Research Center. Retrieved on April 11, 2020 from: https://www.pewsocialtrends.org/essay/millennial-life-how-young-adulthood-today-compares-with-prior-generations/

Bell, P. A., Greene, T. C., Fisher, J. D., & Baum, A. (1996). *Environmental psychology*. Harcourt.

Bollinger, B., & Gillingham, K. (2012). Peer effects in the diffusion of solar photovoltaic panels. *Marketing Science*, *31*(6), 900-912.

Boyer, M.A. (n.d.). *San Francisco's Trash Inspectors Get Up Earlier Than You Do.* SF Environment. Retrieved on March 23, 2020 from: https://sfenvironment.org/news/san-franciscos-trash-inspectors-get-up-earlier-than-you-do

Broom, D. (2019, April 12). *South Korea once recycled 2% of its food waste. Now it recycles 95%.* World Economic Forum. https://www.weforum.org/agenda/2019/04/south-korea-recycling-food-waste/

Browning, G., Halcli, A., & Webster, F. (Eds.). (1999). *Understanding contemporary society: Theories of the present*. Sage.

Chan, R. Y., & Lau, L. B. (2000). Antecedents of green purchases: a survey in China. *Journal of consumer marketing*. DOI:10.1108/07363760010335358

Chau, V. S., & Ngai, L. W. (2010). The youth market for internet banking services: perceptions, attitude and behaviour. *Journal of Services Marketing*. DOI:10.1108/08876041011017880

Chaubey, D. S., Patra, S., Joshi, S. (2011). Attitude towards the environment and green products: an empirical study. *International Journal of Research in Computer Application and Management*, 1 (8), 34-42.

Chen, T. B., & Chai, L. T. (2010). Attitude towards the environment and green products: Consumers' perspective. *Management science and engineering*, *4*(2), 27-39. DOI: http://dx.doi.org/10.3968/j.mse.1913035X20100402.002

Cialdini, R. B., Reno, R. R., & Kallgren, C. A. (1990). A focus theory of normative conduct: Recycling the concept of norms to reduce littering in public places. *Journal of Personality and Social Psychology, 58,* 1015–1026. DOI: /10.1037/0022-3514.58.6.1015

Cialdini, R. B. (1993). Influence: The psychology of persuasion.

Colding, J., & Barthel, S. (2013). The potential of 'Urban Green Commons' in the resilience building of cities. *Ecological economics*, *86*, 156-166. https://doi.org/10.1016/j.ecolecon.2012.10.016

Common Grounds Compost. (n.d.). *Where to bring organics.* Common Grounds Compost. http://commongroundcompost.com/residents/dropping-off-compost/

Cortright, J. (2017). Here's What's Wrong With that Peak Millennial Story. City Lab. Retrieved from: https://www.citylab.com/equity/2017/01/flood-tide-not-ebb-tide-for-young-adults-in-cities/514283/

Dawnay, E., & Shah, H. (2005). Behavioural Economics: Seven Principles for Policy-makers. New Economics Foundation, London, UK.

Demarque, C., Charalambides, L., Hilton, D. J., & Waroquier, L. (2015). Nudging sustainable consumption: The use of descriptive norms to promote a minority behavior in a realistic online shopping environment. *Journal of Environmental Psychology, 43,* 166-174. https://doi.org/10.1016/j.jenvp.2015.06.008

Dimock, M. (2019, March 1). *Defining generations: Where Millennials end and Generation Z begins.* Pew Research Center. https://www.pewresearch.org/fact-tank/2019/01/17/where-millennials-end-and-generation-z-begins/

Eden, S. E. (1993). Individual environmental responsibility and its role in public Environmentalism. *Environment and Planning A, 25(12),* 1743-1758.

Farris, R., Chong, F., & Danning, D. (2002). Generation Y: Purchasing power and implications for marketing. *Academy of Marketing Studies Journal, 6(1-2),* 89.

