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Fighting plastic pollution: An investigation into whether the presence or absence of single-use plastic impacts our impression of others

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Abstract
The evidence is clear that plastic pollution is a huge problem threatening the survival of the modern world. Psychological researchers have risen to the challenge to investigate people's behaviours, attitudes and perceptions around environmentalism. One area of psychology that has been scarcely researched in regard to environmentalism is impression formation. People form impressions of others based on a number of factors, but one of these is their conformance to norms. We wanted to investigate if the use of reusable plastics had become a norm for the university population, and whether failing to comply to this norm would result in negative impression formation by a group of 165 participants. In a mock-friendship app style, participants viewed images of people pictured with single-use or reusable items, and their impressions were gaged using a number of traits. We also investigated if there were differences in the formation of these impressions, by measuring their ocean connectedness level. We found that for one of the photosets, participants did indeed hold a more negative impression of someone if they held reusable items, but overall this was not affected by their ocean connectedness. There was a small issue with the images containing branding, however this sparks potential for future research. Our results can be used to help implement behaviour change. Not conforming to this norm results in negative impressions, which people want to avoid, so making this norm more popularised outside of the university population, will result in more conforming to avoid any negative judgements.

Keywords: Plastic pollution, single-use plastics, judgments, behaviours, environmentalism, reactions, ocean connectedness, branding psychology.

Introduction

After World War Two, plastic production and its usage heavily increased to the point we are at today, where a world free of plastic seems like a far cry (Rogers, 2005). In the 1950s, 5 million tonnes of plastic were produced every year, compared with 448 million in 2015 (Geyer, Jambeck & Law, 2017). Of all plastic production, 50% involves the manufacturing of single-use plastics (Hopewell, Dvorak & Koisor, 2009). Just like its name suggests, single-use plastics are products made of plastic, designed to be used only once and then disposed of (UNEP, 2018). Most commonly, single-use plastics are found in food packaging, drinks bottles and carrier bags (Jambeck et al, 2015). The convenience, price and lightweight nature of these single-use plastics has led to the creation of a 'throwaway society'; a society dominated by the consumption and use of disposable items, rather than reusable (Whiting, 2019). These items are so convenient for human use due to their strong and flexible nature (Whiting, 2019).

However, the materials that confer these properties are also what makes the items so harmful to the environment, due to the time they take to break down (Geyer, Jambeck & Law, 2017). The average lifespan of plastic bags for human use is 12 minutes, yet the time it takes for it to break down and disintegrate is over 450 years (Larsen & Venkova, 2014). These thrown-away plastic items can eventually make their way to the ocean. Over eight million tonnes of plastic is released into the Earth's oceans every year (Plastic Oceans Foundation, 2018). In the ocean, this plastic can have catastrophic effects. Of animals examined, 100% of sea turtles were found to have been affected by plastic, as well as 59% of whales, 40% of sea birds and 36% of seals (Law, 2017). Ocean life is not the only thing affected, with ocean litter also threatening human health. For example one-third of fish caught for human consumption thought to contain plastic (Cauwenberghe & Janseen, 2014). Only 1% of marine litter floats, making a simple removal almost impossible (Jambeck et al, 2015). Plastic production and consumption also contribute to climate change. Whilst contributing to the fossil fuel problem, plastic pollution also makes it more difficult for the Earth to deal with these fossil fuels, as described by Cole et al (2013). They argue that sea creatures such as phytoplankton and zooplankton are thought to reduce atmospheric carbon dioxide by about a third during photosynthesis. However, they also argue that they are having their digestive systems, reproductive ability and survival compromised by plastic in the ocean. This prevents them from absorbing and reducing the amount of carbon dioxide in the atmosphere. Despite well-evidenced effects, plastic production doesn't seem to be slowing down. It is thought that by the year 2050, there will be more plastic in the ocean than fish (Ellen MacArthur Foundation, 2015). Given that plastic pollution is impacting ocean health, contributing to climate change, and is near-impossible to remove from the ocean, it's vital that we work to find solutions to reduce our usage, and therefore production of, single-use plastics to prevent this predicted rise.

