Out of Sight, Out of Mind: Plastic Waste Exports, Psychological Distance and Consumer Plastic Purchasing

Abstract

Per capita consumption of plastic continues to increase and remains at high levels in high-income countries, despite obvious contributions to the global problem of plastics pollution. This paper attempts to provide an explanation for this phenomenon based on construal level theory, positing that plastic waste is a problem that is perceived as "out of sight and out of mind" for consumers in high plastic consumption (typically high income) countries and that this is influenced by the export of plastic waste to other (typically lower income and lower consumption) countries for disposal – shifting the burden of mismanaged plastic waste and perceptions of plastics pollution in the countries creating the majority of plastic waste. The apparent lack of plastics pollution in a local environment becomes a mediator, influenced by the export of plastic waste, which may then contribute to further plastics consumption. The theory is tested using structural equation modelling using rare, available matched data for mismanaged plastic waste, plastic waste exports, and plastics consumption at an aggregate country level. All study hypotheses are supported. The paper concludes with recommendations for future research and practice, including potential changes to government policy aimed at reducing future plastics consumption and pollution.

Keywords: Plastic pollution; plastic waste exports; construal level theory; psychological distance; consumer plastic purchasing.

1. Introduction

Plastic is an inexpensive, plentiful, and versatile man-made organic compound that has grown rapidly in terms of the production and consumption of goods since the 1950s, from a mere 2

million metric tons in 1950 to a massive 322 million metric tons in 2015 (Geyer et al., 2017). Unfortunately, most plastic is not biodegradable, and at the end of its useful life plastic must either be recycled, destroyed or discarded. Herein lies the problem: of the approximately 8.3 billion metric tons of plastic ever produced (to 2017), recycling and incineration are relatively underused, and 4.9 billion metric tons of plastic is still in our planet's environment (Geyer et al., 2017), such as landfill, natural land environments and, increasingly, our oceans and waterways (Barnes et al., 2009). This can create severe deleterious effects for both land-based and marine ecosystems, which are only now becoming better understood, whereby plastic waste in a natural environment may reduce into smaller particles and enter food chains, with harmful results (Setälä et al., 2014).

Public awareness of the effects of plastics pollution on the natural environment is building, developing momentum for public policy. Television documentaries such as Blue Planet II (BBC Worldwide, 2017) have been important in building public awareness and galvanising public debate. Initial policy focus has particularly homed in on single-use plastics and packaging (the latter is responsible for 45% of all plastics production), including for example new policies within the European Union to ban or limit production and use of the most polluting products affecting beaches and seas (European Commission, 2018a). The UK government is planning the introduction of a tax on 'bad plastics', particularly the most damaging single-use items such as coffee cups, carbon black plastic, straws, lids and cutlery (Morley, 2018).

As plastics use has expanded quickly, so have difficulties in plastic waste management. While recycling and reuse are often suggested as key solutions, the reality is that more than half of waste earmarked for recycling is exported overseas (Brooks et al., 2018), and since 1992, nearly half of this has been imported into China. Most developed

50 countries lack sufficient capacity to recycle the large volumes of plastic waste produced and
51 have relied on exporting the waste (Parker and Elliot, 2018; Parveen, 2018).
52 Another issue is that plastic waste exports have flowed from affluent OECD countries
53 to poorer East Asian and Pacific nations, who received 70% of OECD plastic waste in 2016
54 (Brooks et al., 2018). However, such an approach to waste management is inevitably
55 unsustainable, especially as developing nations begin to develop environmental policies
56 which may inhibit such trade. Indeed, in 2017, China introduced a total ban on the import of
57 plastic waste from nonindustrial sources, including consumer packaging and single-use
58 disposable goods (Chinese Ministry of Environmental Protection, 2017). While in the past
59 China has seen consumer plastic waste as a source of raw material for manufacture, in recent
60 years import policies have become more restrictive as part of the "Green Fence" operation,
61 which has sought to increase the quality of plastic waste, while avoiding dependence on
62 particular importers and reducing illegal plastic waste imports (Brooks et al., 2018). While
63 the majority of plastic waste imported into China is recycled, it does not have fully developed
64 waste management systems, and contaminated waste finds its way into the oceans, estimated
65 at 1.3 to 3.5 million metric tons per annum (Jambeck et al., 2015). There were noted
66 problems with waste leakage and illegal or inadequate plastic waste imports processing, such
67 as from small-scale firms and contaminated waste (Velis, 2014). Further, evidence suggests
68 that imported waste exacerbates problems with managing waste in China, and between 2010
69 and 2016, imported plastic waste added 10 to 13 percent to China's domestic waste problem.
70 The Chinese ban on non-industrial plastic waste imports has created enormous knock-
71 on effects for global plastic waste exports and recycling. This has included huge increases in
72 the costs of recycling, more incineration of plastics, more plastic waste landfill, stockpiling of
73 recyclable plastics, and exporting plastics to other countries for processing. Plastics
74 processing costs for China were comparatively very low, with low costs for shipping plastic

75 waste (in otherwise empty cargo vessels) and low labour costs; an estimated 95% of EU and
76 70% of US plastics earmarked for cycling were sold and shipped for processing in China
77 (Katz, 2019). In the wake of increased costs and a lack of recycling capacity, England
78 incinerated 0.67 million more tons of plastics waste last year, while Australia has
79 accumulated stockpile of recyclable waste of around 1.3 million tons (Katz, 2019; Parker and
80 Elliot, 2018). Some areas of the US have stopped recycling municipal plastic waste due to the
81 high costs and low revenues from recycling. Developed countries (such as the US and UK)
82 have also begun to send plastic waste to other countries, often with extremely poor waste
83 management practices (Parveen, 2018). This provides an important juncture at which to
84 reconsider the policy of distancing plastic waste by export (Dauvergne, 2018) to develop real
85 solutions to rapidly increasing global plastic consumption.
86 Some developing countries continue to import plastic waste because it provides a
87 source of income. In some cases, the import of plastic waste is subsidised (The Guardian,
88 2018) and provides a direct source of income. In other cases, the waste can provide a
89 resalable resource via processing and recycling plastics suitable for reuse (Velis, 2014).
90 However, many developing economies often have adequate waste management
91 infrastructures that cannot cope with excess waste, leading to excessive plastic waste leakage
92 into the natural environment, including via some plastic waste sites location on coastlines
93 (Chow, 2015). Some processing countries, such as Malaysia, have questioned the practice of
94 importing plastic waste and have started to send back plastic waste from developed
95 economies (Daniele and Regan, 2019).
96 We contend that exporting waste, local pollution and plastics consumption are related
97 issues, asserting that exporting waste from a local environment reduces perceptions of local
98 waste mismanagement which indirectly influences consumers to purchase more plastic
99 products. The key research question addressed in this study is: Does exporting plastic waste

100 from a country to improve a local environment indirectly influence plastics consumption?
101 The research question is examined through the lens of construal level theory (Trope and
102 Liberman, 2003), which suggests that people's mental representations of psychological
103 distance (in time, in space, socially, and hypotheticality) are important in their interpretation
104 of events and objects, influencing how they behave towards them. A research model is
105 developed and tested at a macro-level using structural equation modelling and available data
106 from 49 countries around the globe.
107 This paper is structured in the following way. In the next section we introduce the
108 underlying theory for the research, construal level theory, and this is followed by the
109 introduction of the research model and hypotheses examined in the study. Section four
110 describes the methodology used for the investigation, whilst the penultimate section provides
111 the empirical results of the analysis. Finally, the paper rounds off by discussing the key
112 findings, delineating possible implications for policy and future research, noting study
113 limitations, and providing concluding remarks.
114

115 ## 2. Construal Level Theory and Environmental Pollution

116 In this section we introduce the theory underpinning the study, construal level theory, which
117 contends that people tend to take a simplified "helicopter view" of phenomena as
118 psychological distance from an object or event rises. We also examine some of the few
119 studies that have suggested or employed the possible application of construal level theory to
120 understanding behaviour regarding environmental pollution.
121

122 ### *2.1 An Introduction to Construal Level Theory and Psychological Distance*

123 In essence, construal level theory (CLT) refers to the differences in an individual's
124 representation of information according to how close or far away it is from them in time,

social distance, space, or hypotheticality (Trope and Liberman, 2010). This can occur, for example, in situations where one thinks about remote locations, perspectives of other people, the future or past, and possible alternative realities (Trope and Liberman, 2010). The reference point for psychological distance is the self in the here and now, whilst hypotheticality, time, social distance and space embody possible distance dimensions. As an individual transcends the current self and begins to think about points along these dimensions that are farther removed from their own, direct experience, so higher and more abstract the level of mental construal becomes (Trope and Liberman, 2003). Thus, higher-level construal refers to the abstract, simplified overview of phenomena taken by individuals as their psychological distance from an object or event increases. At lower levels of construal, individuals are psychologically proximal to events and phenomena, where there is a lot of concrete, real-time, incidental information and "noise" that make it difficult to "see the wood for the trees."