Feygina, I., Jost, J. T., & Goldsmith, R. E. (2010). System justification, the denial of global warming, and the possibility of "system-sanctioned change". *Personality and social psychology bulletin*, *36*(3), 326-338. DOI: 10.1177/0146167209351435

Frontier Group & U.S. PIRG Education Fund. (2019). *Composting in America: A path to eliminate waste, revitalize soil and tackle global warming.* Retrieved from: https://uspirg.org/reports/usp/composting-america

Egebark, J., & Ekström, M. (2016). Can indifference make the world greener?. *Journal of Environmental Economics and Management*, *76*, 1-13. https://doi.org/10.1016/j.jeem.2015.11.004

Galka, M. (2016, October 27). What does New York do with all its trash? One city's waste – in numbers. *The Guardian.* Retrieved from: https://www.theguardian.com/cities/2016/oct/27/new-york-rubbish-all-that-trash-city-waste-in-numbers

Generations gap [Def. 1]. (n.d.). Merriam-Webster Online. In Merriam-Webster. Retrieved March 16, 2020, https://www.merriam-webster.com/dictionary/generation%20gap

Goldstein, N. J., Cialdini, R. B., & Griskevicius, V. (2008). A room with a viewpoint: Using social norms to motivate environmental conservation in hotels. *Journal of consumer Research*, *35*(3), 472-482. https://doi.org/10.1086/586910

Goldstein, N. (2014, February). *Greenmarkets Facilitate Food Scraps Diversion In NYC.* BioCycle. Retrieved on March 06, 2020 from: https://www.biocycle.net/2014/02/21/greenmarkets-facilitate-food-scraps-diversion-in-nyc/

GrowNYC (n.d.). *Compost Food Scraps*. Retrieved March 12, 2020 from: https://www.grownyc.org/compost

Grunert, S. C., & Juhl, H. J. (1995). Values, environmental attitudes, and buying of organic foods. *Journal of economic psychology, 16(1),* 39-62. https://doi.org/10.1016/0167-4870(94)00034-8

Hamid, P. N., & Cheng, S. T. (1995). Predicting antipollution behavior: The role of molar behavioral intentions, past behavior, and locus of control. *Environment and Behavior*, *27*(5), 679-698. https://doi.org/10.1177/0013916595275004

Heaney, J. G. (2007). Generations X and Y's internet banking usage in Australia. *Journal of Financial Services Marketing*, *11*(3), 196-210. DOI:10.1057/palgrave.fsm.4760052

Heimans, J. & Timms, H. (2014, December). Understanding “New Power”. Harvard Business Review. Retrieved from: https://hbr.org/2014/12/understanding-new-power

Hersch, J., & Viscusi, W. K. (2006). The generational divide in support for environmental policies: European evidence. *Climatic Change, 77*(1-2), 121-136. DOI: 10.1007/s10584-006-9074-x

Hopper, J. R., & Nielsen, J. M. (1991). Recycling as altruistic behavior: Normative and behavioral strategies to expand participation in a community recycling program. *Environment and behavior*, *23*(2), 195-220.

Hughner, R. S., McDonagh, P., Prothero, A., Shultz, C. J., & Stanton, J. (2007). Who are organic food consumers? A compilation and review of why people purchase organic food. *Journal of Consumer Behaviour: An International Research Review*, *6*(2-3), 94-110. DOI: 10.1002/cb.210

Hume, M. (2010). Compassion without action: Examining the young consumers consumption and attitude to sustainable consumption. *Journal of world business*, *45*(4), 385-394. https://doi.org/10.1016/j.jwb.2009.08.007

Inglehart, R. (1997). *Modernization and postmodernization: Cultural, economic, and political change in 43 societies*. Princeton university press.

Jackson, T. (2005). Motivating sustainable consumption. *Sustainable Development Research Network, 29*(1), 30-40.

Kahneman, D. (2011). *Thinking, fast and slow.* Macmillan.

