

The University of San Francisco

USF Scholarship: a digital repository @ Gleeson Library | Geschke Center

Master's Theses

Theses, Dissertations, Capstones and Projects

Spring 5-21-2021

Important Factors for Changing Plastic Consumption among Highly Educated People in China

Shen Shen
shenshen2321@gmail.com

Follow this and additional works at: <https://repository.usfca.edu/thes>



Part of the [Asian Studies Commons](#), and the [Environmental Studies Commons](#)

Recommended Citation

Shen, Shen, "Important Factors for Changing Plastic Consumption among Highly Educated People in China" (2021). *Master's Theses*. 1383.
<https://repository.usfca.edu/thes/1383>

This Thesis is brought to you for free and open access by the Theses, Dissertations, Capstones and Projects at USF Scholarship: a digital repository @ Gleeson Library | Geschke Center. It has been accepted for inclusion in Master's Theses by an authorized administrator of USF Scholarship: a digital repository @ Gleeson Library | Geschke Center. For more information, please contact repository@usfca.edu.

**Important Factors for Changing
Plastic Consumption among Highly Educated People in China**

by
Shen Shen
May 2021

Presented to the
Department of International Studies
University of San Francisco

In Partial Fulfillment
of the Requirements for the Degree of
Master of Arts

Approved by: Dr. Stephen Zvestoski

Abstract

As the global plastic pollution situation is getting much more serious, how to change the trend of plastic pollution to save humankind itself has become an urgent issue. In China, the country with the world's fastest-growing economy and the largest population, solving the problem of plastic pollution presents a serious challenge. This thesis draws on a survey of highly educated people in China to investigate how these people's understanding and awareness of plastic pollution, willingness to change their behavior and perceptions of who is responsible for addressing the problem might inform strategies for reducing plastic pollution in China. The analysis pointed out there are some significant results in the categories of gender, hometowns and “whether they have children or not”. The thesis concludes with suggestions for approaches to policy and decision-making aimed at targeting the problem.

Acknowledgments

I would like to express my deep and sincere gratitude to Professor Stephen Zavestoski, for his invaluable supervision, support, inspiration and guidance through each stage of my thesis work. My gratitude extends to Professor Kevin D. Lo for providing me valuable suggestions for my thesis work.

I am also extremely grateful to Professor Brian Dowd-Urbe for inspiring my interest in the development of plastic pollution and sincere help as my academic advisor in the MAIS program. Additionally, I would like to express gratitude to Professor John Zarobell, Professor Nora Fisher Onar, Professor Quỳnh N. Phạm for their support, encouragement and mentorship during my master's degree. I am also extending my thanks to MAIS program faculties-Aide Rodriguez, Ariella Campisi, former program manager-Christie Meno for their friendly support and sincere help.

I would like to say thanks to my classmates and friends-Martina Carette, Megan Wenger, Ghada Alsarhan, for a cherished friendship and companion in class and social settings. I am also extending my thanks to my other classmates-Ana Karen Barragan, Jocelyn Vera, Stuart Blackwell, Brian Andersen for their support and help in class and social settings.

My appreciation also goes to my friends-Harold, Penny, Cici for their encouragement, companion and support all through my life here, and my friends in China-Shuang Cao, Zheng Guo, Fei Zhi, Lu Liu, Wei Xia, Wei Tong, Weixing Li, Shijing Jiang, etc. for their support and help, especially help me share the questionnaire to collect my research data.

I express my special thanks to my parents for their unwavering support and belief in me. Without their tremendous understanding and encouragement in the past two years, it would be impossible for me to complete my study abroad during the COVID pandemic.

Last, I would like to thank myself for the courage, passion and insistence.

Plastic Consumption	1
---------------------	---

Table of Contents

Table of Contents	1
Chapter 1: Introduction	3
Statement of Problems	3
Purpose	7
Framework	8
Chapter 2: Literature Review	10
The Problems	10
1. Treadmill of Production (TOP)	10
2. Green Criminology (overconsumption)	11
3. Relationship between Overproduction and Overconsumption	13
4. Globalization	13
The Solutions	16
1. Sustainable Consumption	16
2. Voluntary Simplicity (anti-consumption)	18
3. Cognitive Psychology	21
4. Degrowth	24
Summary	26
Chapter 3: Methodology	27
Introduction	27
Setting	28
Participants	28
Measurement Instruments	29
Validity and Reliability	30
Procedure	30
Data Analysis	32
Limitation	33
Chapter 4: Results and Findings	34
Introduction	34
Descriptive statistics	34
Inferential statistics	35
Gender	35
Hometown	39
Whether have children	42

Plastic Consumption	2
Summary of all significant results	46
Chapter 5: Discussion and Conclusion	48
Introduction	48
Discussion	48
Gender	48
Hometown	49
Whether have children	50
Limitations	52
Recommendations	54
Conclusion	55
References	59
Appendix A: English Version of Survey about Plastic Pollution	69
Survey about Plastic Pollution	69

Chapter 1: Introduction

Plastic pollution is becoming a serious worldwide problem in the whole world. China has the most population (1.3 billion) in the world with rapid development in recent decades, which means it has needed more plastic materials and the customers have consumed a significant amount of plastic products. Plastic pollution is an emergent environmental problem in China now. This research might raise people's awareness about the harm and emergency of plastic pollution to change to more sustainable consumption. Also, this research might provide effective and useful information to help the government make policies in the future.

Statement of Problems

International. After the Industrial Revolution, with the high-speed development of sciences and technologies, people had produced more and more different products in all areas to help people live more conveniently. The energy consumption also had begun and increased with unprecedented speed and amount, which caused serious environmental problems till nowadays. Around World War II, plastic had been invented and used in different aspects of people's lives. In the beginning, plastic had been mainly used for military weapons because this material is light, durable and modifiable. After World War II, plastic has been used generally in common life that can make all kinds of articles for daily use, especially for packages, such as plastic bottles, plastic bags, etc. And the usage of plastic has been continuing to update and be applied to more aspects. Plastic products have penetrated all aspects of our daily life and especially become a valuable part of the business because of their advantages and convenience(Choi, 2020). According to the statistics (Geyer et al., 2017), until now, we have already created more than 8.3 billion metric tons of it around the world. "If we were able to take all of that plastic and turn it into a single grocery bag, it could hold the entire planet. If the situation continues, as usual, 30 years from now, projections say we will have produced enough plastic waste to double-bag the Earth"(Choi, 2020).

The result of the enormous plastic products is that plastic pollution has been becoming more and more serious and beyond the regional problem, but a global issue. There is no pure place on our planet without plastic waste. People can find plastic from the Arctic Ocean to the deepest oceanic trench-Mariana Trench, even on Mount Everest. The most severe problem is that more than 76% of all plastic has ended up as waste, and nearly 50% of the plastic waste we now produce each year is just single-use only for a few minutes (Geyer et al., 2017). People have already indulged in the convenience of plastic materials and have been harder and harder to get rid of plastic.

Plastic products have been flowing into the ocean continually these years. A large number of researches and reports show how horrible the situation is now. “Every year, an estimated eight million metric tons of land-based plastic enters the world’s oceans. But when marine researchers have measured how much of this plastic is floating on the water’s surface, swirling in offshore gyres—most notably, the so-called Great Pacific Garbage Patch, between Hawaii and California—they have only found quantities on the order of hundreds of thousands of tons, or roughly one percent of all the plastic that has ever gone into the ocean”(Kormann, 2019). And people have already seen the bad consequences now on the beaches and some remote islands that are overwhelmed by plastic pollution. According to Geyer, Jambeck, and Law(2017), “If current production and waste management trends continue, roughly 12,000 Mt of plastic waste will be in landfills or the natural environment by 2050”(p.1). Plastic waste in our environment has some certain health risks for human beings too, especially the microparticles and nanoparticles of plastic that have already been discovered in seafood and the process of food and beverages(Wright, & Kelly, 2017,6634). People cannot ignore such risks because these plastic wastes contain toxic materials. Some research shows that due to polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/F) and polychlorinated biphenyls (PCBs) exposure, marine species and human intake through fish and seafood will increase health risks(Domingo & Bocio, 2007,397). And even in 1993, research showed that the harmful chemicals in plastic products and waste would have bad effects on the endocrine, reproductive and immune systems of wildlife, laboratory animals, and

humans(Colborn, Vom Saal, Soto, 1993, 378). The harmful chemicals will be emitted during the degradation processes. However, “the chemicals generated by degradation of the plastic polymers themselves have not been studied from an environmental perspective”(Gewert, Plassmann, Macleod, 2015,1513).“The flow of plastic into the ocean is projected to nearly triple by 2040, to 29 million metric tons per year, equivalent to 50 kg of plastic per meter of coastline worldwide. (Breaking the plastic wave,2020)

The issue of National Geographic magazine on May 16, 2018, was titled Planet or Plastic on the cover. The whole issue tells us the real situation about plastic. “ 9.2 billion tons of plastic have been produced since 1950...Nearly half of all plastic ever manufactured has been made since 2000...Some nine million tons of plastic waste flows into the ocean every year from coastal regions. That’s the equivalent of five grocery bags of plastic trash sitting on every foot of coastline around the world” (Planet or Plastic? 2018). All these statistics sound horrible and plastic becomes a nightmare for nature and human beings. According to other statistics on the news, 480 billion plastic bottles were being produced in 2016 and only less than half of these bottles were recycled and only 7% were reused to make new bottles(Chinese website). Therefore, how many plastic bottles went into our environment, and where this plastic waste could be stored. Such kind of unimaginable statistics can be seen from anywhere and the situation will be more serious until the use of plastic could be stopped.

Asia. Plastic pollution is much worse in Asia because of a lot of factors. First, Asia has developed countries, like Japan and Singapore, South Korea. However, most of the Asian countries are developing countries and have the most population in the world, like China and India. These countries need development and they become the world factory which also means a lot of pollution. Second, with the development of these countries, especially the big emerging economies, their consumption of all kinds of products are more and more, including plastic products in their daily life. People have more and more options for their daily life. Plastic products are cheap, clean, and convenient. Third, the Global North has been keeping shipping their recycled trash and other plastic trash to Asian countries. This trend was stopped after China banned the

import of waste in 2018. After that, the Philippines and other Asian countries followed and refused to receive trash from western countries, like the U.S., UK, and Australia. But there are still some other Asian countries to keep receiving the trash, and they received more after the ban on China. All these together make Asia seem to have the most plastic pollution globally. Also, some researchers found that the common salt contains the most microplastic in Asia (Xiaoxiao, 2018). All in all, this evidence proves that solving Asian plastic pollution is pivotal for the whole world.

China. The challenges for Asian nations are perhaps most apparent in China. China has gone through almost 30 years of high-speed development. People's living standards have been improved significantly. Now some metropolises as Beijing and Shanghai have the same living level as the western countries, like the counterparts of New York and London. At the same time, urbanization has spread to the whole country at high speed. More and more people have immigrated into the cities, which means the total consumption would be much higher. The commodities in the market are more diverse and much easier to get by the spread of the internet. Chinese people have been used to buying their daily stuff on the internet. According to Yan (2010, 2020), after the Reform, individualization became a social trend concerning policies of privatization and the development of a market economy. "Under this social trend, Chinese consumers place their desire and aspirations at the center of their social lives." In recent years, Chinese consumers have tended to purchase more discretionary, luxury items, global brands, and trendy or fashionable products to forge their social identities and desired lifestyles (Yu, 2014). "However, as a consequence of this rapid economic development over the last three decades, environmental problems such as air pollution, water pollution, and deforestation have become key threats to China's further economic development and the promotion of living standards. China's resource consumption has likewise increased dramatically over the last decades, driven mainly by China's rapid industrial growth (Schroeder, 2014). In this context, the construction of a development model that promotes economic growth compatible with environmental protection has become the focus of national strategies and policies (Liu, 2010; Guo, Marinova, & Hong, 2013). Thus,

encouraging a sustainable consumption pattern that boosts China's domestic economic growth while reducing its impacts on the environment has become an urgent task for Chinese policy-makers" (Liu, C. et al., 2019). Especially we need to change people's consumption behaviors related to plastic products since plastic pollution is the priority of environmental issues. There is only general research about sustainable consumption and environmental pollution now. Therefore, what we need to do is to change people's attitudes about plastic pollution and raise their awareness to consume fewer plastic products in their daily life. It is imperative. From another aspect, because of the large population in China, every person's small change will have a considerable effect on the whole ecosystem and the governments and companies will change their policies to more environment-friendly according to the needs of consumers, such as recycling and alternative degradable packing materials.

Purpose

In light of the seriousness of the problem, the purpose of this study was to examine among highly educated people in China levels of awareness about current plastic pollution and other factors that might predict their willingness to change their daily consumption behaviors. Plastic waste is ubiquitous now and plastic pollution has been a serious ecological crisis not only for the ocean but for the whole world. Plastic material has been overused due to the petroleum industry and people have gotten used to these cheap, convenient, and disposable products, especially the tremendous amount of single-use plastics. According to the newest statistics, until 2015, we have already produced 8.3 billion metric tons of virgin plastics, and the vast majority of 79 percent about 6.3 billion metric tons became plastic waste that was accumulating in landfills or in the natural environment, especially the oceans-the final sink that became the famous Great Pacific Garbage Patch. Now, every day around 8 million pieces of plastic made their way into our oceans. Except the governments and multinational corporations should take their responsibility to deal with the plastic problem, every single person also should

take their own responsibility to reduce the use of plastic in their daily life. (Lau, Bailey, Cook, Stuchtey, Koskella, ... & Thompson, 2020).