The differences between high- and low-level construal can be illustrated by means of some examples. Ledgerwood et al. (2010) found that individuals with concrete, proximal views evaluated health policies with circumstantial, incidental, low-level information, including information from others that are psychological proximal, such as friends and family (low-level construal). In obverse, individuals who considered the same policy via more distant, abstract perspectives were guided by broader, overarching values, which tent to be more stable in different situations (high-level construal). Forster et al. (2004) found that distant future perspectives regarding time engender abstract thinking, but near future perspectives facilitate concrete thinking. Participants in Forster et al.'s study found that those who imagined their lives and carrying out a task in a year's time performed more strongly on tasks requiring insight (more abstract), whereas those focused on the immediate future were better equipped for analytical problem solving.

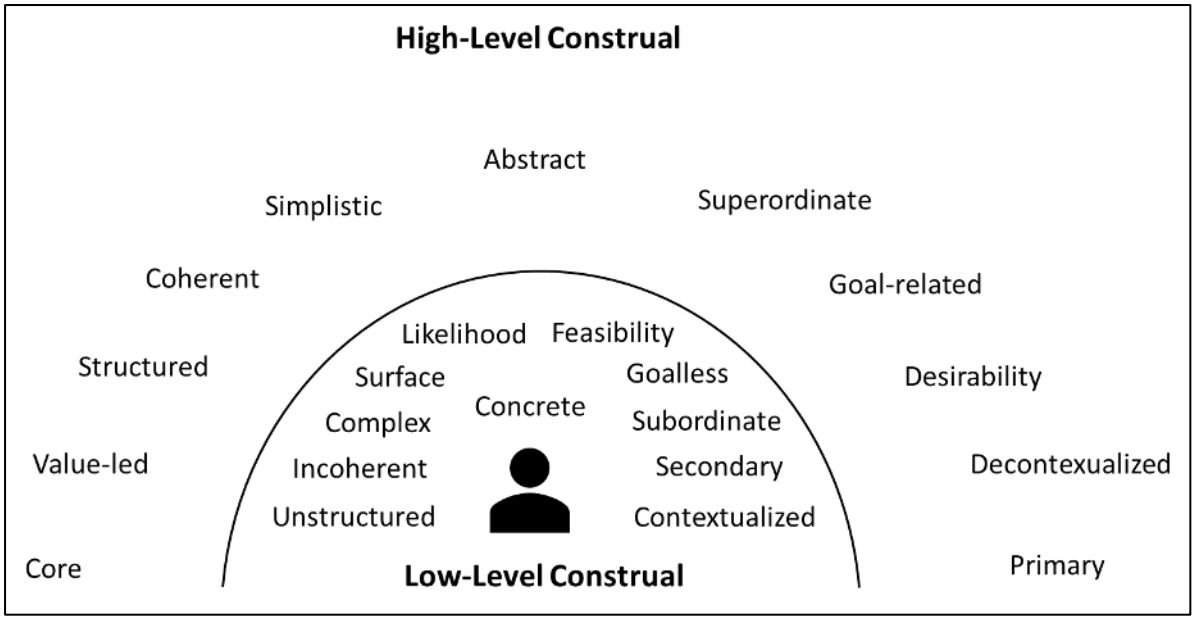
Eyal et al. (2004) demonstrated empirically that cons are subordinate to pros in mindsets and their role will vary depending upon psychological distance; thus, when cons are subordinate to pros, pros become more salient as distance from an event increases, but cons will become less prominent as distance from an event increases. Eyal et al. (2004) examined the centrality of altruism (helping a friend) vs. achievement (getting ahead by working extra hours) values in predicting near and distant behavioural intentions; Eyal et al. (2004) found that when multiple values are relevant to a psychologically distant situation, predominant, central values become uppermost in an individual's thinking, while plans in the near future are less likely to reflect the distinction between central and secondary values.

Liberman and Trope (1998) found that high-level construal of an activity tends to accentuate desirability issues ("why" of an action) whereas low-level construal of an activity tends to underline feasibility issues ("how" of an action); thus, in the context of the interest (desirability) and convenient timing (feasibility) of a university guest lecture, as psychological distance increases, desirability issues become more dominant over feasibility concerns. Thomas et al. (2006) extended this thinking to consumer choice and purchasing, demonstrating that feasibility-related information will impact near purchase intentions more than those of the distant future, whilst desirability information more strongly influences distant purchase intentions than proximal ones (Trope et al., 2007).

Figure 1 illustrates general differences between high- and low-level construal (cf. Leiser et al., 2008). Within CLT, individuals represent psychologically distant objects or events via their high-level and abstract features, generalising via a "helicopter view." Thus, as objects and events become more removed, mental representations typically become more abstract, structured and coherent – essential information is extracted and superfluous details are excluded. This is analogous to trying to perceive a complex image from a distance, such as a distant and unfamiliar landscape, where only certain elements of the image are selected

and interpreted. These high-level construals are comparatively simple, decontextualized mental models that focus on the core of accessible information. High-level construal comprises essential, general, superordinate characteristics of objects and events. This could include value-based or moral attitudes based on simple, generalised perceptions. In the context of plastics pollution, a high-level construal could be, for example, "the terrible impact of pollution on those in other countries".

Figure 1. Features of High- and Low-Level Construal (after Leiser et al., 2008).



In obverse, as objects or events become psychologically nearer, individuals tend to represent them via more complex, detailed, low-level characteristics. This is analogous to being so close to something that you "can't see the wood for the trees." Detail and complexity overwhelm the individual, and they fail to see the "big picture." Proximity stimulates individual mental representations to become concrete, shedding the structure separating central from secondary and irrelevant characteristics. Low-level construal contains contextual, surface, subordinate, and subsidiary features of objects and events. Low-level

192 construal tends to be richer and more detailed, but at the same time more unstructured and
193 incoherent, and less parsimonious in comparison to high-level construal. Examples of low-
194 level construal in the context of plastics pollution could be, for example, "we must live with
195 plastic waste in our town."

196 Overall, research has shown that the various dimensions of psychological distance
197 tend to be interrelated, impact upon and are influenced by the level of construal, and have
198 comparable effects on evaluation, prediction and action (Liberman and Trope, 2008; Trope et
199 al., 2007).

200

201 *2.2 The Application of Construal Level Theory to Environmental Problems*

202 Construal level theory is a relatively recent discovery (Trope and Liberman, 2010). However,
203 the application of construal level theory to research problems related to the environment is
204 not new. Indeed, previous research has focused on the application of construal level theory to
205 issues of air pollution (Nan, 2007; Mir et al., 2016), climate change (Brügger et al., 2016;
206 Ejelöv et al., 2018), recycling of consumer waste (White et al., 2011), green products
207 (Ibrihim et al., 2018; Reczak et al., 2018), and organizational sustainability initiatives
208 (O'Connor and Keil, 2017). However, the application of construal level theory in the research
209 context of this study – the interplay of plastic waste exports, plastic waste mismanagement
210 and plastics consumption – is highly original.

211 Milfont (2010) provided some early clues that construal level theory and
212 psychological distance could provide useful tools for understanding perceptual barriers to
213 environmental problems such as climate change. Milfont links his work to Pawlik's (1991)
214 "psychologically inadvertent characteristics" related to climate change: psychosocial barriers
215 ("low signal to noise ratio of global change"), temporal barriers (lag between human action
216 and consequences, time-orientation), judgmental barriers (underestimating occurrence of low

frequency events), geographical and social barriers ("social distance between actors and victims of global change"), and social dilemma barriers ("low subjective cost-effectiveness of environment-conserving behaviour"). In terms of construal level theory, climate change is perceived to have "weak physical signals and uncertain outcomes" (Milfont, 2010), leading to perceptions that it is less likely to occur (hypothetical distance), will occur in the future (temporal distance), is expected to occur in rather remote locations (spatial distance), and to other people unlike oneself (social distance). Milfont (2010) asserts that "psychological and judgemental barriers are related to hypotheticality, and temporal, geographical and social dilemma barriers are related to temporal, spatial and social distances, respectively" (p. 32).