Kallbekken, S., & Sælen, H. (2013). 'Nudging' hotel guests to reduce food waste as a win–win environmental measure. *Economics Letters*, *119*(3), 325-327. https://doi.org/10.1016/j.econlet.2013.03.019

Kanchanapibul, M., Lacka, E., Wang, X., & Chan, H. K. (2014). An empirical investigation of green purchase behaviour among the young generation. *Journal of Cleaner Production, 66,* 528-536. https://doi.org/10.1016/j.jclepro.2013.10.062

Parrillo, V. N. (Ed.). (2008). *Encyclopedia of social problems*. Sage publications.

Kim, Y., & Choi, S. M. (2005). Antecedents of green purchase behavior: An examination of collectivism, environmental concern, and PCE. ACR North American Advances.

Kormos, C., Gifford, R., & Brown, E. (2015). The influence of descriptive social norm information on sustainable transportation behavior: A field experiment. *Environment and Behavior, 47*(5), 479-501. DOI: 10.1177/0013916513520416

Kosters, M., & Van der Heijden, J. (2015). From mechanism to virtue: Evaluating Nudge theory. *Evaluation, 21*(3), 276-291. DOI: 10.1177/1356389015590218

Lee, K. (2008). Opportunities for green marketing: young consumers. *Marketing intelligence & planning*. DOI:10.1108/02634500810902839

Liere, K. D. V., & Dunlap, R. E. (1980). The social bases of environmental concern: A review of hypotheses, explanations and empirical evidence. *Public opinion quarterly*, *44*(2), 181-197.

Linder, N., Lindahl, T., & Borgström, S. (2018). Using behavioural insights to promote food waste recycling in urban households—Evidence from a longitudinal field experiment. *Frontiers in psychology, 9,* 352. https://doi.org/10.3389/fpsyg.2018.00352

Low, K. C. P., Idowu, S. O., & Ang, S. L. (2013). Corporate social responsibility in Asia. London: Springer.

Marston, C. (2010). *Motivating the" What's in it for me?" workforce: Manage across the generational divide and increase profits.* John Wiley & Sons.

Matsumori, K., Iijima, K., Koike, Y., & Matsumoto, K. (2019). A Decision-Theoretic Model of Behavior Change. *Frontiers in psychology, 10,* 1042. DOI 10.3389/fpsyg.2019.01042

McCarty, J. A. , & Shrum, L. J. (1993). A structural equation analysis of the relationships of personal values, attitudes and beliefs about recycling, and the recycling of solid waste products. A*dvances in Consumer Research, 20,* 641-646.

McKenzie-Mohr, D. (2000). New ways to promote proenvironmental behavior: Promoting sustainable behavior: An introduction to community-based social marketing. *Journal of social issues*, *56*(3), 543-554. DOI: 10.1111/0022-4537.00183

McKenzie-Mohr, D. (2011). *Fostering sustainable behavior: An introduction to community-based social marketing*. New society publishers.

Mitchell, S. (1998). American generations. *American generations series*.

Moisander, J. (2007). Motivational complexity of green consumerism. *International Journal of Consumer Studies, 31*(4), 404-409. DOI: 10.1111/j.1470-6431.2007.00586.x

Moseley, A., & Stoker, G. (2013). Nudging citizens? Prospects and pitfalls confronting a new heuristic. *Resources, Conservation and Recycling, 79*, 4-10. https://doi.org/10.1016/j.resconrec.2013.04.008

Moos, M., Pfeiffer, D., & Vinodrai, T. (Eds.). (2017). The millennial city: Trends, implications, and prospects for urban planning and policy. Routledge

New York City Department of Sanitation (2017). NYC Residential, School and NYCHA Waste Characterization Study. Retrieved from: https://dsny.cityofnewyork.us/wp-content/uploads/2018/04/2017-Waste-Characterization-Study.pdf

New York City Department of Sanitation (n.d.a). Community Composting. Retrieved March 6, 2020 from: https://www1.nyc.gov/assets/dsny/site/our-work/reduce-reuse-recycle/community-composting

