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8

Plastic Communication Campaigns and Interventions: Foci, Theoretical Frameworks, Variables, and Methods

Ronald E. Rice and Cassandra M. Moxley

Interventions and public communication campaigns seeking to reduce, reuse, recycle, ban, or charge for plastic, especially single-use bags, have increased in recent years, after a lull following their initial appearance in the 1990s. (See Chapter 9 in this Handbook for a review of the background of the production, use, dispersal, and environmental aspects of plastics.) Yet, the nature of these campaigns is wildly diverse, few are explicitly evaluated, and there is no review of these to date. After a brief explanation of public communication campaigns in general, and early public and industry plastic campaigns, the chapter reviews campaigns and interventions about plastic (especially recycling), and identifies central foci and themes in related research.

PUBLIC COMMUNICATION CAMPAIGNS

Public communication campaigns are purposive attempts to inform or influence behaviors in large audiences within a specified time period using an organized set of communication activities and featuring an array of mediated messages in multiple channels, generally to produce non-commercial benefits to individuals and society (Rice & Atkin, 2012). Goals can include education (awareness, inform), persuasion (change attitude or behavior), enforcement (rewards, penalties), and/or engineering (design the environment). Evaluation can include formative (message design, audience analysis), process (how well implemented), and/or summative (effects and impacts). Theoretical foundations range from psychological to organizational to societal. Many campaigns have little or no explicit theoretical foundation or evaluation component.

Communicating about environmental problems in general is becoming more central internationally. For example, the Stockholm Convention on Persistent Organic Pollutants (POPs) (United Nations Environment Programme, 2001) includes Article 9 on information exchange, and Article 10 on public awareness, education, and information. Relating to recycling in general, Miafodzyeva and Brandt's (2013) meta-analysis of studies from 1990 through 2010 concluded that moral norms, information, and convenience were the primary influences, followed by concerns about the environment. Individual motivations based on environmental values,

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convenience, knowledge, economic incentives, and social context have some influence on recycling behavior (PlasticZERO, 2012).

SOURCES FOR REVIEW

During November 2018 through May 2019, we searched online news stories, Google Scholar, Google Trends, online academic databases, YouTube videos, films, websites, and books about these topics or keywords: health effects of plastic particles, microbeads [and ocean], microplastics [and] ocean, nanoplastic, ocean plastic gyres, plastic additives, plastic and polymer pollution on land and in rivers and oceans, plastic bag ban, plastic bag fee, plastic bags, plastic bottles, plastic degradation, plastic effects, plastic environment, plastic recycling campaign, plastic recycling separation, plastic recycling, plastics and climate change, and reusable shopping bag. Recycling sources were included if they mentioned plastic. We then followed references in these to other relevant publications. We emphasized campaign-related materials from the year 2000 to present. Our final set of materials included 112 sources on background and 95 sources on communication and campaigns. Table 8.1 lists some websites about plastic communication campaigns and interventions. Thus, the basis for our review is extensive but not exhaustive.

We entered information about each resource into a spreadsheet, noting, for example, academic characteristics (e.g. peer reviewed, theory or model, literature reviewed, study focus, method, sample, study goals, influences, and outcomes) and project characteristics (e.g. campaign development, evaluation and outcome analyses, funding, campaign name, primary and future implications). The ~~two first~~ authors then separately categorized these characteristics for the same set of 14 publications, met to discuss and revise the meaning and coding of the characteristics, and iterated through two more sets of five publications. The goal was to reach convergence between our understanding of the characteristics, so that we each had the same perspective when coding the remaining publications.

Early Public and Industry Plastic Campaigns

One of the earliest and most influential plastic recycling campaigns was the Kids Against Pollution campaign in 1990 (including a boycott, letter-writing, and mailing back greasy containers to local McDonald's), which helped shift McDonald's away from using Styrofoam clamshell packaging. However, at the time McDonald's was also trying to deal with the ineffective and financially unjustifiable recycling system (Paystrup, 1996). Yet, the limited recycling infrastructure and the low costs of plastic feedstock stymied recycling efforts. One popular campaign response was the "Take the Wrap" demonstration on Earth Day 1993, encouraging participants to mail back plastic refused by their local recycling programs, as the recycling labels on plastics implied a system that did not exist. By 1993, five years of awareness campaigns had only raised plastics packaging recycling to 2.2%.

Industry campaigns initially were designed to counter various plastic-related legislation (e.g. bans and deposits), thus deflecting producer responsibility in order to continue benefitting from their large investments in petroleum resources. Industry efforts then shifted toward hindering the market processes that supported plastic recycling (Paystrup, 1996). Paystrup provides an insightful analysis of the rhetorical strategies used in early plastic industry campaigns. Strategies included recategorizing negative terms into new, supportive meanings or metaphors, thus turning "liabilities into assets" (p. 184) such as framing plastics as a "new natural resource," or repositioning or framing information in ways that promoted plastics, such as the disadvantages of paper

AU: Please provide URL if applicable.

Table 8.1 Websites about Plastic Campaigns and Interventions

A Campaign to Eliminate Plastic Straws Is Sucking in Thousands of Converts
A Plastic Planet
Are Plastic Bag Bans Garbage?
American Recycles Day
#breakfreefromplastic
Beat Plastic Pollution (integrated with World Environment Day)
Cambridge Teams up with MassDEP on "Recycle Right" Campaign
Clean Seas
Closed Loop Ocean
Earth Day Campaigns
Earth Day Initiatives to Ban or Reduce Consumption of Single-Use Plastics
Earth Day Network Campaign: End Plastic Pollution
Growing the Recycling Economy
Here's Why I Stayed a Night in the Plastic Bottle Dungeon
Indonesian city outlaws plastic bags as campaigners push for wider bans
International Campaign against Microplastic Ingredients in Cosmetics
International Pellet Watch
It's All You Recycling Campaign: Behind the Scenes of Chicago's New Recycling Campaign
New York Poised To Be Second State In The Nation To Ban Plastic Bags
NOAA Marine Debris Program
O.Berk: Recycling Games, Tutorials, Videos, Crafts, Lesson Plans, Especially for Primary and Secondary School Students
PECO's Story of How a PET Bottle Is Recycled (South Africa)
Plastic Bag Local Campaign in North Carolina
Plastic Recycling and Redesign Campaign Message from OECD
Plastic Use Reduction Campaign: The Smog of the Sea
RecycleBank
Stop! Micro Waste: For a Plastic Free Nature
The Recycling Partnership
The Wrap Recycling Action Program
UK Pledge 4 Plastics recycling campaign launched September 8, 2014.
UK's RECOUP Initiative: Pledge 2 Recycle
Ways to Communicate about Plastics Recycling
This Is What Happens When a Country Bans Plastic
Zero Waste Month

and glass compared to plastic's benefits. Somewhat in response, legislation turned to focus on developing and implementing recycling labels on plastic packaging, which was, in turn, met with another round of industry campaigns, emphasizing increased costs. Another industry response to criticisms of plastic was to develop the Partnership for Plastics Progress (PPP), with the aim of overcoming "misconceptions" by consumers. Nielsen et al. (2019) analyze the political and industrial forces associated with all stages of the plastic lifecycle.