Nan (2007) conducted an early empirical study using three experiments examining the persuasive impact of gain and loss frames, and social frames / outcomes when making judgments according to social distance. Nan finds that gain frames and socially beneficial frames are more persuasive for judgments involving socially distant others; different impacts were not observed across social distance for loss frames or individual frames. White et al. (2011) conduct very similar research, again using experiments, but in the context of waste recycling. Similar to Nan (2007), White et al. find that the effectiveness of loss and gain-framed messages are moderated by psychological distance. Interestingly, Mir et al.'s (2016) experiments in the context of air pollution found that although framing positive consequences of mitigating air pollution take precedence over negative consequences, manipulating psychological distance had no significant impact on the results.

Zhang et al. (2014) examine the impact of different kinds of psychological distance on the assessment of the severity of water pollution. Time distance was not found to be significant, whilst hypotheticality was significant even when psychological distance types co-exist. Social distance had a significant impact on assessments, but not when distance types co-exist. Brugger et al. (2016) examined the impact of psychological distance on decision

making and risk, finding that a distant focus relies on scepticism to represent risks and make decisions, whereas a proximal view relies on fear.

Ibrahim et al. (2018) demonstrated that green products can be conceptualised using different psychological distances of concrete versus abstract. In a comprehensive study using five experiments, Reczek et al. (2018) also examined reactions to green products according to psychological distance. They find that construing information at a distant versus proximal level is associated with more positive reactions to eco-friendly products, and that the green products can be made more appealing with a concrete / present frame construal.

Overall, the literature has some mixed results regarding the impact of construal level on individual perceptions of gains and losses. Some literature suggests that a distant focus – where environmental problems are perceived to be fanciful, in the future, somewhere else, and to happen to other people – is associated with a sceptical view and barrier to perceptions. However, a distant view would appear more effective at framing positive gain frames than a proximal view, e.g. solutions to environmental problems, in a way that is persuasive to individuals.

It is notable that previous studies are overwhelmingly dominated by experimental research designs, focused on the individual unit of analysis. We intend to build on this research by extending and testing the theory at a macro-level based on available nation-level data from a number of countries.

3. Development of the research model

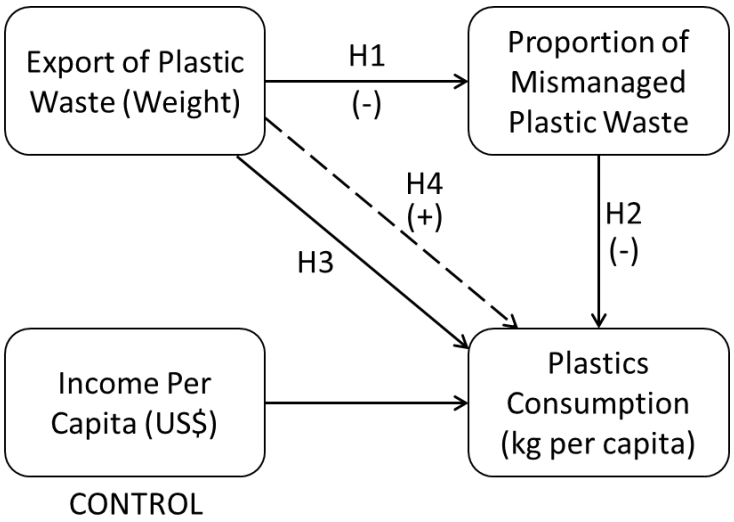
Our research model implements construal level theory to understand the impact of plastic waste exports on plastics consumption. The research model is shown in Figure 2.

If more plastic waste is exported from a country, then, logically, there would be a subsequent reduction in the plastic waste left within that country, suggesting less waste that

could potentially become classified as mismanaged (Thompson et al., 2009; World Health Organization, 2016). Evidence suggests that many developed countries have difficulties in dealing with large volumes of their own plastic waste through recycling, seeking to export the waste overseas (Brooks et al., 2018; European Commission, 2018b; Geyer et al., 2017). Therefore, we posit a significant negative relationship between plastic waste exports and the proportion of mismanaged plastic waste within a country:

H1: As plastic waste is exported from a country, the lower level of plastic waste implies less waste that becomes classified as mismanaged.

Figure 2. Research Model.



Notes: dashed line refers to mediated effect.

Construal level theory has been developed and empirically tested in copious numbers of previous studies based on individual psychology. Our research is conducted at the macro unit of analysis and assumes that the behaviour empirically supported using the micro-level theory holds when aggregated and generalised to a macro-level. We apply social psychology conceptualisations to aid understanding at a national level. This approach is empirically

supported by other popular social psychology work, including Hofstede's (1984; 2001) conceptualisations of individual psychology that are aggregated to represent national culture. Although this type of reconciliated and aggregation has been criticised by some (e.g. McSweeney, 2002a, 2002b; Ailon, 2008, 2009), the criticisms have been countered (Hofstede, 2002, 2009), and Hofstede's work remains a valuable and important tool in current research that is routinely used in recent research in leading journals (e.g. Bogatyreva et al., 2019; Stamolampros et al., 2018). A similar argument is made for this research, in that individual psychological representations can be aggregated to the national level.

The larger the amount of plastic waste in a local environment, the more the population will seek to reduce their consumption of plastic. Plastic waste in a low-level construal will appear as an immediate, proximate, real problem affecting people. Individuals focus on the concrete problem of waste and how this affects their environment in the here and now, seeing in detail the pollution and impact on daily life. In terms of construal-level theory, although reducing plastic consumption in the future may be seen as desirable for a psychologically distant problem, this is more likely to be moral or values-based rather than practical, and feasibility-related information is more likely impact near purchase intentions (Thomas et al., 2006; Trope et al., 2007), having a noticeable aggregate effect on the level of plastics consumption in more polluted locations. Individuals with low-level construal in polluted environments may be motivated to reduce their consumption out of fear (such as environmental health impacts), while those in cleaner environments may be more sceptical of the need to reduce consumption (Brügger et al., 2016). More generally, we would expect distant construal to be associated with less negative attitudes than low-level construal (Eyal et al., 2004; Reczek et al., 2018) towards the problem of plastic waste. Thus, we postulate that:

H2: The proportion of mismanaged plastic waste will be significantly negatively related to plastic consumption in a country.

Logically, there is no reason to suspect a relationship between exporting plastic waste and future consumption of plastics in a country – as borne out by limited evidence (Clapp, 2002). Indeed, plastics are often considered "ugly, unnatural, inauthentic and disposable" by consumers (Economist, 2018), so will natural be considered a waste product. Notwithstanding, although consumers will be conscious of their consumption, they will be oblivious to the export of plastic waste, and there is no reason to suspect that the export of plastic waste will affect their subsequent plastics purchasing decisions. Therefore, we hypothesise that:

H3: The export of plastic waste will have no significant direct effect on the consumption of plastics in a country.

Notwithstanding, exporting plastic waste will have an indirect impact on the consumption of plastic products by improving the appearance of the local environment for a population. Thus, if the environment appears cleaner, with a lower proportion of mismanaged plastic waste, the problem of plastic pollution appears to become more distant in time and space, something that happens to other people in other places, something that might happen (cf. research on climate change by Milfont, 2010). The problem becomes abstract and is seen in general terms as a problem which we desire to solve, rather than one that is necessarily feasible to solve, a higher-level construal (Trope et al., 2007). Negative construals of the impacts of plastic waste are dampened at higher-level construals (Reczek et al., 2018), along with the introduction of scepticism regarding the need to reduce consumption (Brügger et al.,

2016). In sum, as explained by construal level theory, reducing mismanaged plastic waste becomes a positive mediator of the relationship between plastic waste exports and consumption by increasing psychological distance and related impacts. This effect is posited to be aggregated throughout a national population. Thus, we posit that:

H4: The export of plastic waste has an indirect impact on the consumption of plastics in a country (positively mediated by the proportion of mismanaged plastic waste).

Finally, to control for the effects of income in our data set we include an additional variable related to plastics consumption, income per capita measured using gross domestic product per capita at current prices in US dollars (with purchasing power parity).

4. Methodology

In this section, the sources of data used to test the research model are introduced, along with the statistical methods used for testing the hypotheses.