New York City Department of Sanitation (n.d.b). Residential Curbside Composting Overview. Retrieved March 6, 2020 from: https://www1.nyc.gov/assets/dsny/site/services/food-scraps-and-yard-waste-page/overview-residents-organics

New York City Mayor's Office of Sustainability (n.d.). Zero Waste Challenge. Retrieved on April 6 from: https://www1.nyc.gov/site/sustainability/initiatives/zero-waste-challenge.page

Nielsen. (2015, October 12). Consumer goods' brands that demonstrate commitment to sustainability outperform those that don't'. Nielsen Global Study. Retrieved from: https://www.nielsen.com/us/en/press-releases/2015/consumer-goods-brands-that-demonstrate-commitment-to-sustainability-outperform/

O'Donnell, J. (2006). Gen Y sits on top of consumer food chain; they're savvy shoppers with money and influence. *USA Today*, *11*(2), 322-358. Retrieved on March 6 from: https://usatoday30.usatoday.com/money/advertising/2006-10-11-retail-teens-usat_x.htm

Paco, A., & Gouveia Rodrigues, R. (2016). Environmental activism and consumers' perceived responsibility. *International Journal of Consumer Studies, 40*(4), 466-474. DOI: 10.1111/ijcs.12272

Parkinson, J. A., Eccles, K. E., & Goodman, A. (2014). Positive impact by design: The Wales Centre for Behaviour change. *The Journal of Positive Psychology, 9*(6), 517-522. DOI: 10.1080/17439760.2014.936965

Parrillo, V. N. (Ed.). (2008). Encyclopedia of social problems. Sage publications.

Pew Research Center (2018, March 1). *The Generation Gap in American Politics.* Pew Research Center. Retrieved on March 6, 2020 from: https://www.people-press.org/2018/03/01/4-race-immigration-same-sex-marriage-abortion-global-warming-gun-policy-marijuana-legalization/

Pew Research Center (2019, June 12). *Social Media Fact Sheet.* Pew Research Center. Retrieved on March 6, 2020 from: https://www.pewresearch.org/internet/fact-sheet/social-media/#who-uses-social-media

Pozarycki, R. (2020, April). *COVID-19 budget cuts force suspensions of NYC compost, e-waste collection programs*. amNY. Retrieved on April 30, 2020 from: https://www.amny.com/coronavirus/covid-19-budget-cuts-force-suspensions-of-nyc-compost-e-waste-collection-programs/

Redling, A (2019, November 26). *Inside NYC's organics collection program.* Waste Today. https://www.wastetodaymagazine.com/article/new-york-city-organics-collection-waste-program/

Rokka, J., & Uusitalo, L. (2008). Preference for green packaging in consumer product choices–do consumers care?. *International Journal of Consumer Studies*, *32*(5), 516-525. DOI: 10.1111/j.1470-6431.2008.00710.x

Rueb, E. S. (2017, June 2). How New York Is Turning Food Waste Into Compost and Gas. The

New York Times. Retrieved from: https://www.nytimes.com/2017/06/02/nyregion/compost-organic-recycling-new-york-city.html

Sengupta, S. (2019, September 21). *Protesting Climate Change, Young People Take to Streets in a Global Strike.* The New York Times. https://www.nytimes.com/2019/09/20/climate/global-climate-strike.html

Seo, S. N. (2017). The behavioral economics of climate change: adaptation behaviors, global public goods, breakthrough technologies, and policy-making. *Academic Press.*

Seoul Metropolitan Government. (2019). Total Population. Retrieved on April 15, 2020 from: http://english.seoul.go.kr/get-to-know-us/seoul-views/meaning-of-seoul/4-population/

Seoul Policy Archive. (2015, June 22). Minimize food waste: Zero Food Waste, Seoul 2018. https://seoulsolution.kr/ko/content/3438