PLASTIC BAGS

Almost half of the selected literature specifically addresses plastic shopping bags. Various governments, NGOs, and grassroots movements worldwide have taken action in order to reduce plastic bag consumption, generally via introducing fees (charges, taxes, or levies) on, or banning, plastic bags. As of 2018, the United Nations lists 127 nations with plastic bag bans or taxes. In the U.S., nearly 100 state bills have been introduced (Parker, 2019). Gold et al. (2013) summarized the scope and enforcement of international agreements related to plastic marine litter as of 2012,

while Rosemont et al. (2019) reviewed how various countries (e.g. France, Mexico, Canada, Rwanda, and Morocco) have implemented plastic bag legislation.

Bag fee successes. The most frequently cited takeaway from this body of literature is that imposing bag fees is successful at reducing usage and pollution of plastic shopping bags. Bag fees have reduced the quantity of plastic bags in landfills (Environmental Protection Department, 2016). The Sierra Club (2017) notes that plastic and paper bag fees can lead to cleaner streets and storm drains. They advocate for fees for single-use *paper bags* as well, as paper bag production involves more pollution and water usage than do plastic bags. At the point of sale in supermarkets, a plastic bag charge is an adequate financial incentive to immediately reduce the purchase of plastic bags (Jakovcevic et al., 2014) and increase the use of reusable bags (Martinho et al., 2017; Poortinga et al., 2013). A 2007 plastic bag levy (and standardization of bag thickness) in Botswana was largely motivated by the need to reduce pervasive plastic litter which negatively affected tourism and agriculture. Botswana saw a dramatic and sustained decrease in usage, apparently due to an increase of bag fees by 31% (Dikgang & Visser, 2012). However, the amount of the bag fee does not need to be exorbitant; a small, symbolic charge can significantly reduce plastic bag consumption (Luís & Spínola, 2010). Muralidharan and Sheehan (2016) point out that framing a bag charge as "paying a tax" (loss frame) may be more effective than framing reusable bag use as "avoiding a fee" (gain frame) at motivating shoppers to bring reusable bags. How a bag tax or fee is imposed matters. Ireland taxed the bag at the point-of-sale level (individual consumer paid), whereas Denmark did so at the industrial level (retailers paid). The first approach made the costs visible to the consumer, whereas the second did not, resulting in much less reduction in plastic bag use in Denmark (Rayne, 2008).

Bag ban successes. The United Nations Environmental Program concluded that the most effective way to decrease use and waste from single-use plastic bags is an outright ban (Rayne, 2008). Clean Up Australia (2015) notes that "a plastic bag ban is the best mechanism to provide retailers with the economic certainty they require to phase out plastic bags and move to more sustainable alternative bags" (p. 32). People are unlikely to adopt anti-consumption behavior in the absence of negative reinforcement (Sharp et al., 2010); proscription forces non-compliant consumers to comply with bag regulations. Voluntary schemes to reduce bag consumption do not move the needle fast enough (Ritch et al., 2009). Policy initiatives (e.g. banning bags less than 30 microns thick, imposing bag fees on both shoppers and suppliers, and creating consumer awareness campaigns) are necessary to overcome powerful stakeholders' resistance to plastic bag legislation (Rayne, 2008). That being said, ban *enforcement* is as important as the ban itself, as when enforcement is low, a bag ban can easily become ineffective (Gupta, 2011). For example, in spite of Kenya's 2017 strict plastic bag ban, and harsh penalties relating to single-use plastics, two years later, the results are mixed (Mbugua, 2019). Eighty percent of the population reports having stopped using plastic bags (using tote bags, bowls, and baskets instead), and waterways and sewer lines are much cleaner. However, there are problems with the alternatives, including cost, low-quality bags (imported or smuggled in), and inconvenience, as well as uncertainty about what is banned or not, poor waste management, lack of organized cleanups, and weak enforcement. Another problem is that as other African countries do not have such bans, it is difficult to stem illegal supplies of plastic bags.

Creating plastic bag campaigns. Although *awareness* of, *knowledge* of, and *attitude* toward an issue are necessary factors in the process of persuading an individual to change their bag behavior (e.g. reusing plastic bags or buying cloth bags), research repeatedly cautions that campaigns addressing these variables alone are not enough to produce significant, long-term behavioral change (Mustafa & Yusoff, 2011; Zen et al., 2013). Mustafa and Yusoff (2011) note that continuous social support to engage in sustainable bag behavior is a necessary part of

maintaining long-term behavior changes. Continuous social support refers to a sense of social enforcement, suggesting that campaigns should focus on equating sustainable bag behaviors with normative behaviors. De Groot et al. (2013) support this notion of including normative information in campaign messaging. They specify that, among different types of normative messages, *injunctive* normative messages are the most effective. For example, signage inside a market might include "Shoppers in this store believe that re-using shopping bags is a worthwhile way to help the environment. Please continue to re-use your bags" (p. 1837). Additionally, Ohtomo and Ohnuma (2014) found that simple "voice interventions" from cashiers are an effective, no-cost way to reduce to the number of plastic bags distributed. Rather than automatically providing customers with plastic bags at the point of purchase, their voice intervention consisted of cashier simply asking "do you want a plastic bag or not?"

Getting people to bring their own bags to stores is another key step in reducing reliance on plastic bags. However, this requires addressing barriers related to the self-efficacy of remembering to bring reusable bags when shopping (Chase et al., 2009; Lam & Chen, 2006). A campaign can increase self-efficacy for bringing bags by suggesting simple solutions (e.g. always keep extra bags in your car, handbags, or backpacks). In addition to providing consumers with small action steps, Chib et al. (2009) suggest providing specialized information when possible, as it attempts to make a broad fact appear more personally relatable to individuals. For example, a campaign in Singapore might include specialized information such as "Singaporeans use 2.5 billion plastic bags a year. That is 2500 plastic bags per year, for each family. Or almost seven plastic bags a day per family" (p. 688).

A successful consumer-level bag campaign should prioritize campaign messages that emphasize social and environmental motivations, followed by a lesser emphasis on financial motivations (Afroz et al., 2017). In this sense, social motivations and environmental motivations shape our attitude about bag usage to a greater degree than do financial motivations. Jakovcevic et al. (2014) suggest that in order to increase lasting bag behavior changes, a campaign message should strive to link existing financial incentives (e.g. a bag charge) to relevant environmental considerations. Jakovcevic et al. conclude that appealing to intrinsic motivations (rather than extrinsic) helps to drive behavioral environmental change. In order to increase adoption of eco-friendly consumer bag practices, Chan et al. (2007) emphasize appealing to people's ethics. They suggest that bag campaigns should focus on the ethical consequences that result when a consumer does not bring their own shopping bags.