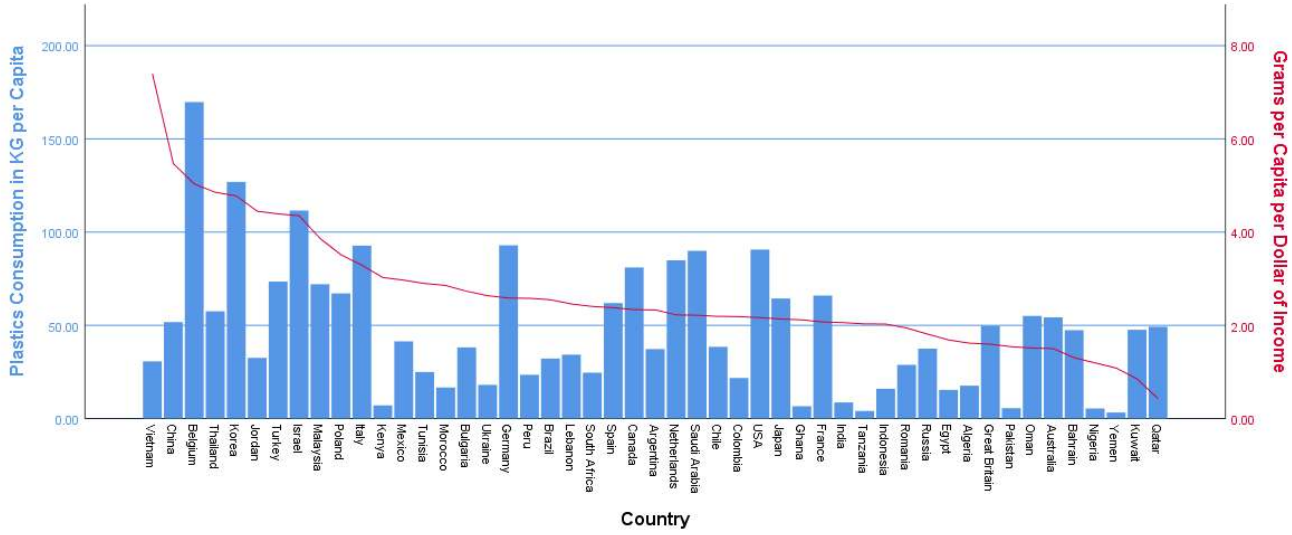
4.1 Data Sources

As a base source for the analysis we used the available data on plastics consumption for 63 countries from Euromap (2016). This data was matched with data on the export of plastic waste from the United Nations' Comtrade Database (Chapter 39, Section 15, in the 2007 Harmonised System of commodity codes), and data on the mismanagement of plastic waste from Jambeck et al. (2015). Since data on mismanaged plastic waste is only available for 2010, we are unable to perform panel analysis, however, we are still able to include some time-oriented effects in our research design. In order to capture the potential lagged effects of plastic waste exports (measured in kg) on possible improvement in the appearance of the

local environment (measured in terms of the percentage of mismanaged plastic waste in 2010), we averaged data on plastic waste exports in the five years preceding the Jambeck et al. data set, i.e. 2005-2009. Similarly, in order to embrace the lagged effects of the appearance of the local environment on plastics consumption, we averaged plastics consumption in the five years afterwards, i.e. in 2011-2015. To control for differences in income, we used income per capita average across 2011-2015 as a control variable on the plastics consumption variable. Income per capita was measured using gross domestic product per capita at current prices in US dollars (with purchasing power parity) via data collected from the IMF Data Mapper.

Issues of data availability and matching between the data sources led to the deletion of 14 countries from the analysis. Syria was excluded from the PLS path modelling analysis due to a lack of consumption and economic data after 2010. The Czech Republic, Austria, Switzerland, Hungary, Kazakhstan, Serbia and Ethiopia were excluded from the PLS path modelling analysis due to unavailability of data for mismanaged plastic waste in the Jambeck et al. (2015) dataset. Iran, Iraq, Libya, Uzbekistan and UAE were omitted due to a lack of data for plastic waste exports in 2009. Similarly, Taiwan is not reported as a separate entity in the Comtrade database and was thus not included in the analysis. The final analysis included matched data on a sample of n=49 countries. The data is summarised in Figure 3, where Belgium is the highest consumer of plastics per capita from 2011 to 2015 and Yemen is the lowest. When we control for income per capita, Vietnam becomes the highest consumer of plastics and Qatar the lowest.

Figure 3. Plastics Consumption for Various Countries (2011-2015)



4.2 Data Analysis

The research model was tested via partial least squares (PLS) path modelling in the SmartPLS 3.0 software package (Ringle et al., 2015). PLS path modelling is a variance maximization technique for structural equation modelling (SEM) without distributional assumptions for data samples, occasionally referred to as 'soft modelling'. Smart-PLS can comfortably analyse metric variables and proportions on different scales in the same model, as we have in this study (Hair et al., 2014). The technique tends to have superior statistical power to the more traditional covariance-based SEM approaches and is particularly strong when testing more complex and often predictive models that include formative indicators (Mode B) and single-item measures (Hair et al., 2014). Since this study is based on a complex model and only single-item formative indicators, PLS path modelling is considered as a pertinent choice for the research. The analysis used bias corrected, complete bootstrapping with 5000 subsamples.

Although single-item constructs have some limitations, they offer expedient summative measures of unambiguous constructs (Bergkvist and Rossiter, 2007; Wanous et al., 1997). Our single-item constructs were based on explicit economic or scientific measures, and can

398 therefore be considered unambiguous. The single-item constructs in our study are formative,
399 and thus it is not possible to conduct standard discriminant validity tests (e.g. via Fornell and
400 Larcker's (1981) method or Chin's (1998) cross-loading method), or to evaluate internal
401 consistency via typical reliability statistics (e.g. Cronbach's Alpha or Dillon-Goldstein's Rho).
402 Notwithstanding, the condition index (Chin, 1998; Duarte and Raposo, 2010) was calculated
403 and found to be below the recommended threshold of 30 for each of our variables, the highest
404 value being 8.286. This confirmed that multicollinearity was not present in our data set.
405 The key objective of PLS path modelling is prediction, hence the goodness of a model
406 is not evaluated using traditional metrics such as Goodness-of-Fit in covariance-based SEM,
407 but rather via assessing of the strength of the various structural paths in the model and the
408 collective predictiveness (R^2) of exogenous constructs (Chin, 1998; Duarte and Raposo,
409 2010). Falk and Miller (1992) suggest that an acceptable predictiveness level of for R^2 is 0.1.
410 Applying this criterion to this study, all endogenous constructs in the research model exhibit
411 acceptable levels of predictiveness, suggesting acceptable levels of nomological validity for
412 the research model.
413
414 **5. Research Results**
415 In this section, the features of the data set are briefly examined before presenting the results of
416 testing the research hypotheses using PLS path modelling.
417
418 *5.1 Description of the Data Set*
419 As explained in the last section, the matched data set consisted of a sample of measures for
420 n=49 countries for which data was available. The data consisted of a very varied mix of high-
421 income, middle-income and low-income countries. Table 1 shows the ten highest and ten
422 lowest consumers of plastics products in the data set. The highest consumer of plastics is

Belgium, with a massive 169.72 kg of plastics consumed by residents per year. The next highest are South Korea (126.92 kg per capita / year) and Israel (111.56 kg per capita / year). All of the top-10 countries are classified as high-income according to the World Bank, with the exception of Turkey, which has the lowest income in the top-10 and is considered as having upper-middle income (US$16,729). The percentage of mismanaged plastic waste (making its way to the local natural environment) is extremely low (2-3%) for the eight developed countries, but higher for the two developing countries, Turkey (18%) and Saudi Arabia (10%). Annual net exports for the top-10 plastics consumers is highest for Belgium at 11.65 kg per capita, followed by the Netherlands (9.49 kg per capita) and Germany (8.17 kg per capita). All but one of the top ten consumers are net exporters of plastic waste. Italy is a very modest net importer of -0.53 kg per capita.

Regarding the lowest ten consumers of plastics we can assert that they are all developing countries according to the UN, with incomes below US$10,000: two countries are classified as low income by the World Bank (Kenya and Tanzania), while the remainder are classified lower-middle income by the World Bank. Plastics consumption per capita is lowest for Yemen at 3.26 kg per capita / year, followed by Tanzania (4.08 kg) and Nigeria (5.42 kg). All of the ten lowest consumers of plastics have poor environmental policies regarding plastics waste, resulting in high levels of mismanaged plastic waste; seven of countries discard more than 80% of plastic waste into the natural environment, with the lowest being Morocco (68%) and Egypt (69%). Half of the lowest consumers of plastics are net importers of plastic waste, while the others are modest exporters.