Framework

In Chapter 2, I discuss the theories and other literature relevant to framing the problem of plastic pollution. The Treadmill of Production theory alone is employed to explain why global plastic pollution has become such a problem and why it is likely to continue to be a problem in China. The process of globalization is discussed as an additional factor shaping these trends in plastic use and the problem of plastic pollution. The second half of the literature review introduces some frameworks and theories for understanding possible solutions to the problem of plastic pollution. Sustainable Consumption is a framework that explains how the quantity and types of consumption might be shifted in more sustainable directions. Voluntary Simplicity is a particular type of sustainable consumption that is discussed. Cognitive psychology and degrowth are also examined as instances of individual bottom-up and top-down structural approaches to intervene in the treadmill of production's inevitable ecological destruction.

Chapter 3 describes the methods employed. In this chapter, I elaborate on my research procedure, including how to design the survey, how to recruit the respondents, how to implement my research, how to analyze the data, etc. All in all, this chapter provides every detail about the methods that this research used. Chapter 4 reports the results and findings. In Chapter 4, I report the most important demographic data, including gender, hometown, and whether or not to have children. I also report the inferential results by using Chi-square, T-test or ANOVA. In the end, I report all the significant results from all the effective questionnaires. Chapter 5 discusses the findings and offers conclusions. In Chapter 5, I provide possible explanations about the analysis results in Chapter 4, and I also offer some potential suggestions for these problems. Furthermore, I discuss the significance and limitations of my research. In the end, I introduce the recent governmental policies about banning some kinds of use of plastic

products in China and I express my own opinion about the meaning of protecting the environment.

Chapter 2: Literature Review

According to the research problem in this paper that tries to figure out the key factors influencing people's awareness about plastic pollution and how to change their consumption behaviors, there are two sections to analyze and address the research problem. The first section addresses research related to plastic pollution's probable reasons, including the treadmill of production and globalization. The second section focuses on research studies about the possible solutions to plastic pollution, including sustainable consumption, voluntary simplicity, the penalty for green criminology, cognitive psychology, and the economy's degrowth. The problems can help people to understand how plastic pollution happens and develop. The solutions can help people understand what we can do to mitigate even eliminate further plastic pollution crucial for humankind.

The Problems

1. Treadmill of Production (TOP)

The treadmill of production theory focuses on the production more than consumption that was introduced by Schnaiberg (1980) to figure out the question of why U.S. environmental degradation had surged after World War II and the main reason is that more capital was becoming accumulated in Western economies with new technologies to create profits. In Gould et al. (2004) study:

The treadmill of production was thus, primarily an economic change theory, but one that had direct implications for natural resource extraction as well as for the opportunity structure for workers...Each round of investment weakened the employment situation for production workers and worsened environmental conditions, but it increased profits. (P. 297)

This is the necessary result of economic expansion. Everything is about earning money; no one cares about the vastly increased rates of ecosystem depletion, resource extraction,

and ecosystem pollution with dumping wastes into ecosystems, even those smart policymakers.

In Lynch, Stretesky and Long's study (2020) about the adverse effects of TOP in southern America:

Treadmills are ravaging plant and animal species in the Amazon, but there is no technology for reversing the loss of biodiversity. As such, a failure to address and prevent this threat to biodiversity could generate catastrophic outcomes not only for the Amazon but for the planet as a whole. (p.253)

In Long et al. (2018) study found:

Our findings support the TOP and ecological Marxism literature which suggest that increases in productivity are the primary drivers of ecological disorganization and vice versa, that decreases in production should decrease pollution (e.g., Foster, 1992, Lynch et al., 2013, O'Connor, 1988, Schnaiberg, 1980, Stretesky et al., 2013b). (p. 189)

All these researches pointed out the fundamental mechanism about capitalism that is to pursue profit and promote consumption all the time because of increasing production. The over-production is one of the most important reasons to cause the lavish use of plastic material. And because of the convenience of plastic material, more and more variable plastic products are made to fit people's needs and reduce the cost for the companies. Under the TOP, it boosts the plastic use and the plastic material makes the TOP more facile.

2. Green Criminology (overconsumption)

Princen et al. (2002) define overconsumption as "that level or quality of consumption that undermines a species' life-support system and for which individuals and collectivities have choices in their consuming patterns. Overconsumption is an aggregate level concept" (p. 33). We live in an era of great convenience and speed, but the problem is that disposable culture is prevalent now. The result is that we are exploiting more and more natural resources and turning them into new commodities, but

in a short time we are throwing these commodities back into the natural world as garbage, which causes waste pollution. People are just like trash makers for the natural environment. In global cities, like New York, Tokyo, London, Beijing, waste management has become an intractable and challenging problem that needs to be solved immediately. Due to the expansion of cities or urbanism, more and more people have been coming to live in cities, and with the development of globalization, people have been living at a faster pace and seeking more and more convenience, like convenience stores, convenience foods, and everything else. Indeed, in the beginning, these convenient products have brought great benefits to people's lives, but at the same time, they have also brought a huge amount of pollution to the natural environment. Now, people are used to throwing things away when they break, instead of fixing things and using them again. This disposable culture is embedded in our societies and people's minds that we cannot get rid of it. With the popularity of plastic products, this problem has become more serious.

However, Gould et al. (2004) also pointed out that consumption is made by overproduction under the neoliberal globalization scenario, as the preexisting conditions of production form human need and human desire - "Desire is socially constructed, and material desires are largely constructed by material producer (Schiller, 1996)" (p. 301). Gould et al. (2004) also mentioned "The 'gospel of mass consumption' was the successful construction of consumer desires not by consumers themselves but by the captains of industry and their collaborators in the advertising sector" (p. 301). These authors blame capitalism and neoliberal globalization for forming the disposable culture and overconsumption now. The problem is that people have already integrated themselves into this consumption culture, and they also need to realize this problem to change their consumption behaviors and create a bottom-top way to influence the governments and producers to stop overproducing and protecting the environment. Even now, the decision of what alternative forms of production will be offered for consumers to choose from is not in the hands of consumers, but with the spread of the realization about protecting the environment, those producers need to consider customers'

requirements to make some changes about their policies. This is a dynamic process, and the mechanism can be changed. Customers can use the advantage of the global information system to call on some events to fight together.

3. Relationship between Overproduction and Overconsumption

Overconsumption is the result of overproduction. These researches pointed out the reason for the overconsumption culture now and let people know the unnecessary desires are created by the capitalist system. Actually, people might do not need so many things to live and if people realize they don't need so many things, especially single-use plastic products, they might choose to change their consumption habits to be more sustainable and simpler.

Overproduction and overconsumption relate negatively to each other: as more products are produced, people's desires for goods must increase to ensure the products are consumed. This is a vicious cycle that needs to be broken to create a new sustainable way of production and consumption.

After China integrated itself into the global capitalist economy, China has become increasingly subject to both the waste that the treadmill produces and the increased consumer demand. This is a dilemma for China now, because currently, China is still at the beginning stage of development. The government needs to balance the development and environment.

4. Globalization

There are a plethora of researches about globalization that try to find the influence of globalization and the complicated relationships with other vital aspects, such as food supply, tourism, transportation, financial activities, etc. O'Brien and Leichenko (2000) explored the double exposure of economic globalization and climate change impacts in developed countries and developing countries. With the new joint implications of globalization and climate change, new sets of winners and losers emerge. This research tried to figure out which countries would be the winners and which nations would be the

losers. Basically, the developed countries are the winners and the developing countries are disadvantaged by the processes and likely to experience negative consequences.

According to McMichael (2013), globalization, climate change, and human health have some relationship. In Labonté et al. (2011) research pointed out:

“These global changes fundamentally influence patterns of human health, international health care, and public health activities and they constitute a syndrome, not a set of separate changes, that reflects the interrelated pressures, stresses, and tensions arising from an overly large world population, the pervasive and increasingly systemic environmental impact of many economic activities, urbanization, the spread of consumerism, and the widening gap between rich and poor both within and between countries. (p. 263)

Considering the change of environment based on human activities, it is popular to say that we are in a particular geologic epoch called “ the Anthropocene” (Crutzen 2002). It provides a new perspective to let people think about globalization, the following environmental problems, and human health. From this point, it makes people have more motivations to change the negative environmental impacts from globalization to keep our health. At the same time, with globalization, plastic pollution has spread to the whole world and has possible negative effects on human health by the food cycle in the ocean and underwater system.

In the book of Christoff and Eckersley-*Globalization and the Environment*, they comprehensively analyzed many aspects of relationships between globalization and the environment. Christoff and Eckersley (2013) point out:

together with a rapidly growing world population, this new phase of global modernization has enabled a massive expansion in the spatial scope and volume of global production and consumption that has generated both systemic global environmental changes as well as a range of globally ubiquitous local environmental effects. (p. 50).

With the help of technological, cultural, political, and primarily regulatory changes, the capitalist markets can spread globally to create globalization now. “Globalization has

enabled environmental impacts to become increasingly extended, or ‘stretched,’ over space and time”(Christoff & Eckersley, 2013, p. 7). At the same time, globalization is not the only reason cause environmental degradation. However, globalization accelerates ecological degradation.

Doytch and Ucutm (2016) used the EKC (Environmental Kuznets Curve) that hypothesized relationships between various indicators of environmental degradation and income per capita. The results showed that there are negative halo effects and positive halo effects in different industries, like manufacturing increasing pollution (Doytch & Ucutm, 2016). These results reveal the inequality of globalization and environmental impacts to different countries, which may cause more serious environmental problems in the low-and middle-income countries (Doytch & Ucutm, 2016). The same situation happens with plastic pollution.

Globalization pushes the process of expanding the market and pursuing more profits even more thoroughly and comprehensively, and the expansion of markets accelerates the treadmill of production, leading to the production of more and more even useless goods. The environmental impact of this mutually accelerating process has also increased geometrically and has shifted from developed countries to developing countries. However, most of the developing countries, in turn, cannot deal with environmental problems, not to mention repair the ecosystem in their countries.

It is a vicious cycle that eventually affects the entire ecosystem of the whole world. These examples abound in developing countries and take China as an example. In the progress of three decades of rapid development, China has also experienced the path of pollution before treatment, which is also very costly. Take plastic waste as a typical example, China has imported a cumulative 45% of plastic waste since 1992, but recently China’s government implemented a new policy banning the importation of most plastic waste. Here is a pressing question of where the plastic waste will go now from developed countries. According to Brooks, Wang, and Jamebeck (2018) research, the estimates that higher-income countries in the Organization for Economic Cooperation have been exporting plastic waste (70% in 2016) to lower-income countries in East Asia and Pacific

for decades by measuring commodity trade data for mass and value, region, and income level. “An estimated 111 million metric tons of plastic waste will be displaced with the new Chinese policy by 2030” (Abstract). Where will this plastic waste go? The answer is other Southeast Asian countries, like Thailand, Vietnam, Indonesia, and the Philippines. However, these countries cannot dispose of this enormous trash and cause severe environmental pollution for the local region and people. This is one of the negative consequences of the development of the global transportation system and international trade.

The Solutions

1.Sustainable Consumption

Sustainable consumption (SC) is a popular theory in recent years. “Consumer behavior is key to the impact that society has on the environment.” (Jackson, 2005,p.5). In this report, Jackson (2005) reviews the literature on consumer behavior and behavioral change and “highlights the dilemmas and opportunities that policy-makers face in addressing unsustainable consumption patterns and encouraging more sustainable lifestyles” (p.5). He mentions that “Changing behaviors-and, in particular, motivating more sustainable behaviors-is far from straightforward. Individual behaviors are deeply embedded in social and institutional contexts. We are guided as much by what others around us say and do and by the ‘rule of the game’ as we are by personal choice. We often find ourselves ‘locked in’ to unsustainable behaviors despite our own best intentions” (p.5). He also emphasizes the important influence of discursive power. “There is evidence to suggest that intentional or goal-oriented behavior require elaboration in discursive consciousness. This insight is important in devising strategies to change habitual behavior” (p.12). However, there might not be a precise definition of the term sustainable consumption. Jackson and Michaelis (2003) provide some insights about sustainable consumption “ But the realization that people’s choices, behaviors and lifestyles will play a vital role in achieving sustainable development is one of the (relatively few) points of agreement to have emerged from international environmental

policy debates over the last decade or so” (p.20). Jackson discusses more general theories and concepts about sustainable consumption, consumer behavior and behavioral change. He points out the inner relationship among these concepts and the importance of sustainable consumption for humankind now and in the future.

China is the most fast-developing country. The most 40 years after the Open Policy, consumer behaviors have been changed significantly by the abundant and prosperous products in domestic and foreign countries. China has become the most consumer market globally with the largest population, which makes sustainable consumption an urgent and essential topic to deal with the environment. In Liu et al.(2019) research about sustainable consumption in Nanjing, China, they wanted to find out “how ordinary people practice the notion of 'sustainable consumption' in relation to their everyday lives and experiences of the wider environment and how these understandings relate to public discourses of sustainability in contemporary China” (p. 1310). They argued that “Sustainable consumption” had been widely circulated as a discourse that seeks to present a solution to the ecological problems associated with industrial economic production (Dolan, 2002, p.170) while providing an improved balance between quality of life and economic growth both in the present for the future (Hobson, 2004)—since the Rio Earth Summit in 1992, Agenda 21” (p.1038). In this paper, Liu et al. analyzed China’s current consumption situation. They pointed out the importance of changing people’s consumption to a sustainable pattern for the environment. “According to the recent empirical studies (Liu et al., 2012; Zhang, 2007; Zhao et al., 2014). Chinese people are increasingly aware of and concerned about the environmental performance of the products they consume” (p.1312). However, it is still hard to change people’s minds due to “with higher incomes and the individualization trend, nowadays, it has been argued that Chinese consumers now desire greater material comforts and are not willing to sacrifice personal interests for collective or environmental benefits (Zhao et al., 2014)” (p.1312). Liu et al. (2019) found that the Chinese focus more on the health aspect that if this consumption behavior is good for their health, they are more willing to change their consumption behaviors, not directly related to the benefits

for the environment. In the end, Liu et al. (2019) mentioned that “Addressing this limit, we have emphasized people's emotive practices of sustainable consumption. Throughout this research, it is clear that complex emotions (such as anxiety, fear and desire) that are inherent to consumption are central to explaining everyday practices of sustainability. Thus, future research on everyday sustainable practices must take emotions into account” (p.1322). In Geng et al.'s (2017) study, “Chinese younger consumers tend to more sustainable consumption while whether they really understand the sustainable consumption concept is not clear” (p. 315). They also pointed out the importance of raising sustainable awareness for Chinese consumers.