A bag campaign should also attempt to shift cultural norms in order to create a sense of what is acceptable, normative plastic-related behavior, such as fostering a culture of bringing one's own bags (Asmuni et al., 2015). In a field experiment, Ohtomo and Ohnuma (2014) tasked grocery cashiers to not automatically give away plastic bags. Instead, a cashier asked if the customer wanted plastic bags. Bags would not be given away unless the customer responded affirmatively. Not only did this simple, low-cost voice intervention significantly reduce plastic bags consumption, this borders on being a small-scale, incognito campaign.

Overall, bag campaigns should be multifaceted, combining multiple approaches. An effective campaign will attempt to persuade consumers in a variety of contexts and interventions over time (e.g. online forums, giveaways, brochures, signage, interaction with community residents, information interventions, bag alternatives, and monetary incentives) (Guenter et al., 2011; Gupta, 2011; Venkatesan et al., 2018).

The ACP (2017) provides comprehensive materials on its "In Our Hands" campaigns, including the ACP charter, a development timeline, a toolkit with three explicit goals, campaign messaging, social media copy, reporting framework, and background statistics. Thus, it is one of the few plastic campaigns that provides full accessible documentation of its components, as

well as explicit reporting of a variety of measures, social media analytics, readers, aquarium and website visits, emails, etc. The campaign was designed for 19 collaborating aquaria, but available to others as well. Guenter et al. (2011) summarized the extensive formative evaluation conducted to develop social marketing campaign to support a voluntary ban on distribution of single-use plastic shopping bags. The Plastic Bag Reduction (BYO Bag) (2011) campaign in Maui lists specific public service announcement messaging and ten tips to reinforce. As with all communication campaigns, development of plastic campaigns should be guided by scientific research and subject to systematic evaluation (Pahl & Wyles, 2017).

Veiga et al. (2016) summarize the most comprehensive plastic-oriented campaign, the MARLISCO program across 15 coastal countries. The campaign principles and components included formulating clear and research-based messages; assessing perceptions, attitudes, and commitment, before-after for each activity; inspiring action through concrete examples; empowering society through national forums/conferences/webcasts, providing accessible information as well as providing engagement opportunities; raising awareness and providing educational tools for informed decisions and responsible behavior; and developing a collaborative network within and across the participating countries.

Major caveats. Regarding plastic bags, some points require serious consideration. *Leakage* (concomitant increase in *other* bag usage elsewhere) is often overlooked (Taylor, 2019). In Portugal, after the introduction of a tax on plastic shopping bags, the number of garbage bags purchased increased by 12% (Martinho et al., 2017); Taylor (2019) reported a 12.4% increase in California. The purchase of trash bags also increased in Malaysia following policy changes banning plastic bags, as many people had been reusing plastic shopping bags as trash can liners (Zen et al., 2013). Zen et al. suggest that campaigns look at plastic bags from a waste management position and encourage more reusage rather than restricting plastic bags. Addressing poverty-related barriers is also necessary to overcome resistance from disadvantaged stakeholders (Rayne, 2008). For example, in some impoverished regions of the world, plastic bags are a necessary part of disposing of human excrement. Bag bans in these areas are considered cruel and pose a major health risk. In a cautionary tone, Ritch et al. (2009) state that the massive focus on plastic bags is likely a smoke screen pushed by certain industries in order to avoid addressing more profound plastic waste problems. In a similar vein, Bruvoll and Nyborg (2004) offer insight into the mental damage caused by placing the responsibility of recycling on individuals. Ideally, the task of "saving the planet" would be undertaken by large, powerful stakeholders, as they are capable of producing massive, scalable progress. Bruvoll and Nyborg note that rather than feeling a "warm glow" for doing our part, individuals instead feel a "cold shiver" for not being able to contribute enough, which results in decreased well-being.

PLASTIC BOTTLES

Plastic bottle deposit charges do motivate increased recycling, up to as high as 80% in Ecuador and 97% in Norway (Lim, 2020). O'Donnell and Rice (2012) reported that a lack of trust in environmental organizations and scientists, along with issues of taste and convenience, ~~was~~ significantly positively correlated with frequency of drinking bottled water. This suggests that in order to reduce consumption of plastic water bottles, underlying trust issues would need to be addressed, especially for something as vital as safe drinking water. Orset et al. (2017) wanted to better understand the effects of informing consumers on their plastic bottle purchasing decisions. In their experimental survey, participants were informed of characteristics of various types of plastic bottles and their environmental impacts. Participants indicated a greater willingness to

pay for water bottles made from recycled PET bottles and biodegradable plastics, as compared to unrecycled PET water bottles. This indicates that informed consumers at least *try* to make the right decision with regard to the environment. However, Orset et al. caution that there is currently no scientific consensus with regard to which types of these plastic bottles are the least environmentally dangerous.

PLASTIC RECYCLING

Plastic recycling campaigns include two broad categories: household/consumer recycling and campus/school recycling.

Understanding household/consumer recycling behaviors. Households with access to recycling infrastructure may either bring their recyclable waste directly to a recycling facility (a bring scheme) or take part in an organized curbside pickup scheme (a pickup scheme). Bring schemes present a serious barrier of convenience, as storing and transporting one's recyclables to a recycling facility take effort and an appropriate vehicle. Pickup schemes face three barriers: accessibility to a pickup scheme, waste sorting issues, and household space to store and properly dispose of recyclable waste (Briguglio et al., 2016). In order to participate in curbside recycling, a household's neighborhood must take part in an organized curbside recycling scheme and the household must also possess an appropriate recycling bin. Additionally, an effective recycling program requires that households take the effort to correctly separate and place waste in waste bins, and recyclables in recycling bins, which is often not a straightforward task.

Interventions to increase household/consumer recycling. Cotterill et al. (2009) suggest that door-to-door canvassing campaigns can increase household recycling participation. In their campaign, canvassers went door to door to remind households of the curbside recycling program, clarify what can and cannot be recycled, promote the benefits of recycling, and respond to possible arguments against recycling. Haldeman and Turner (2009) found similar success, through canvassing door to door, securing residents' commitments to recycle, and distributing free recycling pickup containers. Residents indicated their willingness to improve or begin participating in curbside recycling, as evidenced by an increase in the number of pounds of waste collected for recycling. Robinson and Read (2005) demonstrated further support for the effect of door-to-door canvassing, as handing out pamphlets highlighting household recycling opportunities and providing free recycling bins increased the frequency with which people used their curbside recycling bins. In a similar vein, Lyas et al. (2004) designed a leaflet field intervention, providing households with motivating recycling messages that were either critical, neutral, or encouraging. Surprisingly, recycling participation decreased after the leaflet treatment, although not to a significant degree. Lyas et al. suggest (as did Nixon & Saphores, 2009) that a psychological, individual approach alone is not sufficient enough to increase recycling participation. While leaflets are successful in raising recycling awareness and knowledge (McDonald & Bell, 1998), treatments that highlight the *collective* benefits of and instructions for recycling are also necessary to encourage recycling participation.