445 **Table 1. Top-10 and Bottom-10 Consumers of Plastic in the Sample**

Country	Average Annual Plastic Consumption (kg/ person)	Average Annual Net Plastic Waste Exports (kg/ person)	Mismanaged Plastic Waste (%)	Average Income Per Capita (US$)
Belgium	169.72	11.65	2%	$33,726
Korea	126.92	5.31	2%	$26,565
Israel	111.56	0.56	3%	$25,624
Germany	92.92	8.17	2%	$35,952
Italy	92.78	-0.53	2%	$28,203
USA	90.64	3.30	2%	$41,886
Saudi Arabia	89.94	1.49	10%	$40,576
Netherlands	84.86	9.49	2%	$38,165
Canada	81.08	0.78	2%	$34,707
Turkey	73.44	0.03	18%	$16,729
Morocco	16.64	-0.33	68%	$5,829
Indonesia	15.96	0.17	83%	$7,875
Egypt	15.34	0.14	69%	$9,096
India	8.64	-0.15	87%	$4,199
Kenya	7.08	0.03	85%	$2,340
Ghana	6.62	-0.02	83%	$3,125
Pakistan	5.58	-0.11	88%	$3,619
Nigeria	5.42	-0.12	83%	$4,545
Tanzania	4.08	0.06	86%	$2,009
Yemen	3.26	0.30	75%	$3,011

446

447 An overall summary of the measures used in the analysis are provided in Table 2.
448 Average plastics consumption from 2011 to 2015 ranged from a minimum of 3.26 kg to a
449 maximum of 169.72 kg per capita, with a mean of 47.52 kg per capita and a standard
450 deviation of 35.13 kg per capita. The proportion of mismanaged plastic waste ranged from

2% to 88%, with a mean of 35% and standard deviation of 33%. The annual volume of net plastic waste exports from 2005 to 2009 varied from -4.83 kg per capita to 11.65 kg per capita, with a mean of 1.49 kg per capita and a standard deviation of 3.28 kg per capita. The control variable, average income per capita from 2011 to 2015, ranged from US$2,009 to $114,486, with a mean of $20,737 and a standard deviation of $19,029.71.

Table 2. Summary of Measures Used in the Analysis.

Measure	Mean	Median	Minimum	Maximum	Standard Deviation
Average Annual Plastic Consumption (kg/person) from 2011 to 2015	47.52	38.46	3.26	169.72	35.13
Average Annual Net Plastic Waste Exports (kg/person) from 2005 to 2009	1.49	0.12	-4.83	11.65	3.28
Proportion of Mismanaged Plastic Waste in 2010 (%)	35%	18%	2%	88%	33%
Average Income Per Capita (US$) from 2011 to 2015	$20,737	$14,804	$2,009	$114,486	$19,029.71

5.2 Test of the Research Model

Table 3 provides the results of testing the research model using complete bootstrapping in SmartPLS. The table shows the path coefficients and significance of each of the hypotheses tested in the research model. The results show that there is a very significant negative relationship between the export of plastic waste by weight and the proportion of mismanaged plastic waste in a location (β=-0.467, t=5.998, p<.001), providing strong support for H1 – *as plastic waste is exported from a country, the lower level of plastic waste implies less waste*

466 *that becomes classified as mismanaged*. Similarly, the data demonstrate a very strong
467 negative relationship between the proportion of mismanaged plastic waste in a location and
468 the level of plastics consumption per capita (β=-0.463, t=2.440, p=.015), indicating empirical
469 support for H2, whereby *the proportion of mismanaged plastic waste will be significantly*
470 *negatively related to plastic consumption in a country*.
471
472 **Table 3. Results of Bootstrapping Analysis.**

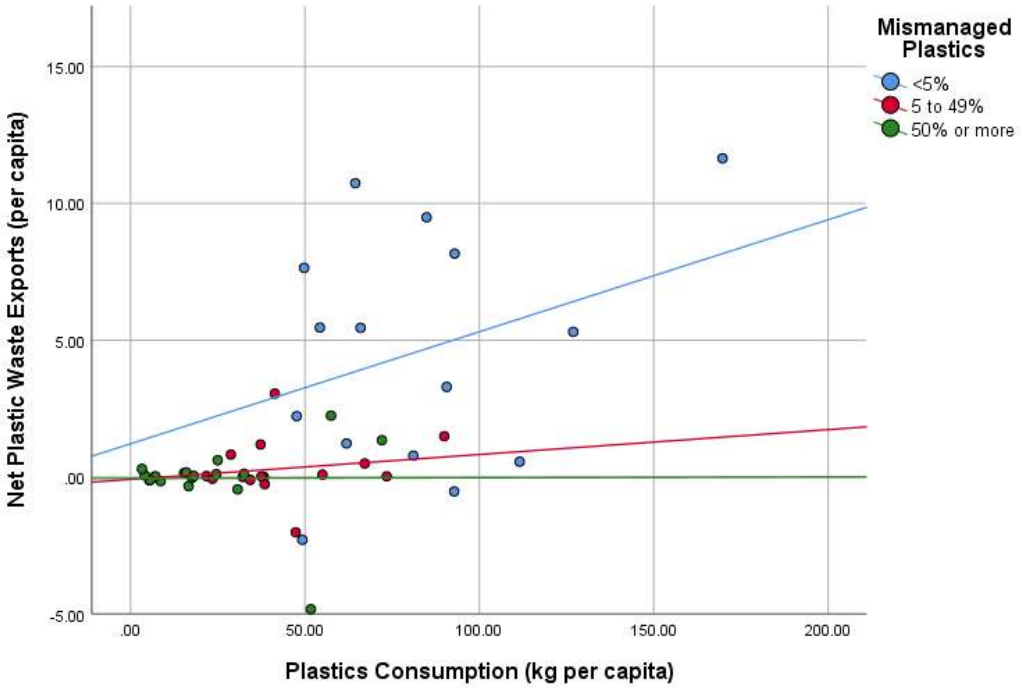
Relationship and Hypothesis Tested	**Path Coefficient (Beta)**	**T-value**	**P-value**
H1: Net Export of Plastics (kg per capita) → Proportion of Mismanaged Plastic Waste	-0.467	5.998	<.001
H2: Proportion of Mismanaged Plastic Waste → Plastics Consumption (kg per capita)	-0.463	2.440	0.015
H3: DIRECT: Net Export of Plastics (kg per capita) -> Plastics Consumption (kg per capita)	0.328	1.845	0.065
H4: INDIRECT: Export of Plastic Waste (Weight) -> Proportion of Mismanaged Plastic Waste → Plastics Consumption (kg per capita)	0.216	2.442	0.015
CONTROL: Income Per Capita → Plastics Consumption (kg per capita)	0.104	0.515	0.607

473
474 The export of plastic waste did not have a significant direct relationship with plastics
475 consumption (β=0.328, t=1.845, p=.065), supporting H3, whereby *the export of plastic waste*
476 *will have no significant direct effect on the consumption of plastics in a country*. However,
477 the mediating effect of mismanaged plastic waste on the relationship between plastic waste
478 exports and plastics consumption was highly significant (β=0.216, t=2.442, p=.015),

providing evidence in support of H4, that *the export of plastic waste has an indirect impact on the consumption of plastics in a country (positively mediated by the proportion of mismanaged plastic waste).* Given that the direct relationship between plastic waste exports and plastics consumption was insignificant, we can thus assert the that the indirect relationship between plastic waste exports and plastics consumption is fully mediated by plastics waste mismanagement; the effect of plastic waste exports on plastics consumption occurs only through the effect of the level of mismanaged plastic waste. The single control variable, income per capita did not have a significant relationship with our outcome variable, plastics consumption per capita (β=0.104, t=0.515, p=.607).

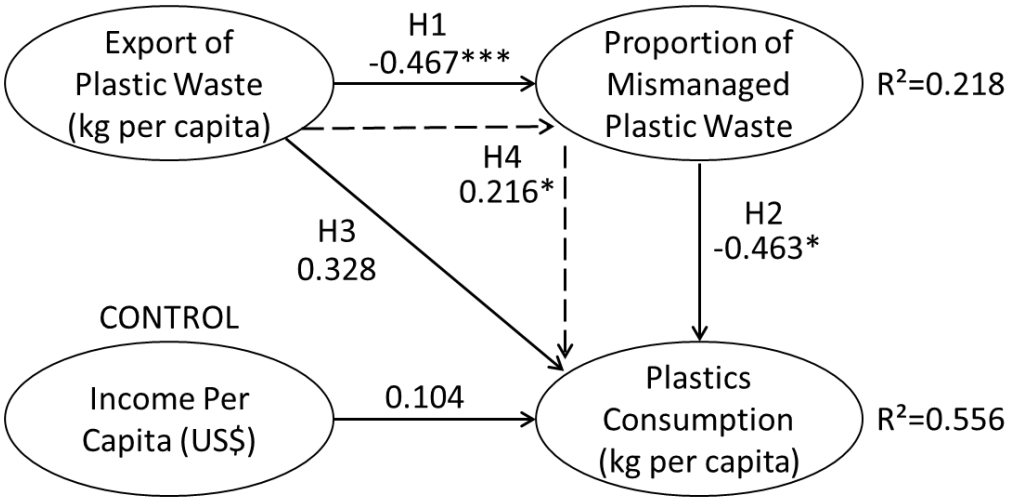
Figure 4 illustrates the mediating effect of the level of mismanaged plastic waste on the relationship between net plastic waste exports and plastics consumption. Countries have been trichotomized into three groups according to the level of mismanaged plastic waste: less than 5% (15 countries), 5 to 49% (15 countries), and 50% or more (19 countries). For each subgroup, a line of best fit has been added to the graph. The results show no relationship (a horizontal line) between net plastics waste exports and plastics consumption for the most polluting countries (levels of mismanaged plastic waste of 50% or more). There is a very slight positive relationship between net plastics waste exports and plastics consumption for the intermediate group of plastics polluters (mismanaged plastic waste of 5 to 49%). However, most notably, the relationship between net plastics waste exports and plastics consumption for the lowest level of mismanaged plastics waste (less than 5%) is very pronounced. These subsamples are too small to test for statistical significance.