Besides sustainable production, SC can not only benefit the environment but also really motivate enterprises to produce sustainable products.” “Education can motivate Chinese adolescents to purchase, treat and dispose of sustainable products. Sustainable awareness & attitude can influence all SC behaviors including purchasing and use of sustainable products as well as treatment & disposal of used products, but the understanding of the SC concept is also important and even necessary. (Geng et al., 2017, p. 321)

The awareness of sustainable consumption is the basis of the reduction of plastic products in China. People will be intended to choose or purchase fewer plastic products in their daily lives only when they understand the crucial benefits of sustainable consumption to the environment directly related to themselves and their children's health in the future. These researches give the foundation to do deeper studies focusing on plastic consumption.

2. Voluntary Simplicity (anti-consumption)

Voluntary simplicity (VS) is a kind of lifestyle that originated in 1970, “Voluntary simplicity, or simple living, is a way of life that rejects the high-consumption, materialistic lifestyles of consumer cultures and affirms what is often just called ‘the simple life’ or ‘downshifting.’”(Wagner, 1901). Doherty and Etzioni (2003) researched the history of the development of voluntary simplicity and the reasons and influence of

voluntary simplicity on consumer culture in the industrialized countries, and they describes the allure of voluntary simplicity as a desire for:

A simpler life. In a shadow cast by the jarring beginning of the new millennium, simplicity has an undeniable appeal...Now is not a time for excess; it is a time, it would seem, to focus on 'what really matters.' Thus the appeal of *voluntary simplicity*, a notion that combines the freedom of modernity with certain comforts and virtues of the past. (Preface)

It seems to be a pattern that after a certain period of time as a hyper-consuming society, people begin to feel the consumption is meaningless and turn to VS. After three decades of market economy, Chinese people's lives have been significantly improved and had more and more products, however, after the feverish of mass-consumption, maybe it is the time to think about a simpler life for most Chinese people now.

Reboucas and Soares (2020) reviewed and organized the past literature about VS to provide some implements and suggestions to the policymakers to be more concerned about environmental issues. They reorganized:

High materialism and irresponsible consumption are increasingly recognized as unsustainable practices. It is important to consider that consumption is more than just an individual behavior based on utilitarian, financial, or hedonic criteria; it is a social, systemic and political act with far-reaching consequences for the individual and for others. Although it may seem easier not to question or change consumption habits and overlook responsibility in purchasing decisions, an increasing number of consumers are developing awareness regarding the consequences of their choices and taking action by voluntarily reducing consumption and claim to be happier with their way of life (Alexander & Ussher, 2012; Brown & Kasser, 2005; Elgin & Mitchell, 1977; Etzioni, 2004; Huneke, 2005). (Reboucas & Soares, 2020, p. 13)

According to The Simplicity Collective (2020), it said, "...lives of high-consumption are unethical in a world of great human need; and...the meaning of life does not and cannot consist in the consumption or accumulation of material things." In a research article about

the anti-consumption in the United States (Peifer et al., 2020), the results showed the different ethical ideologies between nonmaterialism and voluntary simplicity and what the important factors are to persuade people to consume less, like reminding the consumers about the negative environmental consequences of their purchases. It is very critical to think about the relationship between consumption and the environment.

Voluntary simplicity is also about changing people's attitudes about consumption, and the next step is to make people aware of the negative consequences of consumption for the environment. From this point of view, voluntary simplicity is also good for solving plastic pollution, and people who are willing to choose voluntary simplicity might be more inclined to consume fewer plastic products in their daily lives. In Chang's (2021) study, he found that people who are more concerned with the future and with more self-transcendence values are more willing to choose a simple lifestyle, and he also pointed out that senior people and people with bachelor's degree are more likely to be voluntary simplifiers. McGouran and Prothero (2016) said in their research, "Voluntary simplicity is not only relative to people's values and beliefs, but also to people's lifestyle activities and wider socio-cultural and institutional factors" (p. 189). They explored the potential results to intentionally consume less if people were asked to be voluntary simplifiers.

What's more, VS might be related to people's mental health. Zavestoski's (2002) research pointed out:

the increasing number of individuals voluntarily reducing their levels of consumption may be motivated by underlying social-psychological stress related to living in a consumer society. Of the three primary motivational bases of the self (esteem, efficacy, and authenticity), it is argued that only self-esteem and self-efficacy can be acquired through consumption, but failed to achieve a sense of authenticity. (p.149)

Furthermore, in Zavestoski's (2002) study, the reason for the development of VS is because the prevalence of consumerism in current society has put more pressure on people's minds. He explained:

One explanation for the recent flurry of interest in the ideas of voluntary simplicity is that people experiencing unhappiness and discontent are linking these feelings to the media- and culture-driven messages to consume increasing amounts of goods and at greater rates...Chronic stress from the relentless pursuit of wealth for the purpose of consuming material goods in order to create a particular self-image leaves people dissatisfied. (p.151-152)

The findings imply that overconsumption is not good for people's mental health, but the choice of voluntary simplicity might have a more positive mental impact on people's minds. This is an excellent point to persuade people to accept the concept and lifestyle of voluntary simplicity to be good to the environment and themselves.

In the meantime, VS might have certain connections to religious reasons that is also a great angle to persuade people who have faith in religions. According to Chowdhury's (2018) study in Australia, there is a positive relationship between intrinsic religiosity and voluntary simplicity, but not extrinsic religiosity. The findings also pointed out that secular pursuits, like improving personal and environmental well-being, might propel voluntary simplicity (Chowdhury, 2018).

In a nutshell, the appearance and development of VS have the inevitability after a long hyper-consuming period. There might be little influence from the religious aspect in China, but more influence from a spiritual aspect, which is different from the Western countries. It is time to have a Voluntary Simplicity campaign in China now that awakens people's thinking about the relationship between consumption and the environment.

3.Cognitive Psychology

In order to fulfill the Voluntary Simplicity, cognitive psychology could offer the tools for designing strategies to manipulate people into consuming less or differently, just like how the companies use cognitive psychology in advertisements to promote selling. Currently, there is not much literature directly related to sustainable consumption and the change of plastic consumption. However, other relative literature, it can give some

reference to implicit how to change plastic consumption in the future by cognitive psychology.

Psychology is important to every aspect of our lives. The present problem is about how to change people's attitudes about consumption behavior and to promote a sustainable consumption way to reduce pollution. Cognitive psychology can have a significant effect on this process. In the research from Hobson (2006), he suggested that human geographers can learn more from reading environment psychology to promote their studies, and he also pointed out this collaboration might benefit from solving environmental problems and propelling ethical and sustainable consumption.

There are many aspects of cognitive psychology and they all have a vital influence on the cognitive process to make decisions, such as the different types of information, motivations, emotions, and so forth. In a study in Spain (Tonetto & Stein, 2012), the authors explored the importance of different amounts of information in helping frame and achieve consumption goals, which can be called Goal Framing Effect. The result revealed what information should be infused to people to impact their consumption decision, and the same, this process can be used to manipulate people to conduct more sustainable consumption. Holmgren et al. (2019) researched the cognitive bias in the role of people's attitude about CO2 emission methods to further solving climate change, and they finally concluded that "the averaging bias seems to have in people's thinking about the benefits of emission cuts" (p. 54). This finding could be applied to solve plastic pollution, especially how to convince people to consume less plastic products. The result can also be extended to help people change their consumption behaviors to be more sustainable.

In research from Frost et al. (2018), they pointed out the unhealthy lifestyle in the global now and the emergency and challenge of solving the problem of changing people's consumption habits. They did a systematic review of research on this topic. However, they found that there is a lack of high-quality research about this topic. It means more attention and research are needed in the future. According to a new recent study (Romero-Canyas & Hiltner, 2020), the authors analyzed four themes about the principles

for psychological science on sustainable consumption, including new directions, focusing on problem-solving solutions, exploring broader processes, and interdisciplinary collaboration. They suggested in the conclusion:

The path forward for sustainability psychology is not easy, but neither is the path forward for our species to reintegrate with its ecosystem rather than continue to harm it. When disheartened, researchers would be wise to remember this bigger crisis. Even the challenge of advancing psychology's contribution to sustainability pales by comparison to the task of restoring a balance between humanity's collective growth and the health of *our* home. (Romero-Canyas & Hiltner, 2020, p. 170)

However, no matter how hard it is now, we can educate people from now on, especially the students in schools now. Education is also important to cultivate the awareness of sustainability. In Ronen and Kerret's (2020) study, they mentioned the importance of education about positive psychology and environmental sustainability and provided ten rules for implementing sustainable wellbeing in schools that are crucial for the development of sustainability, especially for sustainable consumption in the future.

Last but not least, there is a journal article directly connecting cognitive psychology and plastic pollution. In Septianto and Lee's (2020) study, they used cognitive psychology to detect people's attitudes about plastic pollution, which is important for selecting the most efficient way to raise people's awareness about plastic pollution and further make behavioral changes in their daily life. They said:

This research demonstrates that an image depicting plastic waste (vs. victims of plastic waste) elicits disgust (vs. sadness). Building on construal level theory, we show that an image of plastic waste is more effective in encouraging consumers to reduce their plastic consumption when combined with a 'why' message. In contrast, an image portraying victims of plastic waste is more effective when presented with a 'how' message...The findings of this research highlight the importance of understanding discrete emotional responses to advertising images,

especially in the context of reducing plastic consumption, and thus will benefit social marketers and policymakers. (Septinato & Lee, 2020, p. 18)

However, they also mentioned that they only used negative emotions in their research. In the future, there should be research to study the mechanism of positive emotions on reducing plastic pollution.

There are still a plethora of research gaps between cognitive psychology and sustainable consumption, not to mention direct plastic consumption. Meanwhile, the concepts in cognitive psychology are practical and valuable for measuring the specific variables to study the factors that can affect people's awareness about environmental pollution and the change of people's consumption behaviors.

4.Degrowth

Degrowth is a new theory about how society should go in the future, especially economic degrowth. And it criticizes the theory about development and expanding globalization. The reason for degrowth is that after a long time of development, it cannot solve the poverty problem in the whole world and bring about a large number of environmental issues to threaten the entire ecological system. However, many people refuse to adopt such a theory that may cause a recession to imperil their economic interests, especially in the Western developed countries. "In economics, the degrowth perspective is scarcely present, even among those economists who oppose capitalism or liberalism," stated D'Alisa, Demaria, and Kallis(2014, p. 5). It just reflects the debates and misunderstandings about degrowth. According to Hickel (2019):

On the surface, degrowth sounds like economics of scarcity, as many on both the right and left have been quick to allege. But in fact, exactly the opposite is true...Degrowth seeks to invert the Lauderdale Paradox. By calling for a fairer distribution of existing resources and the expansion of public goods, degrowth demands not scarcity but rather abundance. (p. 54)

This explanation about degrowth reveals the nature of degrowth and what degrowth will lead to in the future.

Degrowth provides an opportunity to slow down the trend for moving forward and look back to see what happened to our planet. The wealth created by development has been flowing into the wealthy class, not the poor class. It is the fundamental nature of capitalism that it cannot be fair all the time. Therefore, the developmental system should stop forcing people to over consume and ignore the potential negative consequences for the environment. One of the approaches related to degrowth is Low Energy Demand. “The LED model represents a ‘degrowth’ scenario- a planned reduction of the material and energy throughput of the global economy” (Hichel, 2019, p. 56). The critical meaning of this approach can not only address emissions and climate change but also reduce environmental impact across a range of other key indicators, including deforestation, chemical pollution, soil depletion, biodiversity loss, and so on (Rockstrom et al.,2009; Steffen et al.,2015). However, capitalism has continued to create scarcity to control people. “In all cases, the creation of artificial scarcity was leveraged, purposefully, as the engine of capitalist expansion” (Hichel, 2019, 61). The logic of capitalism seems to put human beings’ welfare above the environment to earn more money regardless of the ecological consequences.

As a result, degrowth theory emphasizes the structural change to the entire system from top-down. The developed countries should take their responsibility and they should stop being bossy to criticize the developing countries to create pollution because of rapid development. Take plastic pollution in the ocean as an atypical example. Some researches showed that most plastic enters the sea from a small geographic area and that over half comes from just five rapidly growing economies-China, Indonesia, the Philippines, Thailand, and Vietnam (Ocean Conservancy & McKinsey Center for Business and Environment, 2015). On one side, the western countries force the developing countries to develop to create more market for them to earn more money, and on the other side, they ask the developing countries to take the responsibility to deal with the shipped plastic waste properly in the name of helping the development of the lower-income countries. The degrowth might end this paradoxical trend and the currently ridiculous situations.

Summary

To explore what might influence people to change their consumption behaviors to consume fewer plastic products, it is crucial to find out the important factors that decide their consumption behaviors, including the knowledge, awareness, willingness and responsibility about plastic pollution and consumption. The studies in sustainable consumption, green criminology, voluntary simplicity, and degrowth provide the theoretical framework for further research. The studies in cognitive psychology can also provide the mechanism to how to influence people's attitudes and behaviors. Combined together, there are some studied to indicate what's the effects of each aspect. Some research pointed out the root of all the environmental issues now is capitalism that only pursues profits and keeps producing and consuming. This reason has deeply changed the relationship between humankind and the environment. Furthermore, this reason has totally changed the structure of our society and created the trap of consumerism for everyone. The research found that it is still hard to make people sacrifice their own benefits to be good for the environment. Additionally, some of the studies showed that using different psychological interventions could change people's awareness about plastic pollution and might make them more willing to change their consumption behavior in the future. However, most of the studies focused on the general environmental problems instead of focusing on the specific plastic pollution. Meanwhile, there is a lack of research focus on current China. With the fast economic development and the spread of college education, the high-educated people might have more critical roles in changing the plastic pollution problem. This current study contributed to fill out this gap by measuring the high-educated people's knowledge, awareness, willingness and responsibility about plastic pollution in China now.