Varotto and Spagnolli (2017) conducted a meta-analysis of literature regarding field interventions of household plastic recycling behaviors. *Social modeling* and *environmental alterations* were the most effective interventions. The researchers define social modeling as "any kind of passing of information via demonstration or discussion in which the initiators indicate that they personally engage in the behavior" (p. 172). This seems to provide explanatory support for the recycling successes resulting from door-to-door canvassing (Cotterill et al., 2009; Haldeman & Turner, 2009; Lyas et al., 2004). Environmental alterations refer to interventions with

the goal of making recycling more accessible and convenient in the physical environment (e.g. increasing the number of recycling bins). Waite et al. (2015) provide additional support for environmental alterations, suggesting that making structural improvements to a collection scheme, such as optimizing the days and frequencies of curbside pickup, is a greater motivator than financial incentives. Additionally, people respond differently to different sources of information. Receiving recycling information from face-to-face interaction (friends, family, work, and school) (Nixon & Saphores, 2009) or informative household leaflets (McDonald & Bell, 1998) is more effective at increasing recycling participation than local press, print, television, and radio. Overall, literature in this area seems to suggest that social modeling of recycling and convenience of recycling behavior are the most effective factors.

Separation of recyclables. An important step toward achieving recycling goals is to improve the separation of recyclable and non-recyclable materials. If a recycle bin is contaminated with non-recyclable material, the bin's contents cannot be recycled and will be transferred to a landfill. To improve waste separation, Timlett and Williams (2008) suggest a three-pronged approach that includes door-to-door canvassing, offering incentives, and giving personalized household feedback. While these three activities were found to significantly improve waste separation, they did not significantly increase recycling participation. They suggest that this could be because recycling participation rates were already high to begin with, which contradicts McDonald and Ball's (1998) research that suggests piggy-backing recycling campaigns by targeting those who already recycle.

Understanding campus/school recycling. School-related (plastic-related) recycling emerged as an additional focal context in recycling literature.

Recycling campaigns and interventions in schools. Chase et al. (2009) evaluated a campus campaign to increase knowledge and awareness of recycling. Campaign representatives secured an information booth at a campus public health event. In addition to completing surveys on their recycling beliefs and behavior at this booth, event attendees received information and a free recycling bin. Participants were contacted three weeks later to fill out a follow-up survey. The two most notable predictors of recycling behavior were the inconvenience or lack of recycling locations and bins. This suggests that campaigns targeting individuals' knowledge or awareness of recycling benefits are not sufficient to produce recycling behavior. Lee (2011) reported similar results about the importance of recycling access on campuses. Prestin and Pearce (2010) conducted formative research through focus groups with students to help inform a U.S. city's efforts at developing a recycling campaign targeting schools. Students' knowledge of and attitudes toward plastic recycling were already positive, but the limited recycling infrastructure made it difficult to engage in recycling.

Researchers at a Hong Kong university engineered 8-compartment plastic recycling bins to be installed around campus and inside residence halls (Chow et al., 2016). The bins included visual aid posters to facilitate ease of waste separation. Chow et al. found a significant increase in the amount of plastic waste collected after the implementation of the new recycling bins. The researchers position the new recycling bins and instructional posters on the bins as an educational tool capable of easing the burden of engaging in proper waste sorting. Lee (2011) and Kaplowitz et al. (2009) provide additional support for reducing the required effort for students to engage in recycling behavior, noting that campaign messages directed at students "should focus more on *what*, *how*, and *where* to recycle rather that messages on *why* to recycle" (p. 612).

Chib et al. (2009) developed and examined the effectiveness of the *[minus]plastic* campaign in Singapore, intended to increase Singaporean youth's awareness of responsible plastic management and ultimately influence related behaviors. In stages over a two-month period, the researchers provided youth with informative statistics and information emphasizing personal impact (e.g.

"Less chili? How about less plastic?" or "Throwing that away? Maybe you can reuse that plastic item.") (p. 689). Chib et al.'s theoretical framework of the temporal incentives model of social influence emphasizes that behavioral change happens incrementally over time, and that people need time to migrate from stage to stage. Results comparing awareness and behavioral intentions both before and after the campaign showed significant improvement.

Recycling curriculum in classrooms. Some campaign attempts at improving student recycling can take the form of in-class learning and teaching strategies.

Learning strategies. So et al. (2016) assessed an educational campaign (the Plastic Education Project) at primary schools in Hong Kong through an inquiry learning strategy framework, whereby "learners are actively involved in critical thinking and reflection on real environmental problems which come from learners' present or future life experiences" (p. 313). Students were exposed to one of three inquiry learning strategies (*hands-on activities*, *games*, or *experiments*) for a 70-minute lesson on the plastic recycling coding system. All three inquiry learning strategies improved students' knowledge and awareness of plastic waste issues; however, there was no improvement regarding intended recycling behavior. Supakata et al. (2016) developed an environmental day camp designed to promote the 3R concept (reduce, reuse, recycle) to elementary students through various activities, and consequently found a significant improvement in students' 3R knowledge. These researchers note, however, that in order to turn this knowledge into meaningful behavior, ongoing, continuous campaigns should be developed.

Teaching strategies. Chow et al. (2017) experimentally examined the effectiveness of three in-class teaching strategies (*direct teaching*, *hands-on teaching*, and *teaching through simulation game play*) on students' knowledge, attitudes, and behaviors regarding the *3Rs* (reducing, reusing, recycling). Students attended one of three 1.5-day courses. Similar to the So et al.'s (2016) study, while all three strategies improved students' knowledge of plastic waste management (with games showing the highest gains), none significantly improved attitudes or behaviors. The researchers suggest that by lengthening the duration of the interventions (the courses), attitudinal and behavioral changes in students may increase. Additional research suggests that sustainability campaigns targeted at students should include games or competitions, because successful sustainability initiatives need high student participation (Lee, 2011).

MARINE POLLUTING PLASTICS

Much campaign literature has positioned the issue of marine polluting plastics as an individual waste management issue, and not as an industrial or production issue. Indeed, some researchers place blame squarely on individuals and communities for contributing the majority of marine litter. Topping (2000) states that littering is a natural human tendency, suggesting the imposition of strong deterrents for individuals (e.g. prosecution and fines) and improvement of local infrastructure to deal with local marine debris. Yet, much ocean plastic pollution is industrial. For example, 6.4 million tons of fishing gear (especially netting) end up in the oceans yearly (whether lost, discarded, or abandoned) (Wilcox et al., 2015).

Individual-focus communication efforts. Hartley et al. (2018) rigorously evaluated the effectiveness of two educational marine litter activities designed to promote individual change. First, they examined an online training course designed to help educators teach marine litter curriculum in classrooms. Results demonstrated that educators were more confident and perceived themselves as more skillful regarding incorporating marine litter curriculum into the classroom. These researchers also evaluated the effectiveness of a marine litter video competition for children. Following the video competition, students reported a greater understanding of marine litter

issues and an increase in their waste reduction behaviors. Overall, educatoin campaigns to reduce individual plastic pollution should continue over time (Xanthos & Walker, 2017).