Figure 4. The Mediating Effect of Mismanaged Plastic Waste.



The results of testing the structural equation model are summarised in Figure 5. Overall, the model explains a sizeable 55.6% of the variance in plastics consumption per capita (R^2=0.556, t=6.752, p<.001), and 21.8% of the proportion of mismanaged plastic waste (R^2=0.218, t=3.045, p=.002). This suggests nomological validity in the research model (Falk and Miller, 1992).

Figure 5. Results of Testing the Research Model Hypotheses (path coefficients and R^2).



Notes: * p<.05; ** p<.01; *** p<.001; dashed line refers to mediated effect.

6. Discussion and Conclusions

Exporting plastic waste to ameliorate local problems of limited recycling and aversion to landfill, particularly in high-income countries, is typically seen as a solution to the plastics pollution problem by governments. However, exporting plastic waste is not a viable, sustainable long-term solution for our planet. This study suggests that exporting plastic waste is actually part of the problem: by moving high volumes of consumed plastic waste outside of a country (typically from high-income to low-income countries) it actually encourages consumption of plastics in the artificially "cleaner" countries and should not be encouraged without guarantees that the plastic waste can be efficiently recycled without environmental damage. Thus, the problem of rapidly increased plastics consumption and waste appears to be continuing, with little abatement. Hoornweg et al. (2014) calculate that global peak waste production will not be reached until around 2100, although mid-century for developed economies. However, aggressive waste reduction strategies may be able to reduce waste generation by around 30% to bring to the peak to 2075.

Local initiatives to tackle the plastic waste problem within developed countries at the national level are needed, rather than trying to pass the problem on to other countries around the globe. Ultimately, wherever the plastic waste ends up, if it is mismanaged it will find its way into the natural environment, causing a "tragedy of the commons" in land and ocean alike. Samantha Harding of the Campaign to Protect Rural England states: "It makes no sense – either economic or environmental – to send used plastics out of the country" (McClenaghan, 2017).

Visionary leadership and innovation are required by national governments to tackle production, consumption, recycling, and environmental clean-up of plastic products. Particular areas in need of research and innovation include behavioural research into plastics consumption and recycling behaviour and investment in facilities and innovation to improve the recycling of plastic waste (including plastics such as polystyrene, which are not currently recycled; Mazzucato, 2018). After the introduction of the Chinese ban on consumer plastic waste imports, there is evidence that some countries in Europe have begun to invest in new technologies to manage flexible household plastic waste, enabling more efficient sorting, washing, extrusion and filtering of plastics (Recycling Magazine, 2018). Research shows that focusing on gain frames for social benefits and outcomes can be more persuasive in influencing environmental judgments (Nan, 2007), for example, "by recycling we can improve the lives of those whose livelihoods rely on the oceans in [a suitable remote location]." Thus, recycling may be improved for individuals with higher-level construal, such as those in less-polluted, higher-income countries. Concurrently, innovation in developing new materials to replace traditional plastics is needed (e.g. biodegradable plastics) (Mazzucato, 2018), and there is a need to move from unrecyclable multilayer materials to mono-materials that can be recycled (Recycling Magazine, 2018).

551 Another key area of research is on the health impacts of micro-plastics, both human
552 and non-human. This is likely to galvanise behavioural intentions for low-level construal in
553 polluted environments, where evidence suggests that individuals may be motivated to reduce
554 their consumption via fear (Brügger et al., 2016).
555 Reducing the sale and production of plastics, especially highly polluting products, e.g.
556 by regulation in developed economies, will reduce the potential volume of plastics that lend
557 themselves to subsequent mismanagement, recycling, or export. Sales may also be reduced
558 by increasing awareness of the impacts of local plastics consumption (Thomas et al., 2006).
559 Based on the results of this research, stronger regulation or control, including bans, of the
560 export of consumer plastic waste from developed economies will reduce or remove the
561 mediating mechanism encouraging plastics consumption through artificially created cleaner
562 environments, particularly in higher-income countries.
563 Investment in local and global clean-up activities is another important policy area
564 (Mazzucato, 2018). This is particularly important in highly polluted developing countries.
565 This could include concerted effort in driving local public engagement in cleaning up
566 beaches. Innovative solutions such as that of the social enterprise Plasticbank
567 (plasticbank.org) – which is currently active in Haiti, Brazil and the Philippines – provide
568 mechanisms for driving local clean-up and helping local communities; by collecting plastics
569 in the natural environment, individuals receive payments in a Blockchain-secured currency
570 which can be used as cash for food, schooling, and other activities. Further afield, floating
571 screen technology, such as that used by the charity Ocean Cleanup, can be used to collect
572 plastic debris in our oceans.
573 Measures are needed to fix the dysfunctional global circular economy for plastic
574 waste that contributes to environmental pollution. Ideally, internationally-implemented,
575 supervised and enforced standards and regulations are needed. In order to ensure

environmental protection, developing countries that import plastic waste must work together with other countries to develop and fulfil necessary requirements that guarantee clean and efficient plastic waste recycling and reuse. This should include controls on the trade of poor quality and contaminated materials that tend to directly contribute to environmental pollution. Developing economies can be further assisted in playing a role in the global circular economy through the transfer of advanced new technologies that can help developing countries to more efficiently sort, process and recycle different types of plastic waste in a clean and efficient manner. More generally, developing countries should be aided in implementing local environmental management policies that create an appropriate balance between economic development and environmental protection.

The findings of this work can be related more broadly to previous work on the relationship between economic development and environmental pollution. For example, previous work has suggested uneven distribution of pollution between developed and developing countries based on a curvilinear relationship between environmental pollution and economic development – the Kuznets curve (Kuznets, 1955; Grossman and Krueger, 1991, 1993, 1995; Shafik and Bandyopadhyay, 1992). There are various explanations for this relationship. The "pollution havens hypothesis" suggests that an unequal distribution of negative environmental impacts is created across countries as a result of globalization and free trade (Cole, 2004; Friedl and Getzner, 2003). The distribution of production in developing countries occurs due to the relative abundance of labour and natural resources, whilst developed countries tend to specialise in human and manufacture capital (Flam and Flanders, 1991). As economies develop, consumers begin to demand environmental protection and more of a focus on cleaner industries, whilst dirtier industries are exported to developing nations with inferior environmental standards (Copeland and Taylor, 2004). He

600 (2006) found some empirical support for the pollution havens hypothesis, identifying a small
601 increase in industrial SO_2 emissions in China resulting from foreign direct investment.
602 The 'environmental' Kuznets curve has received mixed empirical support. Whilst
603 there is evidence for curve for environmental pollution, deforestation and threatened species
604 (Grossman and Krueger, 1995; McPherson and Nieswiadomy, 2005; Roca, 2003), other
605 studies have found no empirical support (Cole et al., 1997; Mazzanti and Zoboli, 2009;
606 Seppälä et al., 2001). Difference in overall construal level between different countries could
607 potentially offer part of the explanation for differences in results. More generally, the
608 research suggests that consumers of source pollutants that are distant from the impacts of
609 their behaviour are oblivious to the consequences. This leads to continued high consumption
610 and more pollution. The same logic can be applied to other pollutants, such as greenhouse
611 gases that contribute to climate change and urban vehicle pollution that contributes to
612 detrimental health impacts on city populations.
613 This research has several notable limitations. Although construal level theory
614 provides an underlying explanation for the phenomenon examined in our study, we are
615 unable to provide evidence at the individual consumer level beyond the support of previous
616 empirical studies using the theory. Thus, future research could seek to test the model in
617 context at the individual level.
618 In addition, our data sample set is limited. Ideally, we would have conducted a panel
619 study, but unfortunately no longitudinal data is unavailable on plastic waste mismanagement,
620 a necessary component of our research model: the only data we could find was for a single
621 year based on a recent study in the journal *Science*. If data becomes available in the future,
622 we will conduct a panel study in order to more accurately capture causality, which is limited
623 in our design. Similarly, our study is based on a matched data set for only 49 countries.
624 Although the range of countries is broad, it is based on the availability of matched data; thus,

625 the selection of countries could limit our findings. If more data becomes available in the
626 future, we intend to conduct further research using data for a larger set of countries. Finally,
627 the model does not currently include the impact of systems of production, e.g. if producers do
628 not use and provide single use plastics, consumers will not consume them. This is a potential
629 avenue for future research.