Chapter 3: Methodology

Introduction

Plastic pollution is a global environmental problem and has affected significant numbers of creatures and ourselves. Plastic material was the most brilliant invention in 20 century. However, now this most suitable material has created the disaster of environmental degradation. This research focuses on the relationship between people's awareness of plastic pollution and how they change their consumption behavior to be more sustainable to consume and buy fewer plastic products. The research question asks what factors might influence highly educated people's awareness of plastic pollution and what factors might lead them to consume fewer plastic products in their daily lives in China, especially single-use plastic.

H1: Education level is positively correlated with knowledge about plastic use.

H2: Education level is positively correlated with awareness of the problem of plastic pollution.

H3: Education is positively correlated with willingness to change consumption behavior to use less plastic.

H4: Education is positively correlated with a belief in individual responsibility for addressing the problem of plastic pollution.

The quantitative research design was used in this study and included a researcher-made survey as the primary method to measure people's awareness and willingness about plastic pollution. A survey is the most convenient method to know people's attitudes towards plastic pollution since plastic pollution is a widespread phenomenon globally. Plastic products are all over the place to make people easily understand and know the situation. Before the survey, there were some interviews with eight people as the survey base to generalize how to design the questions more effectively. The most popular social media app conducted the survey in China to recruit the targeted respondents with a high education level (at least a bachelor's degree). After collecting the data, the analysis part could be done by the survey website and online SPSS analysis tool in China (SPSSA, <https://spssau.com>).

Setting

This research focuses on China because China has the largest population in the world. With the rapid development of the economy, the Chinese have more and more commodities in the market. They have strong purchasing power, including the vast numbers of plastic products in their daily lives. This is my mother country and there is a convenient and effective network for me to conduct the research.

Considering the COVID-19 since last January, I cannot go back to China. The most popular social media that surveyed China-WeChat is called Weixin in China, which has a similar function WhatsApp in the United States. Until the end of 2020, the Wechat number of users is up to 1.2 billion globally, but the majority of the users are Chinese (Statista,2020).

Before surveying by Wechat to collect data, the survey was designed on the online survey design website, Tencent Survey or Questionnaire (in Chinese “Wenjuan”), which also belongs to the Wechat parent company-Tencent Holdings Ltd., also known as Tencent, is a Chinese multinational technology conglomerate holding company. (“Tencent,” 2020) Therefore, it is straightforward to design the survey on Tencent Survey and make the correct version for Wechat and collect the data more conveniently to transfer to the Tencent Survey backstage directly. Previously, Beijing and Zhengzhou were the specific areas in this research to collect the data. However, because of the flexibility and extensiveness of Wechat, the demographic regions are more diverse, including dozens of different cities in China and even some Chinese in North America. It is acceptable to use miscellaneous demographic information since demographic information is not the most important index in the survey. The demographic information is more varied. The analysis result might be better.

Participants

In this research for the sampling plan, due to the restrictions about the target population and the time and energy for the researcher, it is possible mainly to do the

non-random sample rather than a random sample. Also, due to the time difference and place restrictions, it is the combination of convenience samples available and accessible at the time and the purposive sampling who at least have a bachelor's degree. The target population in this research is high-educated people, and to fulfill this requirement, it mainly depended on the researcher's network to recruit as many target respondents as possible. The original sample size for this research was around 100. In the end, the sample size was more than 200.

All the participants are Chinese and have bachelor's degrees. Their ages are mainly concentrated from 25-45. The genders of the respondents are male and female. Considering their educational background, most of the respondents are either graduate students or have decent jobs in big companies or governments or experts like doctors, designers, engineers, etc. They all live in cities now and their hometowns are cities or rural areas. For this survey, whether they have children or not is a crucial question. The ratio is almost half-half. And most of the respondents' parents don't have a bachelor's degree that is different from their children.

Measurement Instruments

The measurement instrument in this research is researcher-made. The survey title is "the survey about plastic pollution" and measures people's general knowledge, awareness, responsibility, and possible plastic pollution actions. There are 28 items for four sections in this survey, including the available demographic information, the knowledge of plastic pollution, the awareness of plastic pollution, the willingness to reduce the plastic use the plastic pollution in the future the different responsibilities for plastic pollution. There are four different items, including 22 single choice questions, one multiple-choice question, three scale questions and three matrix scale questions. For the convenience and understanding of the survey items, the original version of this survey is Chinese. The full version in Chinese and the translated version in English can refer to Appendix A.

Validity and Reliability

For the validity of this researcher-made instrument, the researcher piloted it with a small group to analyze the results before the formal survey and asked for a professor in the field to review the survey and make necessary adjustments to guarantee the instrument can measure what it was intended to measure. After the survey was designed, a small group of potential targeted respondents did the survey. It gave feedback about their feelings about this survey, like whether the items were not clear to express or whether they thought the survey could effectively measure people's attitudes about plastic pollution. Meanwhile, the translation survey was submitted to the thesis advisor to give some content suggestions to be more effective. In the end, according to all the suggestions, For the reliability part, there are some inherent connections between different items, such as whether they have children and the concerning extends to the environmental problems in the future, which ensure the instrument consistently measures what it was intended to measure.

Procedure

The survey needed to be conducted in China because of the target area and population in this research. The most convenient and efficient way to conduct the survey is by Wechat. The survey was transferred to a proper version to let people finish the survey by Wechat, especially on mobile phones. The researcher sent the survey link to some friends who are the target people and asked them to share the survey link with their friends who also have a bachelor's degree.

In order to attract more people to do the survey, the researcher chose to give a small amount of money, around 1.5 RMB (0.2 dollars), as a red pocket ("hongbao" in Chinese) after they finished the whole survey. The red pocket is one of the functions designed by the Tencent Survey that combined the same role in WeChat. During the research implementation, it was the Chinese New Year holidays and the Chinese have the tradition to give others red pocket during the New Year to express good luck and good wishes to each other. It has to admit that the red pocket strategy worked well and made

the process of spreading the survey simpler and get to the sample size quickly and easily. However, to keep the collected data valid and useful, the red pocket can only be issued after the researcher reviewed every respondent's answer backstage to decide whether it authorized the red pocket. The survey design website-Tencent Survey, helped a lot to design the survey about questions and formats. It also helped to spread the survey too. Because Tencent Survey and Wechat both belong to Tencen Holding Inc., the survey designed on Tencent Survey can take advantage of the large number of users on WeChat.

When the research had 130 respondents, there was a geographic problem that the researcher wanted to collect more data from in the Beijing area. Tencent Survey has a function to help the researcher to directly recruit the target population and respondents in any specific demographic requirement, like the gender, age, education background, hometown, occupation, area, numbers, etc. Still, in this way, the red pocket for the respondents is fixed by the website that is 2.5 RMB (0.4 dollars) for each qualified respondent. The researcher set the age (20-50), education level (bachelor degree and above), area (Beijing) as restrictions to spread the survey by the system automatically and finally collected 30 respondents' answers within one night. The other 187 respondents were collected by the researcher's network. In the end, there are 217 respondents to finish the survey, and 13 respondents don't belong to the target population. Therefore, the number of valid respondents is 204 that can be used for analysis in the next step.

Every coin has two sides. The large popularity of Wechat is one significant advantage and also generated some obstacles in this research. First, it was very difficult to control who would receive the survey link and answer the survey. This disadvantage made the researcher hard to control the target population and the areas to fit for the research design. For the first questions, there were 13 respondents who were not qualified. For the second question, the geographic areas were more diverse than the researcher thought. However, it might be good for the analysis to get more useful information. It was harder to ask friends to help do the survey at the beginning. Human relationships are complicated and very sensitive. It was so fortunate to collect the data that the researcher needed.

Data Analysis

In this study, due to the setting in the wj.qq.com, there was no incomplete survey. all the 217 surveys were finished. However, 13 surveys were invalid because the requirement about the educational level must be a bachelor's degree in this survey. The effective recovery rate is 94%.

And three methods of quantitative data analysis were used in this study for discussion purposes. First, the results from the demographic section in the survey were analyzed descriptively. The use of wj.qq.com (Tencent Survey) enabled the researcher to immediately view compiled results from the survey. The results were reported in three ways: an actual number of respondents, percentages, and bar or pie graphs. The results can be reviewed item-by-item by the researcher. The participants' answers were divided into many cross- subgroups for data analysis purposes: Group 1 was one specific question of the respondents' demographic section answers, like gender, age, educational level, areas, whether have children, parents educational levels, hometown, and Group 2 was one of the other three sections, knowledge, awareness and willingness of plastic pollution. Statistical analysis using Statistical Package for the Social Sciences (SPSS) software was conducted on these two subgroups to identify the range, mean, and standard deviation for each group.

Second, the Chi-square test was used to determine whether there is a statistically significant difference between the expected frequencies and the observed frequencies in one or more categories of a contingency table ("Chi-square test," 2020), such as gender, age, occupations, areas these demographic questions and the relationship among the knowledge, awareness and willingness of plastic pollution. The purpose of the test is to evaluate how likely the observed frequencies would be, assuming the null hypothesis is true. ("Chi-square test," 2020).

Third, an independent samples one-tailed t-test was then conducted to compare the mean scores and identify if there was a significant difference between the cross two subgroups' mean scores and the direction. In practice, if the hypothesis has a parameter

and another directional parameter comparison, such as "greater than," "better than," "worse than," etc., generally choose a one-tailed test. In this study, choosing a one-tailed t-test is to know the different levels of knowledge, awareness, and willingness for plastic pollution than the different demographic information.

Limitation

The most apparent limitation for the methods in this study is the sample limitation. The major limiting factor is a nonrandom sample.

Chapter 4: Results and Findings

Introduction

Before conducting the formal data analysis, the researcher performed a browsing check of the questionnaires and removed those that did not fit the target population's academic background (at least a bachelor's degree) for a total of 13 questionnaires. The remaining 204 valid questionnaires were subjected to descriptive statistical analysis and inferential statistical analysis.

Descriptive statistics

In this study, the first part of the survey measured nine demographic questions that provide nominal details and essential background for the analysis. However, considering relationships and limitations for further analysis, there are only three variables necessary to know their results. The first item was about the respondent's gender. The male and female frequency was 43.6% and 56.4% (there are no strict requirements about the category of genders, only two options), almost half and half. The second item was about the hometown. 49% of the respondents come from cities, 16.2% of the respondents come from counties, and 34.8% come from rural areas. The last item about demographic information was whether the respondent has children or not. 44.1% of respondents have children, and 55.9% of them have not had children now. (see table 1 below)

No.		Choices and Frequency		
1	Gender	Male	Female	
		43.6%	56.4%	
2.	Hometown	City	County	Rural Area
		49%	16.2%	34.8%
3.	Whether have children	Yes	No	

		44.1%	55.9%	
--	--	-------	-------	--

Table 1: Frequencies about gender, hometown and whether have children.

Inferential statistics

To test whether proportions were different in different groups and categories, I used the χ^2 test, T-test and One-way ANOVA of independence with $\alpha/p= .05$ as a criterion for significance. According to the items' different characteristics, the qualitative and quantitative, the scale items were used T-test and one-way ANOVA. The other qualitative-choices things were used in the χ^2 test. (see table 2 below)

	Qualitative Items (Choice)	Quantitative Items (Scale)
Two categories (gender and whether have children)	χ^2 test	T-test
Three types (hometown)	χ^2 test	One-way ANOVA

Table 2: Analysis Methods

Gender

For the Knowledge part, five items were done on the χ^2 test, including items fourteen, fifteen, sixteen, seventeen and nineteen. According to the different genders group-male and female, there are no significant differences in these items. (see table 3 below)

NO.	Knowledge Question	Test	Result	<i>p</i>
14	How long do you think it takes for most plastic waste to degrade in nature?	χ^2	6.051	0.109
15	Where do you think most of the plastic waste currently ends up?	χ^2	6.551	0.162
16	Do you know that plastic waste can be harmful to marine life?	χ^2	0.559	0.455

17	Please roughly estimate the proportion of plastic products in your daily life: (referring to all plastic products, far more than we think, including chemical fiber clothes, contact lenses, tires, cosmetics, all kinds of plastic packaging and products, etc. Please think carefully)	χ^2	1.525	0.676
19	How do you usually dispose of plastic products in your daily life (especially disposable single-use plastic products)?	χ^2	3.262	0.196
* $p < 0.05$ ** $p < 0.01$				

Table 3: Knowledge part questions, analysis method, and χ^2 Analysis Result.

For the Awareness part, items ten, eleven, twelve, eighteen were scale questions and twenty-one was a single-choice question. For the four scale items, I used a T-test to analyze the gender and χ^2 to analyze twenty-one. There was a significant difference for item eighteen. According to the further analysis, male and female for the agreement on the recycling of plastic waste showed a 0.05 level of significance ($t = -2.056$, $p = 0.042$), as well as specific comparative differences, could be seen that the mean value for male (4.44), would be significantly lower than the mean value for female (4.70). Other “awareness items” including 10, 11 and 12 showed no significant difference. (see table 4 below)

NO.	Awareness Questions	Test	Result	p
10	For each of the items below, indicate how serious the problem is to you: air pollution, global warming, plastic pollution, water pollution (1-5)	T-test	0.383	0.702
			0.152	0.880
			-0.154	0.878
			0.415	0.679
11	When you see the plastic waste in your surroundings, how serious do you feel about plastic pollution? (1-5)	T-test	0.559	0.577
12	How worried are you about the harm of plastic pollution? (1-5)	T-test	-0.019	0.984

18	How much do you agree with the recycling of plastic waste? (1-5)	T-test	-2.056	0.042*
21	Which of the following methods do you think is the most effective way to solve plastic pollution?	χ^2	1.382	0.710
* $p < 0.05$ ** $p < 0.01$				

Table 4: Awareness part questions and analysis method, T-test and χ^2 Analysis Results.