Other forms of plastic have different harmful impacts on marine ecosystems. After an alarming amount of plastic resin pellets surfaced on beaches worldwide, the International Pellet Watch formed as a campaign to monitor these pellets. The pellets, also known as "nurdles," are a raw material for building plastic products. Yeo et al. (2015) state that such pellets are likely "spilled into the environment during production, packaging, and transportation" (p. 137). Volunteers are encouraged to find plastic pellets on their local beaches and mail the pellets to the researchers' laboratory. There, researchers chemically analyze the pellets for the presence of POPs. This campaign facilitates citizen science, as well as science communication between scientists and the public (Yeo et al., 2015). They developed a model (Fig 6, p. 143) of how citizen science and science communication in the International Pellet Watch program can foster regulation, waste management, monitoring, and eventual reduction of plastics and POPs pollution. Public engagement and science communication are also exemplified in the campaign of the Aquarium Conservation Partnership (2017), a cooperative of aquariums with the goal of using their collective power to impact conservation efforts. The group worked to educate the public, calling upon aquarium goers to avoid single-use plastics, skip the straw, and use reusable bags. The partnership aimed to accelerate consumer engagement in seeking solutions to plastic pollution. By involving consumers en masse, the ACP hoped that this would contribute on a larger scale to apply pressure to federal, state, and local governments to adopt measures to reduce plastic consumption and pollution.

Stakeholder collaborations and policy initiatives. A social marketing campaign, Plastic Bag-Free Esquimalt, sought to foster voluntary reductions in the distribution and use of single-use plastic shopping bags in the British Columbia Township of Esquimalt. Campaign data collected ~~data~~ from a range of stakeholders (e.g. consumers and businesses) underscored the importance of collaboration among all sectors, given the lack of legal authority to impose regulatory mechanisms (Guenter et al., 2011).

At a macro level, Gold et al. (2013) offer a literature review-based policy brief proposing global policy initiatives to reduce plastic marine litter. Suggestions include developing a new international agreement similar to the Montreal Protocol, amending existing international laws to narrow exceptions and improve enforcement, and creating an "Ocean Friendly" certification program for corporations. In a case study of a large-scale European initiative to tackle the issue of marine litter, Veiga et al. (2016) laud this campaign's combination of approaches involving many different stakeholders. The Marine Litter in Europe: Social Awareness and Co-responsibility (MARLISCO) project brought 15 coastal countries with 20 organizational partners together for 80 public exhibitions, a video competition for students, a variety of publicly accessible educational tools, and 12 national events that brought 1,500 stakeholders together. The overall goals of this project were to raise public awareness, engender a sense of co-responsibility, and engage stakeholders to address marine litter. Veiga et al. emphasize that addressing the issue of marine litter does not have a "one size fits all" solution; many different approaches are needed in order to galvanize many different actors.

Based on insights from a Europe-wide survey, Hartley et al. (2015) provide a guide for communicating with stakeholders regarding marine litter. The United Nations Environment Programme (2016) provides a review of global lessons and research with the intent of advising future policy addressing plastic marine debris. High-level suggestions include government involvement to encourage stakeholders on responsibility. Policy affecting private sectors is imperative for environmental change addressing marine litter; however, macro-level policy initiatives fall short when the private sector is often entrusted to regulate their own progress (Penca, 2018). Overall,

literature repeatedly suggests the necessity to involve various stakeholders (in addition to, or other than, the public or individuals).

SPOTLIGHT: CHINA PLASTIC CAMPAIGNS

China is the largest producer and consumer of plastic materials in the world. Ranking at the top in production of several different types of plastic materials, China produced more than 100 million tons of plastic materials in 2017, accounting for nearly 30% of plastic production around the world (Fu & Wang, 2019; PlasticsEurope, 2018). In addition, China contributes the largest mass of mismanaged plastic waste due to still relatively low levels of environmental awareness and the lack of effective legal and administrative regulations (Fu & Wang, 2019). Both regulating production of plastic material and reducing the amount of plastic waste have become increasingly vital concerns for Chinese society, resulting in the import ban on plastic waste in 2017 that has generated broad global impacts (Brooks et al., 2018; NAPCOR, 2018). Following that ban, in an attempt to meet the resulting demand for feedstock plastic, and reduce landfill waste and air pollution, China is trying to improve its own waste recycling (currently only 20%; Morgan, 2019). Though news reports have suggested an increase in plastic recycling campaigns in China, they have rarely been formally reported in popular media outlets, much less systematically studied, evaluated, or reviewed (Halder, 2019; Hu, 2019). Our brief summary of materials available so far shows several interesting characteristics.

First, the authoritarian central and local governments play inseparable roles in supporting, funding, and shaping various public communication campaigns on environmental protection and (plastic) recycling (Cao et al., 2016; Lu, 2007; Teets, 2018). For instance, in collaboration with the Sports Facilities Association and Civil Affairs Department of Shanxi Province, Mobike and Dow Corporate together organized a charitable donation event, held a series of educational workshops in local schools, and donated the first school playground made out of recycled plastic tires. Similarly, supported by the National Development and Reform Commission as well as the Beijing local government, the Alliance of Technological Innovation in Compulsory Resources Recycling Industry (ATCRR) organized a whole-day conference and a public photo exhibition aiming at raising awareness and promoting cross-sectional collaboration between schools, scholars, government officials, for-profit corporates, and non-profit organizations.

Second, community-based campaigns have also been an integral part of public communication campaigns in a wide range of environmental issues, including plastic recycling. This could include both involvement in school-based curriculum and participation in local decision-making processes (Chi-Kin Lee, 2009). Though participation in the decision-making process or political events surrounding environmental concerns is not being actively encouraged, scholars and governments have showed considerable support toward societal participation in the process of promoting awareness or engaging in recycling campaigns (Chen et al., 2012; Deng et al., 2018; Wang et al. 2016). For example, Rendo Ocean, one of the first organizations to focus on issues of ocean garbage and marine ecological protection, facilitated 16 family events to clean beaches and recycle various types of ocean garbage, including plastics, throughout 2018.

Third, the creative combination of online and offline communication channels and the use of celebrities are becoming increasingly popular. Non-profit organizations such as Precious Plastic Shanghai, Rendo Ocean, and Zero Waste Alliance all provide a broad range of services ranging from developing interactive apps, creating promotional videos, and managing social media and digital networks, to designing recycling demonstrations, organizing art exhibitions, or holding private workshops (Wu et al., 2017). Public communication campaigns are also involving

credible public figures. The Enough Plastic campaign in Hong Kong made a short video featuring over 60 celebrities and posted the video on both Weibo, one of the most frequently used social media platforms in China, and Facebook. Corresponding to the online discussion, they recruited over 200 volunteers who went into local restaurants in 15 different districts to distribute posters and brochures related to this campaign (The public service advertisement…, 2019).