The Seoul Research Data Service (n.d.). Area and Population. Retrieved on April 15, 2020 from: http://data.si.re.kr/2015br10-area-and-population-size

SF Environment. (n.d.). Zero Waste - Frequently Asked Questions (FAQs). SF Environment. Retrieved March 23, 2020 from: https://sfenvironment.org/zero-waste-faqs#barriers

Smith, B. (2010). Behavioral economics and social marketing: new allies in the war on absent behavior. *Social Marketing Quarterly*, *16*(2), 137-141. https://doi.org/10.1080/15245001003796241

Smola, K. W., & Sutton, C. D. (2002). Generational differences: Revisiting generational work values for the new millennium. *Journal of Organizational Behavior: The International Journal of Industrial, Occupational and Organizational Psychology and Behavior, 23*(4), 363-382.

Straughan, R. D., & Roberts, J. A. (1999). Environmental segmentation alternatives: a look at green consumer behavior in the new millennium. *Journal of consumer marketing.* DOI:10.1108/07363769910297506

Stern, P. C., Dietz, T., & Black, J. S. (1985). Support for environmental protection: The role of moral norms. *Population and Environment, 8*(3-4), 204-222.

Sun, M., & Trudel, R. (2017). The effect of recycling versus trashing on consumption: Theory and experimental evidence. *Journal of Marketing Research, 5*4(2), 293-305. DOI: 10.1509/jmr.15.0574

Taylor, S., & Todd, P. (1995). An integrated model of waste management behavior: A test of household recycling and composting intentions. *Environment and behavior, 27*(5), 603-630. DOI: 10.1177/0013916595275001

Taylor, S., & Todd, P. (1997). Understanding the determinants of consumer composting behavior *Journal of Applied Social Psychology, 27*(7), 602-628. DOI: 10.1111/j.1559-1816.1997.tb00651.x

Thaler, R. (1980). Toward a positive theory of consumer choice. *Journal of economic behavior & organization, 1*(1), 39-60. https://doi.org/10.1016/0167-2681(80)90051-7

Thaler, R. H., & Sunstein, C. R. (2009). *Nudge: Improving decisions about health, wealth, and happiness*. Penguin.

Tsen, C. H., Phang, G., Hasan, H., & Buncha, M. R. (2006). Going green: A study of consumers' willingness to pay for green products in Kota Kinabalu. *International Journal of Business and Society*, *7*(2), 40-54.

Turaga, R. M. R., Howarth, R. B., & Borsuk, M. E. (2010). Pro-environmental behavior: Rational choice meets moral motivation. *Annals of the New York Academy of Sciences, 1185(*1), 211-224. DOI: 10.1111/j.1749-6632.2009.05163.x

U.S. Census Bureau (2019a). QuickFacts New York City, New York. Retrieved on April 15, 2020 from: https://www.census.gov/quickfacts/fact/table/newyorkcitynewyork,bronxcountybronxboroughnewyork,kingscountybrooklynboroughnewyork,newyorkcountymanhattanboroughnewyork,queenscountyqueensboroughnewyork,richmondcountystatenislandboroughnewyork#

U.S. Census Bureau (2019b). QuickFacts San Francisco County, California. Retrieved on April 15, 2020 from: https://www.census.gov/quickfacts/fact/table/sanfranciscocountycalifornia,CA,US/PST045219#PST045219

Vining, J. & Ebreo, A. (1990). What makes a recycler? A comparison of recyclers and nonrecyclers. *Environment and Behavior, 22*(1), 55-73.

White, K., Hardisty, D. J., & Habib, R. (2019, July). *The Elusive Green Consumer.* Harvard Business Review. https://hbr.org/2019/07/the-elusive-green-consumer

Wilson, D. K., Kaplan, R. M., & Schneiderman, L. J. (1987). Framing of decisions and selections of alternatives in health care. *Social Behaviour, 2*(1), 51-59. https://www.nytimes.com/2020/03/12/nyregion/nyc-compost-recycling.html?auth=login-email&login=email