630 In conclusion, this research has shown that exporting plastic waste is not a long-term
631 sustainable solution for our planet. Governments must grasp the nettle of innovation,
632 recycling, and reducing production and consumption of harmful plastics. We hope that this
633 study encourages others to begin research that contributes to our understanding of how to
634 reduced plastics pollution in the future.

635

636 **References**

637 Ailon, G. (2008). Mirror, mirror on the wall: Culture's consequences in a value test of its own
638 design. *Academy of Management Review*, 33(4), 885–904.

639 Ailon, G. (2009). A reply to Geert Hofstede. *Academy of Management Review*, 34(3), 571-573.

640 Barnes, D. K. A., Galgani, F., Thompson, R. C., and Barlaz, M. (2009). Accumulation and
641 fragmentation of plastic debris in global environments. *Philosophical Transactions of*
642 *the Royal Society B: Biological Sciences*, 364 (1526), 1985–1998.

643 BBC Worldwide (2017). *Blue Planet II*. Episode 7: Our Blue Planet. London: BBC Worldwide.
644 Available at: https://www.bbc.co.uk/mediacentre/proginfo/2017/50/blue-planet-ii
645 (accessed 11th December, 2017).

646 Bergkvist, L., and Rossiter, J. R. (2007). The predictive validity of multiple-item versus single-
647 item measures of the same constructs. *Journal of Marketing Research,* 44, 175-184.

Bogatyreva, K., Edelman, L. F., Manolova, T. S., Osiyevskyy, O., and Shirokova, G. (2019). When do entrepreneurial intentions lead to actions? The role of national culture. *Journal of Business Research*, 96, 309-312.

Brooks, A. L., Wang, S., and Jambeck, J. R. (2018). The Chinese import ban and its impact on global plastic waste. *Science Advances*, 4, eaat0131.

Brügger, A, Morton, T. A., and Rauto Dessai, S. (2016). "Proximising" climate change reconsidered: A construal level theory perspective. *Journal of Environmental Psychology*, 46, 125-142.

Chin, W. W. (1998). The partial least squares approach for structural equation modeling. In *Modern Methods for Business Research*, edited by G. A. Marcoulides, 236-295. London: Lawrence Erlbaum.

Chinese Ministry of Environmental Protection (2017). *Announcement of Releasing the Catalogues of Imported Wastes Management*. Announcement no. 39. Beijing: Chinese Ministry of Environmental Protection.

Chow, L. (2015). These 5 Countries Account for 60% of Plastic Pollution in Oceans. *EcoWatch*, 15 October, 2015. Available online: https://www.ecowatch.com/these-5-countries-account-for-60-of-plastic-pollution-in-oceans-1882107531.html

Clapp, J. (2002). The distancing of waste: Overconsumption in a global economy. In *Confronting Consumption*, edited by Princen, R., Maniates, M. and Conca, K., 155-176. Cambridge, MA: MIT Press.

Cole, M.A., Rayner, A.J., and Bates, J.M. (1997). The environmental Kuznets curve: An empirical analysis. *Environmental Development Economics*, 2 (4), 401–416.

Cole, M. (2004). Trade, the pollution haven hypothesis and environmental Kuznets Curve: Examining the linkages. *Ecological Economics*, 48, 71–81.

672 Copeland, B.R., and Taylor, M.S. (2004). Trade, growth, and the environment. *Journal of*
673 *Economic Literature.*, 42(1), 7-71.
674 Daniele, U. and Regan, H. (2019). Plastic waste dumped in Malaysia will be returned to UK,
675 US and others. *CNN*, 29 May 2019. Available online:
676 https://edition.cnn.com/2019/05/28/asia/malaysia-plastic-waste-return-intl/index.html
677 Dauvergne, P. (2018). Why is the global governance of plastic failing the oceans? *Global*
678 *Environmental Change*, 51, 22-31.
679 Duarte, P. A. O., and Raposo, M. L. B. (2010). A PLS model to study brand preference: An
680 application to the mobile phone market. In *Handbook of Partial Least Squares:*
681 *Concepts, Methods and Applications*, edited by V. Esposito Vinzi, W. W. Chin, J.
682 Henseler and H. Wang, 449-485. Berlin: Springer-Verlag.
683 Economist (2018). The known unknowns of plastic pollution. *Economist*. Available online:
684 https://www.economist.com/international/2018/03/03/the-known-unknowns-of-
685 plastic-pollution (3rd march, 2018).
686 Ejelöv, E., Hansla, A., Bergquist, M., and Nilsson, A. (2018). Regulating emotional responses
687 to climate change – A construal level perspective. *Frontiers in Psychology*, 9, 629.
688 European Commission (2018a). *Directive of the European Parliament and of the Council on*
689 *the Reduction of the Impact of Certain Plastic Products on the Environment*. Brussels:
690 European Commission.
691 European Commission (2018b). A European Strategy for Plastics in a Circular Economy.
692 Brussels: European Commission.
693 Euromap (2016). *Plastic Resin Production and Consumption in 63 Countries Worldwide:*
694 *2009-2020*. Frankfurt: Euromap.
695 Eyal, T., Liberman, N., Trope ,Y., and Walther, E. (2004). The pros and cons of temporally
696 near and distant action. *Journal of Personality and Social Psychology*, 86, 781–795.

697 Falk, R. F., and N. B. Miller. 1992. “A Primer for Soft Modeling”. Ohio: University of Akron
698 Press.
699 Flam, H., and Flanders, M.J. (1991). *Heckscher-Ohlin Trade Theory*. Cambridge, MA: MIT
700 Press.
701 Fornell, C., and Larcker, F. D. (1981). Evaluating structural equation models with unobservable
702 variables and measurement error. *Journal of Marketing Research,* 18 (1), 39-50.
703 Forster, J., Friedman, R. S., and Liberman, N. (2004). Temporal construal effects on abstract
704 and concrete thinking: Consequences for insight and creative cognition. *Journal of*
705 *Personality and Social Psychology*, 87, 177–189.
706 Friedl, B., and Getzner, M. (2003). Determinants of CO2 emissions in a small open economy.
707 *Ecological Economics*, 45 (1), 133– 148.
708 Geyer, R., Jambeck, J.R., and Lavender Law, K. (2017). Production, use, and fate of all plastics
709 ever made. *Science Advances*, 3, e1700782.
710 Grossman, G.M., and Krueger, A.B. (1991). *Environmental Impacts of the North American*
711 *Free Trade Agreement*. Working paper 3914. Cambridge, MA: National Bureau of
712 Economic Research.
713 Grossman, G.M., and Krueger, A.B. (1993). Environmental impacts of the North American
714 Free Trade Agreement. In Garber, P. (Ed.), *The U.S.-Mexico Free Trade Agreement*., pp.
715 13–56. Cambridge, MA: MIT Press.
716 Grossman, G.M., and Krueger, A.B. (1995). Economic growth and the environment.
717 *Quarterly Journal of Economics*, 110 (2), 353– 377.
718 Hair, J. F., G. M. T. Hult, C. M. Ringle, and M. Sarstedt. (2014*). A Primer on Partial Least*
719 *Squares Structural Equation Modeling (PLS-SEM)*. Thousand Oaks: Sage.

He, J. (2006). Pollution haven hypothesis and environmental impacts of foreign direct investment: The case of industrial emission of sulfur dioxide (SO_2) in Chinese provinces. *Ecological Economics*, 60(1), 228-245.

Hofstede, G. (1984). *Culture's Consequences: International Differences in Work-Related Values*. Beverly Hills CA: SAGE Publications.

Hofstede, G. (2001). *Culture's Consequences: Comparing Values, Behaviors, Institutions, and Organizations Across Nations* (2nd ed.). Thousand Oaks, CA: SAGE Publications.

Hofstede, G. (2002). Dimensions do not exist – A reply to Brendan McSweeney. *Human Relations*, 55(11), 1355-1361.

Hofstede, G. (2009). Who is the fairest of them all? Galit Ailon's mirror. *Academy of Management Review*, 34(3), 570-571.