Last, sensitivity toward cultural context is critical for the success of public communication campaigns in China. A study of public service advertisements on environmental protection showed that ads that adopted a collectivistic narrative, relied on powerful individuals or entities, used high uncertainty avoidance frames, incorporated long-term orientation, and created messages in a high context manner were more effective at conveying messages toward the audience compared to other approaches in the Chinese context (Sun, 2018). Zhang et al. (2015) examined factors that predicted household recycling behaviors in Guangzhou. Among several significant influences, a sense of moral obligation was significantly associated with attitude toward household recycling, which, in turn, predicted recycling intent and behavior.

One critical issue China still faces is the lack of applicable laws and regulations. Until 1995, China did not have systemic regulations on plastic waste or production of unrecyclable plastic materials (Deng et al., 2018). The 2001 ban on disposable foamed plastic tableware, the 2007 ban on free plastic bags, and the implementation of the Classification System for Municipal Solid Waste were all milestones that marked governmental efforts to promote awareness and regulate the production and use of plastic materials. However, the effectiveness of these regulations remains highly contested. For instance, a number of recent reports pointed out that only a very small proportion of stores and retail businesses strictly followed all the regulations and requirements based on the 2007 ban, ranging from 3.7% to 5% (China Zero Waste Alliance, 2018; Deng et al., 2018). The traditional approach to recycling is having informal waste pickers collect, separate, deliver, and be paid for materials; this approach lacks regulation for proper disposal and material quality is variable. However, a penalty-inducing policy requiring separation of waste into four separate bins (dry, web, recyclable, hazardous), new fleets of municipal waste trucks, and limits on use of plastic in retail businesses are being piloted in Shanghai beginning July 1, 2019 (Morgan, 2019). The policy will be phased in across regions throughout China by 2025. Residents must provide their separated trash to a paid inspector first. However, this exposes residents to embarrassment and conflict. Inspection hours are too limited for young professionals working long days. Some locales include facial recognition cameras at the sorting sites. In some cases, the separated waste is still dumped into the same truck. Lastly, smaller cities will not be able to afford the improvements.

THEMES IN COMMUNICATION AND CAMPAIGNS ABOUT PLASTIC

Theoretical Frameworks in Plastics Campaigns and Research

The selected plastic campaigns studies applied a variety of theoretical perspectives.

The theory of planned behavior. By far, the most commonly cited theory in this body of literature is the theory of planned behavior (TPB) (Chan et al., 2007; Kaplowitz et al., 2009; Lam & Chen, 2006; Muralidharan & Sheehan 2016; Nixon & Saphores, 2009). TPB offers a theoretical model that can be applied to contexts with the goal of persuading others to enact or adopt specific behaviors. This theory takes into consideration the mutual influence that one's attitude toward a behavior, subjective norms about the behavior, and perceived behavioral control over the behavior have on each other. According to TPB, when a person's attitude and perceptions of social

norms align with the desired behavior, and this person feels efficacious enough to perform the desired behavior, this person is then more likely to engage in whatever behavior the campaign is calling on them to do. Thus, a campaign should take into consideration who the target audience is, and correspondingly decide if the campaign should address people's attitudes, people's perception of social norms, and/or people's efficacy in performing the behavior. For example, if the target audience already has a positive attitude about recycling and recycling is socially expected (attitudes and norms), then it would likely be more beneficial for the campaign to focus on ways to make recycling easier (efficacy) (Kaplowitz et al., 2009). However, perhaps in a given location, it is already very easy to recycle (lots of bins, clear instructions, etc.); yet, the community does not seem to engage in recycling behavior. In this case, it would likely be more beneficial to focus on changing people's attitudes toward recycling and present an image that those who do not recycle are violating social norms (Zhang et al., 2015).

Diffusion of innovations. The diffusion of an innovation is "the process through which an innovation (an idea, product, technology, process, or service) spreads… through mass and digital media, interpersonal, and network communication, over time, through a social system" (Rice, 2009, p. 489). Rice notes that an underlying component of the diffusion process revolves around reducing potential adopters' *uncertainty* regarding adopting the innovation. Chib et al. (2009) draw campaign insights from Rogers' (2003) model of *diffusion of innovations,* emphasizing that there is likely overlap between adjacent stages. An overarching point is to determine which stages the target audience belongs to, and where the overlap between stages exists, in order to plan a campaign according to these overlaps. Discovering the uncertainties that prevent the person from fully moving to the next stage may be important to consider in campaign development.

Norm theories. Several variations of theories related to *norms* were used as guiding frameworks, including the focus theory of normative conduct (De Groot et al., 2013), the norm activation model (De Groot et al., 2013; Klöckner, 2013; Nixon & Saphores, 2009), norm dynamics (Clapp & Swanston, 2009), and value-belief-norm theory (Klöckner, 2013; Thomas & Sharp, 2013). Taking a historical and norms approach, Clapp and Swanston (2009) note that early anti-plastic shopping bag campaigns and legislation arose in Bangladesh and India in 1990s, and in the early 2000s in Taiwan and South Africa. Interestingly, the primary rationales for each were different, grounded in the local, cultural, and economic contexts. Only later did such norms and policies emerge in the industrialized regions (Iceland and Australia). In the mid-2000s, the United Nations Environment Programme promoted the norm in Africa, helping to internationalize the norm, although most campaigns are local. The norm began to take hold in the UK and North America in the second half of 2000, with one of the first major urban adoptions in San Francisco in 2007. At the same time, towns and villages in Canada, the UK, Honk Kong, and China, and later in Israel, Italy, New Zealand, and Philippines, were implementing various anti-bag policies. One major UK norm-based campaign was "Banish the Bag" in 2008. If, during the formative research stage, a campaign developer has determined that the primary goal for a campaign should be to influence individuals' sense of what is normative or socially acceptable, then norm theories can help provide inspiration as to what types of campaign messages might be most effective.

Message framing. Message framing has been a frequently used strategy in campaigns seeking to influence environmentally sustainable behaviors (Cheng et al., 2011). While there are many ways to frame a message (e.g. emotionally, logically, ethically, or socially), a commonly researched message frame is the gain/loss frame. When developing a message, one should consider which frame(s) might be most beneficial in achieving desired campaign results. For example, are there *benefits to be gained* by adopting a behavior? Or are there *losses incurred* for rejecting a behavior? When trying to motivate shoppers to bring their own bags, Muralidharan and Sheehan (2016) (and Dawnay & Shah, 2011) noted that framing a message as a loss ("paying

a tax" for not bringing one's own bags) was more effective than a gain frame (avoiding the charge by using one's own bag).