For the Willingness part, items twenty, twenty-five, twenty-six, twenty-seven, twenty-eight were qualitative questions. For these five items, χ^2 can be used for analysis. There was a significant difference between men and women in response to the question asking whether respondents would reduce the use of plastic products in their daily lives, with 90.43% of women responding positively compared to 78.65% of men ($\chi^2=6.231$, $p=0.044 < 0.05$). Other “willingness items” including 25, 26, 27 and 28, showed no significant difference. Item 22 was a scale question that needed to use a T-test to do the analysis, but there was no significant difference, including governments, companies, individuals, on these three levels. (see table 5 below)

NO.	Willingness Questions	Test	Result	<i>p</i>
20	After understanding the harm of plastic pollution, will you consciously reduce the use of plastic products in your daily life in the future?	χ^2	6.231	0.044*
22	What level are the following factors that motivate you to reduce the use of plastic products? Protection of the environment; Pressure from social opinion; Laws and regulations. (1-5)	T-test	-1.049	0.295
			1.033	0.303
			0.332	0.740
25	On a personal level, what would you be most willing to do to help reduce plastic pollution? (Select the option you think you would be most willing to do)	χ^2	4.354	0.500
26	Considering the severe health hazards that plastic pollution may cause to ourselves and the next generation (your children/grandchildren), are you willing to reduce the use of plastic products now and in the future?	χ^2	5.413	0.067

27	If an alternative product to plastic would be much more expensive but could reduce further plastic pollution, would you choose it voluntarily or be willing to undertake it?	χ^2	5.483	0.064
28	When adopting a relatively environmentally friendly lifestyle, it would make life less convenient (such as bringing your own lunch boxes and dishes, shopping bags, and doing a good job of sorting and recycling waste), do you still have a strong willingness to do it voluntarily?	χ^2	5.196	0.074
* $p < 0.05$ ** $p < 0.01$				

Table 5: Willingness questions and analysis method, χ^2 and T-test Analysis Results.

For the Responsibility part, items twenty-three needed to use a T-test and item twenty-four was used χ^2 . And there were no significant differences for these two items. However, the analysis result of item twenty-four ($p=0.053$) was approaching the limit of significance and non-significance. (see table 6 below)

NO.	Responsibility Questions	Test	Result	p
23	At what level do you think the below choices should take responsibility for solving the plastic pollution problem? Governments; Companies; Individuals. (1-5)	T-test	0.459	0.647
			0.610	0.543
			-0.569	0.570
24	Do you think it would be more useful for the government to launch mandatory policies and regulations to ban certain plastic products?	χ^2	5.863	0.053
* $p < 0.05$ ** $p < 0.01$				

Table 6: Responsibility questions and analysis method, χ^2 and T-test Analysis Results.

Hometown

For the Knowledge part, five items were done on the χ^2 test, including items fourteen, fifteen, sixteen, seventeen and nineteen (repeat). There was a significant difference among city, county and rural area in response to item fourteen, item fifteen. By further analysis, the hometown was for how long you think most of the plastic waste in nature takes to degrade presents a 0.01 level of significance ($\chi^2=21.726$, $p=0.001<0.01$), by percentage comparison difference could be seen that the proportion of rural areas chose 50-100 years 40.85%, would be significantly higher than the average 30.39%. The percentage of counties choosing 200-400 years, 42.42%, would be significantly higher than the average of 26.96%. The percentage of cities choosing 200-400 years is 34.00%, significantly higher than the average of 26.96%. For item 15, the difference in percentage comparison shows that 70.00% of cities choose landfill, which was significantly higher than the average of 56.37%. The percentage of counties choosing to burn 30.30% would be significantly higher than the average of 16.67%. The rural population chose to burn 23.94%, significantly higher than the average level of 16.67%. The proportion of rural people who choose to recycle, 19.72%, will be significantly higher than the average level of 12.25%. Other “Knowledge items” including 16, 17, and 19, showed no significant differences.(see table 7 below)

NO.	Knowledge Question	Test	Result	<i>p</i>
14	How long do you think it takes for most plastic waste to degrade in nature?	χ^2	21.726	0.001**
15	Where do you think most of the plastic waste currently ends up?	χ^2	24.433	0.002**
16	Do you know that plastic waste can be harmful to marine life?	χ^2	2.155	0.340
17	Please roughly estimate the proportion of plastic products in your daily life: (referring to all plastic products, far more than we think, including chemical fiber clothes, contact lenses, tires, cosmetics, all kinds of plastic packaging and products, etc. Please think carefully)	χ^2	5.395	0.494

19	How do you usually dispose of plastic products in your daily life (especially disposable single-use plastic products)?	χ^2	1.723	0.787
* $p < 0.05$ ** $p < 0.01$				

Table 7: Knowledge part questions, analysis method, and χ^2 Analysis Result.

For the Awareness part, items ten, eleven, twelve, eighteen were scale questions. I used one-way ANOVA to do the analysis. Item twenty-one used χ^2 to analyze the data. There was only the air pollution in item ten that showed a 0.05 level of significance ($F=3.399$, $p=0.035$), and the specific difference in comparison showed that there was a more significant difference in the group mean score comparison results "urban > rural". There were no significant differences in other "awareness items", including other aspects in item 10, and 11, 12, 18, 21. (see table 8 below)

NO.	Awareness Questions	Test	Result	p
10	For each of the items below, indicate how serious the problem is to you: air pollution, global warming, plastic pollution, water pollution (1-5)	ANOVA (F)	3.399	0.035*
			2.520	0.083
			0.191	0.826
			0.936	0.394
11	When you see the plastic waste in your surroundings, how serious do you feel about plastic pollution? (1-5)	ANOVA (F)	0.264	0.768
12	How worried are you about the harm of plastic pollution? (1-5)	ANOVA (F)	0.285	0.752
18	How much do you agree with the recycling of plastic waste? (1-5)	ANOVA (F)	1.119	0.329
21	Which of the following methods do you think is the most effective way to solve plastic pollution?	χ^2	9.371	0.154
* $p < 0.05$ ** $p < 0.01$				

Table 8: Awareness part questions and analysis method, χ^2 and ANOVA Analysis Results.

For the Willingness part, items twenty, twenty-five, twenty-six, twenty-seven, twenty-eight were qualitative questions. For these five items, χ^2 can be used for the results for hometowns. However, all these items showed no significant difference (see table 9 below).

NO.	Willingness Questions	Test	Result	<i>p</i>
20	After understanding the harm of plastic pollution, will you consciously reduce the use of plastic products in your daily life in the future?	χ^2	0.853	0.931
22	What level are the following factors that motivate you to reduce the use of plastic products? Protection of the environment; Pressure from social opinion; Laws and regulations. (1-5)	ANOVA (<i>F</i>)	0.626	0.536
			0.132	0.877
			1.017	0.363
25	On a personal level, what would you be most willing to do to help reduce plastic pollution? (Select the option you think you would be most willing to do)	χ^2	12.757	0.238
26	Considering the severe health hazards that plastic pollution may cause to ourselves and the next generation (your children/grandchildren), are you willing to reduce the use of plastic products now and in the future?	χ^2	3.976	0.409
27	If an alternative product to plastic would be much more expensive but could reduce further plastic pollution, would you choose it voluntarily or be willing to undertake it?	χ^2	0.433	0.980
28	When adopting a relatively environmentally friendly lifestyle, it would make life less convenient (such as bringing your own lunch	χ^2	7.445	0.114

	boxes and dishes, shopping bags, and doing a good job of sorting and recycling waste), do you still have a strong willingness to do it voluntarily?			
* $p < 0.05$ ** $p < 0.01$				

Table 9: Willingness questions and analysis method, χ^2 and ANOVA Analysis Results.

For the Responsibility part, item twenty-three was a multi-scale question. For this item, I used one-way ANOVA for the hometowns category. For item twenty-four, I used χ^2 to do the analysis. And these two items still make no significant difference for 23 and 24. (see table 10 below)

NO.	Responsibility Questions	Test	Result	p
23	At what level do you think the below choices should take responsibility for solving the plastic pollution problem? Governments; Companies; Individuals. (1-5)	ANOVA (F)	2.112	0.124
			1.792	0.169
			0.254	0.776
24	Do you think it would be more useful for the government to launch mandatory policies and regulations to ban certain plastic products?	χ^2	5.661	0.226
* $p < 0.05$ ** $p < 0.01$				

Table 10: Responsibility questions and analysis method, χ^2 and ANOVA Analysis Results.

Whether have children

For the Knowledge part, five items were done on the χ^2 test, including items fourteen, fifteen, sixteen, seventeen and nineteen (see the result below). There was a significant difference between “have children” and “without children” in response to item sixteen, with 94.44% of “have children” responding negatively compared to 100% of “without children” ($\chi^2=6.492$, $p=0.011 < 0.05$). And there was also a significant difference between “have children” and “without children” in response to the item

nineteen, with 46.67% of “have children” responding higher compared to 31.58 of “without children” ($\chi^2=8.138$, $p=0.017<0.05$) about throwing away directly and with 24.44% of “have children” responding lower compared to 42.98% of “without children” about recycling. Other “knowledge items” including 14, 15 and 17, showed no significant difference. (see table 11 below)

NO.	Knowledge Question	Test	Result	<i>p</i>
14	How long do you think it takes for most plastic waste to degrade in nature?	χ^2	4.370	0.224
15	Where do you think most of the plastic waste currently ends up?	χ^2	2.472	0.650
16	Do you know that plastic waste can be harmful to marine life?	χ^2	6.492	0.011*
17	Please roughly estimate the proportion of plastic products in your daily life: (referring to all plastic products, far more than we think, including chemical fiber clothes, contact lenses, tires, cosmetics, all kinds of plastic packaging and products, etc. Please think carefully)	χ^2	0.689	0.876
19	How do you usually dispose of plastic products in your daily life (especially disposable single-use plastic products)?	χ^2	8.183	0.017*
* $p<0.05$ ** $p<0.01$				

Table 11: Knowledge questions and analysis method, χ^2 Analysis Results.

For the Awareness part, items ten, eleven, twelve, eighteen were scale questions to use the T-test method to analyze and twenty-one was a single-choice question to use the χ^2 method to analyze (see the result below). There were significant differences between “have children ” and “without children ” in response to item ten for air pollution and water pollution, with the mean of “have children” 3.93 respondings positively compared to the mean of “without children” 3.61 in air pollution and the mean of “have children” 4.02 responding positively compared to the mean of “without children” 3.72 in water pollution. For item eleven, it showed a strongly significant difference, as well as

the specific comparison difference, could be seen that the mean “have children” (4.21), would be significantly higher than the mean “without children” (3.89). Other “awareness items” including global warming and plastic pollution in 10, 12, 18 and 21, showed no significant difference. (see table 12 below)

NO.	Awareness Questions	Test	Result	<i>p</i>
10	For each of the items below, indicate how serious the problem is to you: air pollution, global warming, plastic pollution, water pollution (1-5)	T-test	2.243	0.026*
			1.181	0.239
			1.798	0.074
			2.063	0.040*
11	When you see the plastic waste in your surroundings, how serious do you feel about plastic pollution? (1-5)	T-test	2.745	0.007**
12	How worried are you about the harm of plastic pollution? (1-5)	T-test	0.608	0.544
18	How much do you agree with the recycling of plastic waste? (1-5)	T-test	-0.915	0.361
21	Which of the following methods do you think is the most effective way to solve plastic pollution?	χ^2	4.945	0.176
* $p < 0.05$ ** $p < 0.01$				

Table 12: Awareness questions and analysis method, χ^2 and T-test Analysis Results.

For the Willingness part, items twenty, twenty-five, twenty-six, twenty-seven, twenty-eight were qualitative questions. For these five items, χ^2 can be used for analysis. Item twenty-two was a scale question that needed to use a T-test to do the analysis. But there were no significant differences between “have children” and “without children” for all “willingness items”. (see table 13 below)

NO.	Willingness Questions	Test	Result	<i>P</i>
20	After understanding the harm of plastic pollution, will you consciously reduce the	χ^2	0.819	0.664

	use of plastic products in your daily life in the future?			
22	What level are the following factors that motivate you to reduce the use of plastic products? Protection of the environment; Pressure from social opinion; Laws and regulations. (1-5)	T-test	-0.077	0.939
			1.127	0.261
			0.200	0.842
25	On a personal level, what would you be most willing to do to help reduce plastic pollution? (Select the option you think you would be most willing to do)	χ^2	3.349	0.646
26	Considering the severe health hazards that plastic pollution may cause to ourselves and the next generation (your children/grandchildren), are you willing to reduce the use of plastic products now and in the future?	χ^2	0.918	0.632
27	If an alternative product to plastic would be much more expensive but could reduce further plastic pollution, would you choose it voluntarily or be willing to undertake it?	χ^2	3.557	0.169
28	When adopting a relatively environmentally friendly lifestyle, it would make life less convenient (such as bringing your own lunch boxes and dishes, shopping bags, and doing a good job of sorting and recycling waste). Do you still have a strong willingness to do it voluntarily?	χ^2	3.019	0.221
* $p < 0.05$ ** $p < 0.01$				

Table 13: Willingness questions and analysis method, χ^2 and T-test Analysis Results.

For the Responsibility part, item twenty-three was used T-test and item twenty-four was used χ^2 for the analysis. However, the results all showed no significant difference. (see table 14 below)

NO.	Responsibility Questions	Test	Results	p
-----	--------------------------	------	---------	-----

23	At what level do you think the below choices should take responsibility for solving the plastic pollution problem? Governments; Companies; Individuals. (1-5)	T-test	0.355	0.723
			-1.385	0.168
			-1.025	0.307
24	Do you think it would be more useful for the government to launch mandatory policies and regulations to ban certain plastic products?	χ^2	4.701	0.095
* $p < 0.05$ ** $p < 0.01$				

Table 14: Responsibility questions and analysis method, χ^2 and T-test Analysis Results.