Hoornweg, D., Bhada-Tata, P., and Kennedy, C. (2014). Peak waste: When is it likely to occur? *Journal of Industrial Ecology*, 19 (1), 117-128.

Ibrahim, H., and Al-Ajlouni, M. M. Q. (2018). Sustainable consumption: Insights from the protection motivation (PMT), deontic justice (DJT) and construal level (CLT) theories. *Management Decision*, 56(3), 610-633.

Jambeck, J.R., Geyer, R., Wilcox, C., Siegler, T.R., Perryman, M., Andrady, A., Narayan, R., and Lavender Law, K. (2015). Plastic waste inputs from land into the ocean. *Science*, 347 (6223), 768-771.

Katz, C. (2019). Piling Up: How China's Ban on Importing Waste Has Stalled Global Recycling. *Yale Environment 360*, 7 March 2019. Available online: https://e360.yale.edu/features/piling-up-how-chinas-ban-on-importing-waste-has-stalled-global-recycling

Kuznets, S.P. (1955). Economic growth and income inequality. *American Economic Review,* 45, 1– 28.

745 Liberman, N., and Trope, Y. (1998). The role of feasibility and desirability considerations in
746 near and distant future decisions: A test of temporal construal theory. *Journal of*
747 *Personality and Social Psychology*, 75, 5–18.
748 Liberman, N., and Trope, Y. (2008). The psychology of transcending the here and now.
749 Science, 322, 1201-1205.
750 Ledgerwood, A., Trope, Y., and Chaiken, S. (2010). Flexibility now, consistency later:
751 Psychological distance and construal shape evaluative responding. *Journal of*
752 *Personality and Social Psychology*, 99, 32–51.
753 Leiser, D., Azar, O. F., and Hadar, L. (2008). Psychological construal of economic behavior.
754 *Journal of Economic Psychology*, 29(5), 762-776.
755 Mazzanti, M., and Zoboli, R. (2009). Municipal waste Kuznets curves: Evidence on socio-
756 economic drivers and policy effectiveness from the EU. *Environmental Resource*
757 *Economics*, 44, 203-230.
758 Mazzucato, M. (2018). *Mission-Oriented Research & Innovation in the European Union: A*
759 *Problem-Solving Approach to Fuel Innovation-Led Growth*. Brussels: European
760 Commission.
761 McClenaghan, M. (2017). Data: UK exporting two thirds of plastic waste amidst concerns
762 over illegal practice. Unearthed. Available at:
763 https://unearthed.greenpeace.org/2017/03/13/data-uk-exporting-two-thirds-plastic-
764 waste-amidst-concerns-illegal-practice/ (13th March, 2017).
765 McPherson, M.A., and Nieswiadomy, M.L. (2005). Environmental Kuznets curve:
766 Threatened species and spatial effects. *Ecological Economics*, 55(3), 395–407.
767 McSweeney, B. (2002a), Hofstede's model of national cultural differences and their
768 consequences: A triumph of faith – a failure of analysis. *Human Relations*, 55(1), 89-
769 117.

McSweeney, B. (2002b). The essentials of scholarship: A reply to Hofstede. *Human Relations*, 55(11), 1363-1372.

Milfont, T. L. (2010). Global warming, climate change and human psychology. In: Corral-Verdugo, V., Garcia-Cadena, C. H., and Frias-Armenta, M. (Eds.), *Psychological Approaches to Sustainability: Current Trends in Theory, Research and Applications* (pp. 19-42). New York: Nova Science.

Milfont, T. L., Abrahamse, W., and McCarthy, N. (2011). Spatial and temporal biases in assessments of environmental conditions in New Zealand. *New Zealand Journal of Psychology*, 40 (2), 56-67.

Mir, H. M., Behrang, K., Isaai, M. T., and Nejat, P. (2016). The impact of outcome framing and psychological distance of air pollution consequences on transportation mode choice. *Transportation Research Part D*, 46, 328–338.

Morley, K. (2018). Tax on 'bad plastic' expected to be signed off by Government to boost recycling. The Telegraph, 18th August, 2018. Available at : https://www.telegraph.co.uk/news/2018/08/17/tax-bad-plastic-expected-signed-government-boost-recycling/ (accessed 24th August, 2018).

O'Connor, J., and Keil, M. (2017). The effects of construal level and small wins framing on an individual's commitment to an environmental initiative. *Journal of Environmental Psychology*, 52, 1-10.

Parker, L., and Elliot, K. (2018). Plastic Recycling Is Broken. Here's How to Fix It. *National Geographic*, 20 June, 2018. Available online: https://news.nationalgeographic.com/2018/06/china-plastic-recycling-ban-solutions-science-environment/

Parveen, N. (2018). UK's plastic waste may be dumped overseas instead of recycled. *The Guardian*, 23 July 2018. Available online:

https://www.theguardian.com/environment/2018/jul/23/uks-plastic-waste-may-be-dumped-overseas-instead-of-recycled

Pawlik, K. (1991). The psychology of global environmental change: Some basic data and an agenda for cooperative international research. *International Journal of Psychology*, 26, 547-563.

Roca, J. (2003). Do individual preferences explain Environmental Kuznets Curve? *Ecological Economics*, 45(1), 3– 10.

Nan, X. (2007). Social distance, framing, and judgment: A construal level perspective. *Human Communication Research*, 33, 489-514.

Recyling Magazine (2018). Plastics recycling grows in Europe. *Recycling Magazine*, 14 February, 2018. Available online: https://www.recycling-magazine.com/2018/02/14/plastics-recycling-grows-europe/

Reczek, R. W., Trudel, R., and White, K. (2018). Focusing on the forest or the trees: How abstract versus concrete construal level predicts responses to eco-friendly products. *Journal of Environmental Psychology*, 57, 87–98.

Ringle, C. M., Wende, S., and Becker, J.-M. (2015). *SmartPLS 3*. Boenningstedt: SmartPLS GmbH, http://www.smartpls.com.

Seppälä, T., Haukioja, T., and Kaivo-oja, J. (2001). The EKC Hypothesis does not hold for direct material flows: Environmental Kuznets Curve Hypothesis tests for direct material flows in five industrial countries. *Population and Environment*, 23(2), 217–238.

Setälä, O., Fleming-Lehtinen, V., and Lehtiniemi, M. (2014). Ingestion and transfer of microplastics in the planktonic food web. *Environmental Pollution*, 185, 77–83.

Shafik, N., and Bandyopadhyay, S. (1992). *Economic Growth and Environmental Quality: Time Series and Cross-Country Evidence. Background Paper for the World Development Report*. The World Bank, Washington, DC.

820 Stamolampros, P., Korfiatis, N., Kourouthanassis, P., and Symitsi, E. (2018). Flying to quality:
821 Cultural influences on online reviews. *Journal of Travel Research*, 58(3), 496-511.
822 Thomas, M., Chandran, S., and Trope, Y. (2006). The effects of temporal distance on purchase
823 construal. Unpublished manuscript, Cornell University.
824 Thompson, R. C., Moore, C. J., vom Saal, F. S., and Swan, S. H. (2009). Plastics, the
825 environment and human health: current consensus and future trends. *Philosophical*
826 *Transactions of the Royal Society B: Biological Sciences,* 364(1526), 2153–2166.
827 Trope, Y., and Liberman, N. (2003). Temporal construal. *Psychological Review*, 110, 403–421.
828 Trope, Y., and Liberman, N. (2010). Construal-level theory of psychological distance.
829 *Psychological Review*, 117 (2), 440-463.
830 Trope, Y., Liberman, N., and Wakslak, C. (2007). Construal levels and psychological distance:
831 Effects on representation, prediction, evaluation, and behaviour. *Journal of Consumer*
832 *Psychology*, 17, 83-95.
833 Velis, C. (2014). *Global Recycling Markets: Plastic Waste*. Vienna: International Solid Waste
834 Association.
835 Wanous, J. P., Reichers, A., and Hudy, M. J. (1997). Overall job satisfaction: How good are
836 single-item measures? *Journal of Applied Psychology,* 82 (2), 247-252.
837 White, K., MacDonnell, R., and Dahl, D. W. (2011). It's the mind-set that matters: The role of
838 construal level and message framing in influencing consumer efficacy and conservation
839 behaviors. *Journal of Marketing Research*, 48(3), 472-485.
840 World Health Organization (2016). *Waste and Human Health: Evidence and Needs*.
841 Copenhagen: World Health Organization
842 Zhang, W., He, G.-B., Zhu, Y., and Cheng, L. (2014). Effects of psychological distance on
843 assessment of severity of water pollution. *Social Behavior and Personality*, 42(1), 69-
844 78.