Nudging theory. The goal of nudging is to influence behavior without the use of coercion (Thaler & Sunstein, 2008). Rivers et al. (2017) describe the nudging policy as "an attempt to change the 'choice architecture' that surrounds a decision in order to promote a desired outcome" (p. 154), through small, symbolic, visible, continuous, and default messages and choices. Their longitudinal study positioned bag fees as a small, non-coercive measure that stimulates people's thinking about plastic waste. They suggest that a nudging policy framework is ideal when the goal is to maintain continued compliance, noting that the nudge had no effect on people who infrequently supplied their own bags.

Other approaches. Several other theories appear infrequently in the selected literature. Dikgang and Visser (2012; Dikgang et al., 2012) apply economic approaches, such as regulation or market incentives, including externalities in the price of plastic bags, demand elasticity, and income-distribution effects. Community-based social marketing has been proposed as particularly appropriate for enhancing environmental regulation in general (Kennedy, 2010), and reducing plastic bag distribution in particular (Guenter et al., 2011). Semiotic approaches include Ritch et al.'s (2009) application of consumer policy, stakeholder analysis, and public policy perspectives to seeking changes in deep cultural beliefs about consumption, toward sustainable practices, based on "decoupling consumer behaviour from plastic bag use." Cherrier's (2006) dialectical analyses of consumer interviews revealed a mix of liberal and conservative principles, and involvement of issues such as social norms, self-identity, consumer rights and autonomy, guilt, social meaning of the green bags, moral obligations, emotional affiliation, political discourses, and personalization. Several studies take a "citizen science" perspective. For example, International Pellet Watch encourages volunteers to collect and send in samples of beach plastic resin pellets, which promotes greater awareness and understanding of issues, citizen advocacy, and development of new projects (Yeo et al., 2015).

COMMON VARIABLES IN PLASTIC RESEARCH

Notable explanatory variables. The most common predictor variables are *knowledge* and *attitude* regarding various plastic issues. This is likely due to the fact that the TPB has been a dominant guiding theoretical framework in this body of literature (noted above). Some studies assessed subjects' current level of knowledge and attitudes, in order to correlate those with various desired behaviors (Afroz et al., 2017; Davis et al., 2006; Lam & Chen, 2006; Mustafa & Yusoff, 2011; Zhang et al., 2015). Other research attempted to experimentally influence subjects' knowledge and attitudes in order to induce desired behavior (Chase et al., 2009; Chib et al., 2009; Chow et al., 2017; Muralidharan & Sheehan, 2016; So et al., 2016; Supakata et al., 2016).

While each of these studies is individually insightful, a variety of covarying factors and contradictory findings make it difficult to characterize the bigger picture. Through a meta-analysis of TPB literature addressing how to produce environmentally relevant behavior, Klöckner (2013) found that one's *perceived behavioral control* and *habits* were the strongest predictors of environmentally relevant behavior. Oftentimes, the main predictor variable in this type of research is the treatment or intervention itself. Treatment can take many forms, including communication campaigns (Chase et al. 2009; Chib et al., 2009), canvassing (Cotterill et al., 2009; Timlett & Williams, 2008), educational programs (Supakata et al., 2016), and proscriptive policy such as bag bans (Sharp et al., 2010) and bag fees (Martinho et al., 2017). Socio-economic factors also emerged frequently as predictor variables. Generally speaking, those with higher SES simply

have access to more resources that ease the burden of recycling (Briguglio et al., 2016; Nixon & Saphores, 2009). These people are also able to pay a higher premium for more "environmentally friendly" products (Orset et al., 2017).

Notable outcome variables. The most common outcome variables centered around eco-friendly *behaviors*, including participation in recycling programs (Chase et al., 2009; Nixon, & Saphores, 2009) and bringing reusable bags when shopping (Asmuni et al., 2015; Lam & Chen, 2006; Jakovcevic et al., 2014). Others include frequency of drinking bottled water (O'Donnell & Rice, 2012), and willingness to pay for various types of plastic water bottles (Orset et al., 2017) and plastic bags (Venkatesan et al., 2018). When behavior was not measured, often *intention* to perform a behavior was assessed (e.g. intent to bring your own bag (Chan et al., 2007); intent to reduce usage of single-use plastics (Chib et al., 2009); intent to engage in recycling behavior (Davis et al., 2006)). In some cases, aggregate behavior was measured by observing the volume of recyclables collected during specific time frames (Haldeman & Turner, 2009), the accuracy of waste sorted in recycling bins (Chow et al., 2016), the number of plastic bags issued monthly to supermarkets (Dikgang et al., 2012), and the weight of trash bags purchased (Taylor, 2019).

METHODS FOR PLASTIC COMMUNICATION RESEARCH

The following sections discuss a variety of methodologies used to examine plastic campaigns and communication, emphasizing first quantitative methods and statistical rigor, and second qualitative and mixed methods.

Quantitative methods. Cross-sectional surveys were the most common method used to assess a variety of plastic-related outcome variables. These include plastic bottle consumption (O'Donnell & Rice, 2012), willingness to participate in recycling (Afroz et al., 2017), the impact of recycling on self-image (Bruvoll & Nyborg, 2004), knowledge and awareness (Kaplowitz et al., 2009; Zen et al., 2013), perceived effectiveness of recycling (Kaplowitz et al., 2009), behavioral intentions (Chan et al., 2007; Davis et al., 2006), recycling behaviors (Davis et al., 2006; Halvorsen, 2012; Lee, 2011; McDonald & Ball, 1998; Nixon & Saphores, 2009; Robinson & Read, 2005; Vicente & Reis, 2008; Zhang et al., 2015), plastic bag behaviors (Musa et al. 2013; Mustafa & Yusoff, 2011; Sharp et al., 2010), and willingness to pay for environmentally friendly plastic products (Orset et al., 2017).

Some research employed experiments and experimental surveys in order to assess outcomes such as attitudes and knowledge regarding plastic waste (Chase et al., 2009; Chow et al., 2017; Hartley et al., 2018; Supakata et al., 2016), recycling behavior (Chase et al., 2009; Chow et al., 2017; Cotterill et al., 2009; Lyas et al., 2004; Timlett & Williams, 2008), plastic bag behaviors (Martinho et al., 2017; Ohtomo & Ohnuma, 2014; Poortinga et al., 2013), volume of waste collected (Chow et al., 2016; Haldeman & Turner, 2009), volume of trash bags purchased (Taylor, 2019), and accuracy of sorting waste (Chow et al., 2016). Research examining archival and aggregate data provides insight into outcome variables such as recycling rates (Briguglio et al., 2016; Waite et al., 2015), city recycling costs (Burnett, 2013), the quantity of plastic bags issued monthly by super markets (Dikgang et al., 2012), plastic bag behaviors (Rivers et al., 2017), and volume of recyclables collected (Waite et al., 2015).