Summary of all significant results

The below table (Table 15) showed all the significant results in the analysis for this survey. For gender, hometown and whether have children three variables, they all have significant differences in the “awareness part”.

Gender				
NO.	Awareness Questions	Test	Result	<i>p</i>
18	How much do you agree with the recycling of plastic waste? (1-5)	T-test	-2.056	0.042*
NO.	Willingness Questions	Test	Result	<i>p</i>
20	After understanding the harm of plastic pollution, will you consciously reduce the use of plastic products in your daily life in the future?	χ^2	6.231	0.044*
Hometown				
NO.	Knowledge Question	Test	Result	<i>p</i>
14	How long do you think it takes for most plastic waste to degrade in nature?	χ^2	21.726	0.001**
15	Where do you think most of the plastic waste currently ends up?	χ^2	24.433	0.002**
NO.	Awareness Questions	Test	Result	<i>p</i>
10	For each of the items below, indicate how serious the problem is to you: air pollution (1-5)	ANOVA (<i>F</i>)	3.399	0.035*

Whether have children				
NO.	Knowledge Question	Test	Result	<i>p</i>
16	Do you know that plastic waste can be harmful to marine life?	χ	6.492	0.011*
19	How do you usually dispose of plastic products in your daily life (especially disposable single-use plastic products)?	χ	8.183	0.017*
NO.	Awareness Questions	Test	Result	<i>p</i>
10	For each of the items below, indicate how serious the problem is to you: air pollution, water pollution (1-5)	T-test	2.243	0.026*
			2.063	0.040*
11	When you see the plastic waste in your surroundings, how serious do you feel about plastic pollution? (1-5)	T-test	2.745	0.007**
* $p < 0.05$ ** $p < 0.01$				

Table 15: All significant results in the analysis

Chapter 5: Discussion and Conclusion

Introduction

At present, the global plastic pollution problem has become more and more serious, and like a snowball, it will become more and more challenging to solve. If we don't take action immediately, plastic pollution will cause irreparable damage to the earth's ecology, the oceans and our future generations. (Breaking the Plastic Wave,2020) Many ways need to work together to solve this problem. There is no one-size-fits-all solution to plastic pollution. Various researches have sought to verify different methods to solve it, like regulations, circular economy, biodegradable materials, and changing people's consumption behaviors, voluntary simplicity, and degrowth.

The purpose of this research was to try to learn the people's basic knowledge and attitudes about plastic pollution in China. Moreover, the study also sought to find the essential factors that might influence people's awareness and willingness to reduce using plastic products in China's daily life.

Discussion

In the results, according to the three major independent variables: gender, hometowns and whether have children or not. There are several significant differences in the four dependent variables of knowledge, awareness, willingness, and responsibility.

Gender

In the willingness part, item twenty showed a 0.05 level of significance. The difference by percentage comparison showed that the percentage of females choosing yes was 90.43%, significantly higher than the percentage of males choosing 78.65%. The percentage of men who chose not sure was 16.85%, which was significantly higher than the percentage of women who chose 8.70%.

This result showed to some extent that women were more concerned about environmental issues compared to men. In particular, after learning that plastic pollution

may harm children and the next generation, women would pay more attention to this issue and make changes to reduce the effects of plastic pollution. This difference may also be interpreted from a maternal perspective. Women as mothers may be more concerned about their children's food, clothing, and healthy growth than fathers, making women more concerned about environmental health issues. Plenty of researches on environmental concerns discovered that women showed slightly greater environmental concerns than men in the past few decades (McCright & Xiao, 2014). But overall, the percentages were very high for both males (78.65%) and females (90.43%), indicating that people were really worried about the potentially harmful effects of plastic pollution.

Hometown

In the knowledge part, item fourteen and item fifteen showed great significant differences. Furthermore, the results indicated the hometown was for “how long you think most of the plastic waste in nature takes to degrade” presents a 0.01 level of significance, by percentage comparison difference, could be seen that the proportion of rural areas chose 50-100 years 40.85%, would be significantly higher than the average 30.39%. The percentage of counties choosing 200-400 years, 42.42%, would be significantly higher than the average of 26.96%. The rate of cities choosing 200-400 years is 34.00%, significantly higher than the average of 26.96%.

The response to the question asking “where do you think most of the plastic waste currently ends up?”, the difference in percentage comparison shows that 70.00% of people from cities choose landfill, which was significantly higher than the average of 56.37%. The percentage of people from counties choosing to burn 30.30% would be significantly higher than the average of 16.67%. The people from the rural areas decided to burn 23.94%, which would be significantly higher than the average level of 16.67%. The proportion of people from rural areas who decide to recycle, 19.72%, will be significantly higher than the average level of 12.25%.

This result showed that the people from cities and counties know more about plastic than people from rural areas. Plastic waste needs 200-400 years or more to

degrade in nature. And basics were setting that all the respondents have at least a college degree. However, the people who come from rural areas still lack basic knowledge about plastic. Overall, the percentage of people from rural areas choosing 200-400 years only accounted for 27%, which is still low. Considering they are all high-educated people, the popularization of plastic-related knowledge is far from enough. The same situation happened for the current ending of plastic waste. Suppose people can know that plastic can exist in nature for more than 400 years and now the plastic waste is not disposed of well and has generated plenty of environmental problems for people. In that case, they might have more awareness and willingness to change the current situation.

The results indicate that people who come from might have more access to knowledge about plastic than people who come from other areas, especially the rural areas. Another reason is that people who live in cities are surrounded by more plastic products than rural areas, so they have more knowledge about plastic.

Whether have children

In the knowledge part, item sixteen and item nineteen showed separately a 0.05 level of significance and a 0.05 level of significance. Furthermore, the difference by percentage comparison showed that the percentage of those who did not choose yes was 100.00%, which was significantly higher than the percentage of those who did choose 94.44%. For “how do you usually dispose of plastic products (especially disposable plastic products) in your daily life” shows 0.05 level of significance, and the difference by percentage comparison showed that the percentage of those who have children chosen to throw away directly is 46.67%, significantly higher than the percentage of those who have not children chosen 31.58%. The percentage of those who did not choose to recycle (recycling and sorting according to waste classification requirements) was 42.98%, which was significantly higher than the percentage of those who did choose 24.44%. This result is very interesting.

This result indicated that the people who don't have children did better than those who have children, like the people without children would like to recycle the plastic

products in their daily lives instead of just throwing them directly. And the people without children all said they know plastic pollution can be harmful to marine life. These results are not quite the same as expected. Initially, researchers believed that people with children should be more concerned about environmental issues because they need to consider their children and the next generation. However, this result seemed to provide proof to the contrary. Of course, this situation could be due to the lack of sample size. It could instead be due to having children. Those people need to consume more plastic products, create more plastic waste, and consider health and hygiene reasons, they don't choose to recycle plastic products.

In the awareness part, air pollution and water pollution in item ten had a significant difference. Moreover, item eleven showed a strongly significant difference. With more detailed analyses, air pollution showed a 0.05 level of significance, as well as specific comparative differences, could be seen, the mean with (3.93), would be significantly higher than the mean without (3.61). For the water pollution was significant at the 0.05 level, and the difference in specific comparisons showed that the mean value with (4.02) was significantly higher than the mean value without (3.72). For item eleven showed a 0.01 level of significance, as well as the specific comparison difference, could be seen that the mean having children(4.21), would be significantly higher than the mean having no children (3.89).

On this issue, having or not having children does not affect the perception of plastic pollution. The fact that 46.1% of the subjects thought that the current plastic pollution problem was particularly serious and 33.8% thought it was severe indicated that there is still a consensus on the seriousness of plastic pollution. And for item eleven "When you see plastic waste in your surroundings, how seriously do you feel about plastic pollution?", the respondents who have children showed more concern about the situation of plastic pollution. In this point, it can be explained after having children, people would learn more knowledge about the good and harmful things for children, especially the environmental impacts on children's health and development. They will learn more knowledge to protect their children consciously or unconsciously. It's natural

to be parents to nurture children. From this point, if the parents have already awarded the severe situation of plastic pollution now, it might be much easier to make them change their consumption behaviors to be more sustainable and reduce the use of plastic.

Limitations

Although the sample size in this study is large enough and more significant than I thought it would, there were still several limitations to this study. First of all, this limitation was about the sampling plan and sample size. The study took the convenience sample and purposive sampling that constricted the representation of the population. A random sample would be much better in this kind of research. And for the large population in China, two hundred sample-size was still too small. Suppose the advantage of the internet and the popularity of social media could be exploited well. In that case, much more people could be involved in this study to know more about their attitudes to plastic pollution. The purpose of this study would like to explore the root factors to change people's attitudes and raise awareness about plastic pollution and then change their consumption behaviors to be more sustainable and environment-friendly. To make this aim, the more random and the more people involved will be much better.

The second limitation was related to the contents of the survey. The survey was designed by the researchers and might not be the perfect material to measure awareness and willingness. The inherent relationships among knowledge, awareness, willingness and responsibility were hard to measure and explain. The survey should do more pre-tests and make more adjustments to enhance the inner and external validity. And the inner logic between questions should be considered more carefully to make sure the results were useful. The third limitation was the social desirability bias (Marlow, & Crowne, 1961; S Ganster, Hennessey & Luthans, 1983; Grimm, 2010) in the survey. In this study, most of the respondents were aware that plastic pollution is bad for the environment and reducing the use of plastic products in daily life is a good behavior in society. The respondents would prefer to choose the right answer to fit the social value. However, it is very difficult to say that the respondents will do the same things as they reported in the

survey. The social desirability bias cannot be avoided completely in the questionnaire, but this effect should be reduced. For this limitation, the design of the questions is vital for solving the problem. However, this process will take a long time and put a lot of effort.

Last but not least, this limitation was the analysis part. Due to the analysis tool's restrictions and the limited time for the researcher, some of the demographic information could not be analyzed in this study, like the parent's educational level, the current residence, and the age range. These demographic categories could also have some important meanings for further explanations. For example, suppose the city where the respondents live now implements strict recycling policies or have more regulations about banning the use of some kinds of plastic products. In that case, these respondents might know more about the harmful effects of plastic pollution and be more concerned about plastic pollution, and be more willing to change their consumption behavior or to choose a more sustainable way of living.

Other limitations were related to the demographic information. First, the subjects' income levels should be included in the scope of the study. In addition to different levels of education, different income levels may also constrain people from choosing a more environment-friendly and sustainable lifestyle; after all, an environment-friendly and sustainable lifestyle may cost more and require people to have certain financial support. Although income and life choice are not directly related, they do have significance for examination. Furthermore, according to a new McKinsey & Company report *-Sustainability in Packaging in Asia*, In China, more than 65 percent of surveyed consumers are willing to pay more for sustainable packaging (Long, 2021). Second, on the question of whether or not to have children, it should further pursue the idea of whether one intends to have children in the future even if the person does not currently have children, so as to improve the accuracy of the answers to this question. For example, if a person does not have children now but still wants to have children in the future, the person may also think more about the next generation, while those who do not have children and do not intend to have children may think less about the impacts for subsequent generations. This will have a more accurate analysis of the results.

Recommendations

Based on the results of this research, there are some recommendations for future research. First, plastic pollution is a social problem and requires the joint efforts of the whole society. Future research can also expand the targets to more groups, especially children and teenagers, because they are the masters of the future, and cultivating their awareness at an early age will play a vital role in solving the plastic pollution problem and reducing plastic pollution in the future. To know the different groups of people's thoughts about plastic pollution will provide more helpful information for the governments and companies to change their policies for plastic pollution. Second, when designing the questionnaire, some shocking and impressing pictures can be added appropriately to deepen people's awareness of plastic pollution's seriousness and urgency. And by designing relevant questions, it can further analyze whether people's attitudes will change before and after seeing the pictures, which will also help further policies and propaganda against plastic pollution in the future. Third, because China is a large-scale country and the development level of each region varies greatly, in future research, the respondents' current residence can be divided into different groups according to the level of the economy to compare the awareness and attitudes toward plastic pollution among people at varying levels of economic development areas and find out the differences, which can make the related policies adapt to local conditions and be more effective in the future. Finally, raising awareness and the change of actual action still has a long process. Therefore, the questionnaire design should also focus more on the crucial aspects that will lead to real action change while reducing the influence of social approval effects and measuring the factors that are actually useful. It is not easy to discover the influential factors that can influence people's minds, but it is a good try.

Conclusion

Four significant conclusions can be made in this study (Gomes, 2008). First of all, the Knowledge of the hazards associated with plastic and plastic pollution is still far from adequate. Most people still lack basic knowledge about plastic and plastic pollution, not to mention microplastic harm which has already been found in the human placenta and affected the endocrine system (SDG Knowledge Hub, 2021). Second, women perhaps are more concerned about plastic pollution than men, especially in the aspect of reducing the use of plastic products. Third, people from different areas (cities, counties, rural areas) have other plastic pollution ideas. People who lived in cities might know more about plastic knowledge and better understand plastic pollutants than people from rural areas. Last, people who don't have children now seem to do better than people who have children to deal with plastic waste. People without children were more willing to recycle their plastic waste instead of disposing of them directly.

The first conclusion reminded us that although there seems to be a lot of publicity about plastic pollution, people are not aware of the hazards of plastic pollution and plastic products. And this should be reinforced in future publicity. The awareness about plastic pollution cannot be changed overnight. From this perspective, it will be a long process to get people to reduce plastic pollution. However, the current pollution situation also shows that the action to reduce plastic pollution is urgent. In this case, the government should play a more significant role. Perhaps laws and regulations can play a more decisive role now.