Pahl and Wyles (2017) emphasize the need and possibilities for rigorous social and behavioral research (design, data collection, and analysis) in environmental studies (in their case, microplastics). Some publications were intended to be descriptive, non-technical reports to non-academic audiences, or were qualitative in nature, so reasonably did not include statistical analyses. However, some of the selected publications only reported descriptive statistics despite

collecting rich quantitative datasets. This approach can severely constrain the claims that can be made about their findings (Lee, 2011; Venkatesan et al., 2018), or lead to advocating otherwise contradictory positions (Ayalon, et al., 2009). Some studies do report significant differences in survey-based reporting of plastic recycling attitudes or behaviors across demographics, access, or intervention conditions (Nixon & Saphores, 2009; Supakata et al., 2016) as well as apply multivariate analyses (Afroz et al., 2017; Muralidharan & Sheehan, 2016).

Dikgang et al. (2012) used a variety of data and methods in their study of the waning effects of a South African plastic bag levy in 2003, including econometric and five-year time-series analysis of monthly issuing of bags by four supermarket chains, each with a distinct income-based audience. Poortinga et al.'s (2013) analysis of the single-use plastic bag charge implemented in Wales in 2011 implemented a quasi-experimental field study, with baseline and post-national surveys, in both Wales and England (which had no bag change). In addition to significantly higher increases in reusable bags in Wales, self-reported waste-conscious environmental identity also increased. Gupta (2011) provides another superb example of rigorous sampling and treatment design, analyses, and economic aspects, in a campaign encouraging shoppers to bring their own bag. The field experiment applied differing and sequenced treatments (information via banners, t-shirts, and local advocates; cash-back for non-plastic bag use; and provision of plastic bag substitutes, testing for the effects of negative versus positive information) across cluster-sampled fruit, vegetable, and grocery vendors in the semi-organized market sector (fruits, vegetables, grocery shops) of Delhi, India, across multiple time periods. Overall, analyzing over 20,000 unique observations of consumers across all these conditions showed strong effects of switching from plastic bags to own bag use, with incremental increases in each condition, with differences also by type of shop, and consumer gender, age, occupation, and income. Gupta (2011) also conducted demand curve and elasticity analyses, which showed declines in plastic bag use demand associated with different pricings.

Qualitative methods and mixed methods. Field observations are a common qualitative method in plastic communication research (Cherrier, 2006; Jakovcevic et al., 2014; Luís & Spínola, 2010). Asmuni et al. (2015) conducted field observations of consumers' bag behavior in supermarkets following the implementation of in-store messaging that provided information about a bag fee, and suggested that above all, a cultural shift is necessary in order to reduce plastic bag usage. Gupta (2011) observed interventions such as providing the customer with information, providing bag substitutes, and offering a cash-back scheme for reusable bags, concluding that enforcing a blanket ban on plastic bags is most effective. Japutra et al. (2013) employed field observations, interviews, and expert reviews, in order to find ways to reach recycling goals, emphasizing that campaign messaging should be tailored for various stakeholders.

Case studies have also been frequently used in plastics research. A case study (with simple before-after statistics, interviews with retail leaders and householders, and policy analysis) by Convery et al. (2007) showed how a product tax (Ireland's 2002 15 Euro plastic bag fee), representing one way of representing negative externality costs of plastic use, can substantially and quickly influence consumer behavior and environmental benefits in a cost-efficient way. Rayne (2008) highlighted cases of "garbage villages" emerging in a number of African countries due to mismanagement of plastic waste in landfills. This case serves to highlight how the resistance of powerful stakeholders can drastically and negatively impact impoverished stakeholders, to the point of living atop piles of garbage and petrochemical-based plastics. The most comprehensive and integrated set of case studies and statistical analyses in the realm of plastic campaigns is applied to MARLISCO (the Marine Litter in European Seas: Social Awareness and CO-Responsibility), a European coalition of 15 countries and 20 stakeholders. Veiga et al. (2016) underscore that solving the issues related to plastic litter (specifically plastic marine litter) does

not have a "one size fits all" solution. Rather, the MARLISCO project demonstrates how a combination of many different activities involving many actors over time can be a highly effective way to reduce plastic litter.

Focus groups can provide insight into the knowledge, attitudes, and behaviors of various communities. Chib et al. (2009) and Prestin and Pearce (2010) employed focus groups in order to better understand people's knowledge about and attitudes toward plastic in various communities. In an effort to improve classroom curriculum, So and Chow (2018) examined the effectiveness of the Plastic Resources Education program by drawing from focus groups of teachers.

Interviews can also generate targeted feedback that might otherwise go unnoticed in quantitative research (Ayalon et al, 2009; Cherrier, 2006). For example, Zen et al. (2013) interviewed stakeholders from various consumer groups, industry associations, and government organizations in Malaysia in order to better understand issues and obstacles related to reducing plastic bag production and usage. Chib et al. (2009) demonstrated the power of using in-depth interviews (followed by focus groups) during the formative research phase of developing campaign messaging to address attitudes toward plastic. Dikgang and Visser (2012) interviewed representatives from various supermarkets in order to better understand concerns faced by retailers with regard to plastic bag legislation. In an effort to compare the effectiveness of policy versus campaigns when addressing plastic marine litter, Willis et al. (2018) conducted interviews of waste plant managers from 40 locations in Australia. The insight from these interviews suggests that communication campaigns will lead to a greater reduction in plastic waste than will policy changes. They note that investing in outreach campaigns alongside providing access to recycling bins are key to reducing marine litter. Cherrier (2006) analyzed phenomenological interviews and observations about ethical rationales in using "environmentally friendly" grocery shopping bags. Reusable bags are also symbolic, social, and ideological possessions and social constructions. These themes and insights can provide bases for campaign message development.

INVOLVING STAKEHOLDERS IN CAMPAIGNS

Whether building a campaign addressing recycling, marine pollution, reduced usage, or banning plastic products, in plastic waste research, there is a resounding call for campaigns to involve multiple stakeholders and target campaign messages accordingly in order to achieve meaningful, sustainable change (Hartley et al., 2015; Japutra et al., 2013; Supakata et al., 2016; Zen et al., 2013). While a study of recycling in general rather than plastic specifically, Lee and Krieger (2020) interviewed a stratified sample of 30 country recycling coordinators in England on their approaches, generating two primary themes: communication accommodation (aimed at reducing knowledge deficits, or at uncovering interpretations of recycling messages through interactions), and campaign customization (audience-centric, multiple channels, or single channel/outlet), leading to six categories. While each had its benefits and challenges, the authors rejected the one-way communication model and recommended the more dialogic, participative, and multi-media approaches emphasizing community values and shared meaning.

CONCLUSION

This chapter reviewed a variety of communication activities about plastic and attempts at public communication campaigns to address plastic-related issues. While we find an abundance of focus (and blame) on individual-level efforts, the industrial sectors' lack of commitments to recycle

and reduce plastic production is deeply troubling. Global producers of plastic are powerful stakeholders and their participation is a necessary piece of the puzzle to produce meaningful, sustainable improvement to plastic issues. However, progress from within these industries is too slow to outpace the rate of growing plastic issues. By using appropriate theory and methods, following effective campaign principles, and involving a wide variety of stakeholders, environmental and plastic recycling campaigns can improve awareness, understanding, behavior, and policy.

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