The second conclusion indicates that women are more concerned about environmental pollution than men. In Mohai (1997) studies, he discovered that women showed more concern about environmental issues, including conservation, preservation, pollution, etc. It may also be a matter of division of social responsibility. Women are more emotional and attentive and maybe more sensitive to environmental pollution issues. Plus, being mothers by nature, they are more concerned about their children. Therefore all these make women more concerned about environmental issues. This point

can be further demonstrated in future studies with larger sample sizes with more diverse groups.

The third conclusion is that people living in cities are more aware of plastic issues. In cities, people receive more and more intensive information and more channels to the relevant knowledge. On the other hand, perhaps due to the city's density, people are more intuitive about plastic pollution, such as the various plastic packaging products seen everywhere in supermarkets and the plastic garbage stuffed in the garbage bins. Knowing the problem is the starting point for a change in awareness, and if we can take advantage of this point, it will be beneficial to raise awareness of plastic pollution and change people's consumption patterns. The last conclusion seems that more studies are needed to explore whether there is a change in the awareness of people about plastic pollution and consumption patterns by the index of having or not having children. This study's result was a bit unexpected. However, this result might be influenced by combined reasons, like the small sample size, or the high-educated people all have a higher sense of ethics. It is an exciting point to dig deeper. Additionally, there are still some insignificant differences for some categories, like how the price of sustainable products and the convenience of an environment-friendly lifestyle influence people's willingness to change their consumption behaviors. However, in the future, more research might have different results about them.

Recently, the Chinese government has launched plenty of orders forbidding the use of some kinds of plastic products, such as plastic straws, single-use plastic cutlery, and plastic bags in groceries. Attention to the problem is growing in the general public as well, as illustrated by a special feature report about plastic pollution in the famous newspaper-Southern Weekly (*nánfāngzhōumó* in Chinese) named "Plastic" War (*sūzhān* in Chinese) (Southern Weekly, 2020). These special feature reports included the actions for restricting the usage of plastic-related products, some cold knowledge about plastic materials and what we should do in the future with fewer plastic products in our daily lives according to the ban on plastic. Vigorously publicize the hazards of plastic pollution and the huge amount of plastic products used to draw people's attention and concern, in line with national policies. China's National Development and Reform Commission

(China NDRC) has launched a series of administrative orders to restrict the use of some plastic products since 2020. After piloting in major cities in 2020, the "plastic ban" will be rolled out across the provinces in 2022, with the goal of banning plastic in all provinces by 2025. In the next 2-5 years, the plastic ban will be rolled out on a large scale across the country (China NDRC, 2020). These policies include the regulation about the recycling of courier packaging, the ban for single-use plastic straws in all beverage shops, the ban for providing plastic bags in groceries and shops, etc.

Reducing the use of plastic is the most effective solution for solving plastic pollution, and recycling and biodegradable materials are only stopgap measures. Plastic pollution is everywhere now, and frankly, we are taking action to reduce the use of plastic to protect ourselves, not to protect the planet. In the past, our environmental slogans have always wanted to raise awareness of the need to protect the Earth-our home. However, in reality, the earth does not belong to us, and we are just a passing visitor in the development of the earth for hundreds of millions of years, although plastic materials need to take hundreds of years or more to be decomposed naturally, compared to the history of the earth, it is only a snap of the fingers. However, for ourselves, we can't afford the result of plastic pollution, just as climate warming would not impact the Earth, just we can't afford the fatal consequences of climate warming. And it is the same that to reduce the use of plastic products is also in order to save human beings. Therefore, the urgent need to make people aware of the harm and urgency of plastic pollution. Let us work together to save ourselves. According to David (n.d.), "Large-scale problems do not require large-scale solutions; they require small-scale solutions within this kind of large-scale framework." The same logic of the solution for the plastic pollution, it is a large-scale problem now, however, this can be solved by small-scale solutions like all people can have the awareness and willingness to change the situation now, and all people can make small changes every day. Then it is possible to solve this large-scale problem with all our small efforts.

In Gretchen's article (2020), Rob Hopkins talked about his expectation about his new book- *From What Is To What If*:

I hope it will kickstart conversations and help people reevaluate education and their relationship to technology and their relationship to the future. I hope it leads to activists making their activism more playful and inspired. I hope it becomes an antidote to the growing sense of despondence and an argument for why that attitude runs the risk of becoming a self-fulfilling prophecy. I hope it unlocks a whole different way of looking at things.

I don't expect my research can have such influence, but I really hope my research could make people think about the plastic pollution problem carefully. All in all, all the environmental problems are connected with each other, we should find a way to solve them as a whole problem. It means the systematic and fundamental change in our society and government. In that case, we can change the current environmental vicious circle to a virtuous circle to save ourselves. It is the time that we need to take action and make changes for ourselves. In the end, I would like to finish my thesis by quoting Kallis and March's explanation (2014) about Ursula K. Le Guin's opinion about utopia (1974)- "There is no causal link between past and future. Rather, a variety of futures emerge from human action in the present. As a result, the future is always latent in the past" (p. 362).

References

- Brooks, A. L., Wang, S., & Jambeck, J. R. (2018). The Chinese import ban and its impact on global plastic waste trade. *Science Advances*, *4*(6), eaat0131.
<https://doi.org/10.1126/sciadv.aat0131>
- Charles Wagner, *The Simple Life* (1901); Juliet Schor, *The Overspent American: Upscaling, Downshifting, and the New Consumer* (1st ed, 1998). The term voluntary simplicity was coined by Richard Gregg, an American lawyer and committed follower of Gandhi. See Richard Gregg, 'The Value of Voluntary Simplicity,' in Samuel Alexander (ed), *Voluntary Simplicity: The Poetic Alternative to Consumer Culture* (2009) 111-126.
- Chang, H. H. (2021). Exploring consumer behavioral predispositions toward voluntary simplicity. *Current Psychology*, *40*(2), 731–743.
<https://doi.org/10.1007/s12144-018-9994-4>
- China NDRC (Chinese). (2020).
https://www.ndrc.gov.cn/xxgk/zcfb/tz/202001/t20200119_1219275.html
- Choi, A. (2020, April 21). *Why Plastic Waste Is a C-Suite Issue*. Harvard Business Review. <https://hbr.org/2020/04/why-plastic-waste-is-a-c-suite-issue>
- Chowdhury, R. M. (2018). Religiosity and Voluntary Simplicity: The Mediating Role of Spiritual Well-Being. *Journal of Business Ethics*, *152*(1), 149–174.
<https://doi.org/10.1007/s10551-016-3305-5>
- Christoff, P., & Eckersley, R. (2013). *Globalization and the Environment*. Rowman & Littlefield Publishers.
- Colborn, T., vom Saal, F. S., & Soto, A. M. (1993). Developmental effects of endocrine-disrupting chemicals in wildlife and humans. *Environmental Health Perspectives*, *101*(5), 378–384. <https://doi.org/10.1289/ehp.93101378>
- © 2021 Shen Shen

- Crutzen, P. J. (2002). Geology of mankind. *Nature*, *415*(6867), 23.
<https://doi.org/10.1038/415023a>
- D'Alisa, G., Demaria, F., & Kallis, G. (Eds.). (2014). *Degrowth: A Vocabulary for a New Era* (1st ed.). Routledge.
- David, D. F. (n.d.). *WHEEL OF LIFE, THE. LEAN LOGIC*.
<https://leanlogic.online/glossary/wheel-of-life-the/>
- Doherty, D., & Etzioni, A. (Eds.). (2003). *Voluntary Simplicity: Responding to Consumer Culture (Rights & Responsibilities)*. Rowman & Littlefield Publishers.
- Domingo, J. L., & Bocio, A. (2007). Levels of PCDD/PCDFs and PCBs in edible marine species and human intake: A literature review. *Environment International*, *33*(3), 397–405. <https://doi.org/10.1016/j.envint.2006.12.004>
- Doytch, N., & Uctum, M. (2016). Globalization and the environmental impact of sectoral FDI. *Economic Systems*, *40*(4), 582–594.
<https://doi.org/10.1016/j.ecosys.2016.02.005>
- Frost, H., Campbell, P., Maxwell, M., O'Carroll, R. E., Dombrowski, S. U., Williams, B., Cheyne, H., Coles, E., & Pollock, A. (2018). Effectiveness of Motivational Interviewing on adult behaviour change in health and social care settings: A systematic review of reviews. *PLOS ONE*, *13*(10), e0204890.
<https://doi.org/10.1371/journal.pone.0204890>
- Ganster, D. C., Hennessey, H. W., & Luthans, F. (1983). Social Desirability Response Effects: Three Alternative Models. *Academy of Management Journal*, *26*(2), 321–331. <https://doi.org/10.5465/255979>
- Geng, D., Liu, J., & Zhu, Q. (2017). Motivating sustainable consumption among Chinese adolescents: An empirical examination. *Journal of Cleaner Production*, *141*, 315–322. <https://doi.org/10.1016/j.jclepro.2016.09.113>

- Gewert, B., Plassmann, M. M., & MacLeod, M. (2015). Pathways for degradation of plastic polymers floating in the marine environment. *Environmental Science: Processes & Impacts*, 17(9), 1513–1521. <https://doi.org/10.1039/c5em00207a>
- Geyer, R., Jambeck, J. R., & Law, K. L. (2017). Production, use, and fate of all plastics ever made. *Science Advances*, 3(7), e1700782. <https://doi.org/10.1126/sciadv.1700782>
- Gould, K. A., Pellow, D. N., & Schnaiberg, A. (2004). Interrogating the Treadmill of Production. *Organization & Environment*, 17(3), 296–316. <https://doi.org/10.1177/1086026604268747>
- Gretchen, G. K. (2020). *the importance of imagination*. Chelsea Green Publishing. <https://www.chelseagreen.com/2019/the-importance-of-imagination/>
- Grimm, P. (2010). Social Desirability Bias. *Wiley International Encyclopedia of Marketing*, no. <https://doi.org/10.1002/9781444316568.wiem02057>
- Guo, X., Marinova, D., & Hong, J. (2013). China's Shifting Policies towards Sustainability: a low-carbon economy and environmental protection. *Journal of Contemporary China*, 22(81), 428–445. <https://doi.org/10.1080/10670564.2012.748962>
- Hickel, J. (2019). Degrowth: a theory of radical abundance. *Real-World Economics Reviews*, 54–68. <http://www.paecon.net/PAEReview/issue87/whole87.pdf#page=54>
- Hobson, K. (2006). Environmental psychology and the geographies of ethical and sustainable consumption: aligning, triangulating, challenging? *Area*, 38(3), 292–300. <https://doi.org/10.1111/j.1475-4762.2006.00669.x>
- Holmgren, M., Kabanshi, A., Langeborg, L., Barthel, S., Colding, J., Eriksson, O., & Sörqvist, P. (2019). Deceptive sustainability: Cognitive bias in people's judgment

of the benefits of CO₂ emission cuts. *Journal of Environmental Psychology*, 64, 48–55. <https://doi.org/10.1016/j.jenvp.2019.05.005>

Jackson, T. (2005). Motivating sustainable consumption. *Sustainable Development Research Network*, 29(1), 30–40.
https://www.researchgate.net/profile/Antonio_Franco-Crespo/post/What_are_some_of_the_commonly_used_theories_in_Consumer_Behavior_research_articles/attachment/5fcf993b3b21a2000160a712/AS%3A966490496958465%401607440699341/download/Jackson+-+Motivating+Sustainable+Consumption.pdf

Jackson, T., & Michaelis, L. (2003, September). *Sustainable Consumption & Production, Economic, Regeneration*. Sustainable Development Commission, London.
<http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.322.6476&rep=rep1&type=pdf>

Kallis, G., & March, H. (2014). Imaginaries of Hope: The Utopianism of Degrowth. *Annals of the Association of American Geographers*, 105(2), 360–368.
<https://doi.org/10.1080/00045608.2014.973803>

Kormann, C. (2019, September 16). Where Does All the Plastic Go? *The New Yorker*.
<https://www.newyorker.com/news/news-desk/where-does-all-the-plastic-go>

Labonté, R., Mohindra, K., & Schrecker, T. (2011). The Growing Impact of Globalization for Health and Public Health Practice. *Annual Review of Public Health*, 32(1), 263–283. <https://doi.org/10.1146/annurev-publhealth-031210-101225>

Lau, W. W., Shiran, Y., Bailey, R. M., Cook, E., Stuchtey, M. R., Koskella, J., Velis, C. A., Godfrey, L., Boucher, J., Murphy, M. B., Thompson, R. C., Jankowska, E., Castillo Castillo, A., Pilditch, T. D., Dixon, B., Koerselman, L., Kosior, E., Favoino, E., Gutberlet, J., . . . Palardy, J. E. (2020). Evaluating scenarios toward zero plastic pollution. *Science*, 369(6510), 1455–1461.
<https://doi.org/10.1126/science.aba9475>

Le Guin, U. K. (2004). *The Dispossessed*. 1974. *New Y.*

Liu, C., Valentine, G., Vanderbeck, R. M., McQuaid, K., & Diprose, K. (2019). Placing ‘sustainability’ in context: narratives of sustainable consumption in Nanjing, China. *Social & Cultural Geography*, 20(9), 1307–1324.
<https://doi.org/10.1080/14649365.2018.1454978>

Liu, J. (2010). China’s road to sustainability. *Science*, 328(5974), 50.
https://science.sciencemag.org/content/328/5974/50.summary?casa_token=Fn9dURU5WEIAAAAA:CDx19_YWIZoBTiH_0rMIN8ZpUHnhLsJ62kIVZ-gCKh7dxWFLVIKH78-L8n95R0CcHHWMuIdP55Qsng

Long, M. A., Lynch, M. J., & Stretesky, P. B. (2018). The Great Recession, the Treadmill of Production and Ecological Disorganization: Did the Recession Decrease Toxic Releases Across US States, 2005–2014? *Ecological Economics*, 146, 184–192.
<https://doi.org/10.1016/j.ecolecon.2017.10.022>

Long, M. V. T. H. (2021, March 19). *The myth of plastic recycling*. INQUIRER.Net.
<https://opinion.inquirer.net/138554/the-myth-of-plastic-recycling#ixzz6t6AQHDY7>

Lynch, M. J., Stretesky, P. B., & Long, M. A. (2020). The Treadmill of Production and the Treadmill of Law: Propositions for Analyzing Law, Ecological Disorganization and Crime. *Capitalism Nature Socialism*, 31(1), 107–122.
<https://doi.org/10.1080/10455752.2018.1545241>

Marlow, D., & Crowne, D. P. (1961). Social desirability and response to perceived situational demands. *Journal of Consulting Psychology*, 25(2), 109–115.
<https://doi.org/10.1037/h0041627>

McCright, A. M., & Xiao, C. (2014). Gender and Environmental Concern: Insights from Recent Work and for Future Research. *Society & Natural Resources*, 27(10),

1109–1113. <https://doi.org/10.1080/08941920.2014.918235>

McGouran, C., & Prothero, A. (2016). Enacted voluntary simplicity – exploring the consequences of requesting consumers to intentionally consume less. *European Journal of Marketing*, 50(1/2), 189–212.
<https://doi.org/10.1108/ejm-09-2013-0521>

McMichael, A. J. (2013a). Globalization, Climate Change, and Human Health. *New England Journal of Medicine*, 368(14), 1335–1343.
<https://doi.org/10.1056/nejmra1109341>

McMichael, A. J. (2013b). Globalization, Climate Change, and Human Health. *New England Journal of Medicine*, 368(14), 1335–1343.
<https://doi.org/10.1056/nejmra1109341>

Mohai, P. (1997). Gender differences in the perception of most important environmental problems. *Race, Gender & Class*, 5(1), 153–169.
<https://www.jstor.org/stable/41674853>

O'Brien, K. L., & Leichenko, R. M. (2000a). Double exposure: assessing the impacts of climate change within the context of economic globalization. *Global Environmental Change*, 10(3), 221–232.
[https://doi.org/10.1016/s0959-3780\(00\)00021-2](https://doi.org/10.1016/s0959-3780(00)00021-2)

O'Brien, K. L., & Leichenko, R. M. (2000b). Double exposure: assessing the impacts of climate change within the context of economic globalization. *Global Environmental Change*, 10(3), 221–232.
[https://doi.org/10.1016/s0959-3780\(00\)00021-2](https://doi.org/10.1016/s0959-3780(00)00021-2)

Ocean Conservancy & McKinsey Center for Business and Environment. (2015). *Stemming the tide: Land-based strategies for a plastic-free ocean*.
<https://www.mckinsey.com/business-functions/sustainability/our-insights/stemmin>

g-the-tide-land-based-strategies-for-a-plastic-free-ocean

- Peifer, J. L., Chugani, S., & Roos, J. M. (2020). The ethical underpinnings of nonmaterialistic values and voluntary simplicity behavior in the United States. *Psychology & Marketing, 37*(2), 232–249. <https://doi.org/10.1002/mar.21277>
- PEW Charitable Trusts & SYSTEMIQ. (2020). *Breaking the Plastic Wave*. <https://www.systemiq.earth/breakingtheplasticwave/>
- Planet or Plastic? (2018). *National Geographic*. <https://www.nationalgeographic.com/environment/topic/planetorplastic>
- Princen, T., Maniates, M., & Conca, K. (2002). *Confronting Consumption*. The MIT Press.
- Rebouças, R., & Soares, A. M. (2020). Voluntary simplicity: A literature review and research agenda. *International Journal of Consumer Studies, 45*(3), 303–319. <https://doi.org/10.1111/ijcs.12621>
- Rockström, J., Steffen, W., No-one, K., Persson, Å., Chapin III, F. S., Lambin, E., & Foley, J. (2009). Planetary boundaries: exploring the safe operating space for humanity. *Ecology and Society, 14*(2), 1–33. https://www.jstor.org/stable/26268316?seq=1#metadata_info_tab_contents
- Romero-Canyas, R., & Hiltner, S. (2020). Scaling Up and Out: Psychological Science in the Service of Promoting Sustainable Consumption. *Journal of Social Issues, 76*(1), 164–171. <https://doi.org/10.1111/josi.12375>
- Ronen, T., & Kerret, D. (2020). Promoting Sustainable Wellbeing: Integrating Positive Psychology and Environmental Sustainability in Education. *International Journal of Environmental Research and Public Health, 17*(19), 6968. <https://doi.org/10.3390/ijerph17196968>

Schiller, D. (1996). *Theorizing Communication: A History* (1st ed.). Oxford University Press.

Schnaiberg, A. (1980). *The Environment: From Surplus to Scarcity*. Oxford University Press.

Schroeder, P. (2014). Assessing effectiveness of governance approaches for sustainable consumption and production in China. *Journal of Cleaner Production*, 63, 64–73. <https://doi.org/10.1016/j.jclepro.2013.05.039>

SDG Knowledge Hub. (2021, January 13). *Household Plastic Products Disrupt Endocrine System, Threaten Human Health* | News | SDG Knowledge Hub | IISD. <http://sdg.iisd.org/news/household-plastic-products-disrupt-endocrine-system-threaten-human-health/>

Septianto, F., & Lee, M. S. (2020). Emotional Responses to Plastic Waste: Matching Image and Message Framing in Encouraging Consumers to Reduce Plastic Consumption. *Australasian Marketing Journal*, 28(1), 18–29. <https://doi.org/10.1016/j.ausmj.2019.09.002>

Southern Weekly (Chinese). (2020). “Plastic” War <https://www.infzm.com/contents/194667>

Statista. (2020). *Number of active WeChat messenger accounts Q2 2011-Q4 2020*. <https://www.statista.com/statistics/255778/number-of-active-wechat-messenger-accounts/>

Steffen, W., Richardson, K., Rockstrom, J., Cornell, S. E., Fetzer, I., Bennett, E. M., Biggs, R., Carpenter, S. R., de Vries, W., de Wit, C. A., Folke, C., Gerten, D., Heinke, J., Mace, G. M., Persson, L. M., Ramanathan, V., Reyers, B., & Sorlin, S. (2015). Planetary boundaries: Guiding human development on a changing planet. *Science*, 347(6223), 736. <https://doi.org/10.1126/science.1259855>

The Simplicity Collective. (2020). *Simplicity Collective - Join the Simple Living*

Movement. The Simplicity Collective | A Community of People Exploring a Life That Is Materially Simple, Inwardly Rich. <http://simplicitycollective.com>

Tonetto, L. M., & Stein, L. M. (2012). Cognitive psychology and consumption: The impact of the amount of information on goal framing (Psicologia cognitiva e consumo: o impacto da quantidade de informações na configuração de objetivos). *Psicologia: Reflexão e Crítica*, 25(1), 174–181. <https://doi.org/10.1590/s0102-79722012000100021>

Wells, V., & Martin, D. (2017). Research frontiers in cognitive, socio-cognitive, behavioural, social and applied psychology: implications for marketing theory and consumer research. *Journal of Marketing Management*, 33(11–12), 873–877. <https://doi.org/10.1080/0267257x.2017.1337668>

Wikipedia contributors. (2020). *Tencent*. Wikipedia. <https://en.wikipedia.org/wiki/Tencent>

Wikipedia contributors. (2021). *Chi-squared test*. Wikipedia. https://en.wikipedia.org/wiki/Chi-squared_test

Wright, S. L., & Kelly, F. J. (2017). Plastic and Human Health: A Micro Issue? *Environmental Science & Technology*, 51(12), 6634–6647. <https://doi.org/10.1021/acs.est.7b00423>

Xiaoxiao (2018, October 19). Over 90% of table salt is contaminated with microplastics, Asian brands have higher microplastic content. The Huanqiu Website (Chinese website). <https://tech.huanqiu.com/article/9CaKrnKdOI9>

Yan, Y. (2010). The Chinese path to individualization. *The British Journal of Sociology*, 61(3), 489–512. <https://doi.org/10.1111/j.1468-4446.2010.01323.x>

Yan, Y. (2020). *The Individualization of Chinese Society*. Taylor & Francis.

Yu, L. (2014). *Consumption in China: How China's New Consumer Ideology is Shaping the Nation (China Today)* (1st ed.). John Wiley & Sons.

Zavestoski, S. (2002). The social-psychological bases of anticonsumption attitudes.

Psychology and Marketing, 19(2), 149–165. <https://doi.org/10.1002/mar.10007>

Appendix A: English Version of Survey about Plastic Pollution

Survey about Plastic Pollution

I. Demographic Information

1. Gender:

Male

Female

2. Where do you live now: drop-down menu including all provinces and cities in China

3. How old are you: drop-down menu

Under 18;

18-25;

26-35;

36-45;

46 or more.

4. What are your occupations:

school student;

government/cadre/civil servant;

business manager (including junior and senior management);

general employee (office/office worker);

professional (e.g. doctor/lawyer/sports/journalist/teacher, etc.);

general worker (e.g. factory worker/manual laborer, etc.);

business service worker (e.g. salesperson/store clerk/servant, etc.);

self-employed/contractor;

freelancer;

agricultural, forestry, animal husbandry and fishery worker;

retired (e.g. factory workers/manual workers, etc.);

no occupation;

Other____

5. Where is your hometown:

city;

county;

rural.

6. Your education:

- junior high school or below;
- high school/junior high school/technical school;
- community college;
- university bachelor's degree;
- master's degree or above

7. Your father's education is:

- junior high school or below;
- high school/junior high school/technical school;
- community college;
- university bachelor's degree;
- master's degree or above

8. Your mother's education is:

- junior high school or below;
- high school/junior high school/technical school;
- community college;
- university bachelor's degree;
- master's degree or above

9. Do you have children:

- Yes ;
- No.

II. Basic understanding of plastic pollution

Until 2015, we have already produced 8.3 billion metric tons of virgin plastics, and the vast majority-79 percent-nearly 6.3 billion metric tons of plastic are accumulating in landfills or sloughing off in the natural environment as litter-much of it ends up in the oceans, the final sink. And most of the plastic waste is caused by especially single-use plastics.

10. For each of the items below, indicate how serious the problem is to you:

Not at all serious Very serious

Air pollution 1 2 3 4 5

Climate change 1 2 3 4 5

Plastic pollution 1 2 3 4 5

Water pollution 1 2 3 4 5

11. When you see plastic waste in your surroundings, how seriously do you feel about plastic pollution?: [scale question]

(1. not serious 2. slightly serious 3. generally serious 4. very serious 5. very serious)

Not serious at all 1 2 3 4 5 Very serious

12. How worried are you about the harm of plastic pollution: [scale question]

(1. Not worried 2. Slightly worried 3. Generally worried 4. Very worried 5. Very worried)

Not worried at all 1 2 3 4 5 Very worried

13. Where do you get your knowledge and understanding related to plastic pollution mainly from: [multiple choice]

Social media (WeChat/Weibo/DouYin/Douban, etc.)

TV news/radio

Magazines/books

Family/friends

Others _____

14. How long do you think it takes for most plastic waste to degrade in nature:

10-20 years

50-100 years

100-200 years

200-400 years

15. Where do you think most of the plastic waste currently ends up?

Landfill

Fire Incineration

Biodegradation/natural degradation

Recycling

Other _____

16. Do you know that plastic waste can be harmful to marine life?

Yes

No

III. Awareness of plastic pollution

17. Please roughly estimate the proportion of plastic products in your daily life:

(referring to all plastic products, far more than we think, including chemical fiber clothes, contact lenses, tires, cosmetics, all kinds of plastic packaging and products, etc.

Please think carefully.)

More than 90%

70%-90%

50%-70%

Less than 50%

18. How much do you agree with the recycling of plastic waste: [scale question]

Strongly disagree 1 2 3 4 5 Strongly agree

19. How do you usually dispose of plastic products in your daily life (especially disposable single-use plastic products):

Throw them away directly

Reuse (e.g. wash plastic bottles and use them to fill things)

Recycle (recycle and organize according to waste classification requirements)

20. After understanding the harm of plastic pollution, will you consciously reduce the use of plastic products in your daily life in the future?

Yes

No

Not sure

IV. Responsibility

21. Which of the following methods do you think is the most effective way to solve plastic pollution?

Reduce the production and use of plastic products

Establish more effective recycling mechanisms

Reuse plastic products (like extending their life span)
Other _____

22. What level are the following factors that motivate you to reduce the use of plastic products? [Matrix Scale Questions] 1~5

Protection of the environment	1	2	3	4	5
Pressure from social opinion	1	2	3	4	5
Laws and regulations	1	2	3	4	5

23. At what level do you think the below choices should take responsibility for solving the plastic pollution problem? [Matrix Scale Questions] 1~5

Governments	1	2	3	4	5
Companies	1	2	3	4	5
Individuals	1	2	3	4	5

24. Do you think it would be more useful for the government to launch mandatory policies and regulations to ban certain plastic products?

Yes
No
Not sure

V. Willingness to reduce plastic waste

25. On a personal level, what would you be most willing to do to help reduce plastic pollution? (Select the option you think you would be most willing to do)

Reduce the use and purchase of plastic products
Choose more sustainable and environmental-friendly alternatives
Strictly follow the requirements of waste classification
Help raise awareness of the dangers of plastic pollution
Do nothing at all
Other _____

26. Considering the severe health hazards that plastic pollution may cause to ourselves and the next generation (your children/grandchildren), are you willing to reduce the use of plastic products now and in the future?

Yes
No

Not sure

27. If an alternative product to plastic would be much more expensive but could reduce further plastic pollution, would you choose it voluntarily or be willing to undertake it?

Yes

Not

Not sure

28. When adopting a relatively environmentally friendly lifestyle, it would make life less convenient (such as bringing your own lunch boxes and dishes, shopping bags, and doing a good job of sorting and recycling waste), do you still have a strong willingness to do it voluntarily?

Yes

No

Not sure