Despite this knowledge, little successful action has been taken in the fight against climate change and plastic pollution. One reason for this is the struggle to engage people. For example, there is said to be a 'global warming age gap' in attitudes and beliefs surrounding climate change, with 70% of adults aged 18 to 34 stating that they are worried about global warming compared to only 56% of those aged 55 or older (Reinhart, 2018). One of the possible solutions in reducing damaging

behaviours, therefore, is trying to fully engage people in the fight against climate change.

As a result, psychology is a useful discipline to use when investigating climate change and plastic pollution. Psychology can be used to help understand the behaviour that causes climate change and why people engage in either pro- or anti-environmental behaviour (Stern, 2011). Pro-environmental behaviours refer to any action taken that helps to reduce one's impact on the environment, such as reducing how much electricity you use (Steg & Vlek, 2009). Psychological research has helped to identify several traits that predict the likelihood of someone engaging in pro-environmental behaviour. One of these traits is nature connectedness, which refers to how someone subjectively views nature as being part of their identity (Schultz, 2002). Those high in nature connectedness have greater concern for natural environments and so are more likely to engage in pro-environmental behaviours (Nisbet, Zelenski & Murphy, 2009). Other individual differences come in the form of different values held by different people. Nordlund and Garvill (2002) found those that hold values away from their self-interest have been found to engage more in pro-environmental behaviours. They found that those that held altruistic, prosocial and self-transcendent values were more likely to partake in such behaviours.

Psychology can also be used to investigate different interventions for behaviours, how to motivate people to engage in these interventions and how people will respond to said interventions (Swim et al, 2011). For example, a study by O'Neill et al. (2013) argued that imagery could be a useful tool in motivating individuals. They found that climate change images, such as images of coastal erosion or a climate change protest, could be used to promote feelings of self-efficacy, feeling like one can do something about climate change. It can be said, therefore, that psychology is a useful discipline in the fight against climate change.

Other areas of psychology, such as social psychology and especially literature surrounding social influence and social norms, have proven useful for understanding climate change and engagement in pro-environmental behaviour (Stern et al, 1999). Much of social psychology is invested in how the presence, or imagined presence, of others can influence our attitudes and behaviours (Allport, 1985). One's families, friends and neighbours are particularly influential, especially in the context of environmentalism (Stevenson, Peterson & Bondell, 2019). The strength of this influence can differ across different circumstances. For example, in risk environments, such as in a society at risk of succumbing to climate change or being damaged by plastic pollution, it has been found that young people are more likely to copy the behaviour of their peers (Maxwell, 2002).

Another aspect of this influence is the concept of norms. Norms can be described as a set of rules that a certain group follows; they are unwritten guidelines about how a certain group should behave (Sherif, 1936). Pro-environmental behaviours can become norms. For example, Thomas and Sharp (2013) investigated norms in the context of household recycling and argued that recycling has become a norm, with around 90% of people said to put out paper for recycling every week. Bar et al. (2001) argued this was due to the visible activity of putting the recycling out; people see their neighbours putting the recycling out, so feel they should be doing the same.

Furthermore, these norms can also help us in the process of impression formation. Impression formation, put simply, is the cognitive process by which we form our impressions of others based on an initial judgement of their traits and behaviours (Zebrowitz, 1990). Norms can positively or negatively inform these impressions (Asch, 1946). For example, if someone does not conform to a societal norm, one's impression of them may be more negative (Bar, Neta & Linz, 2006). Human beings are social creatures; we like to be liked and do not want people to form a negative impression of us (Asch, 1946). This therefore creates an opportunity for behavioural change. If failing to conform to a norm will make people dislike us, we are more likely to conform to said norm so other's impressions of us are positive (Zebrowitz, 1990). Behaviour change is a key component to fighting plastic pollution and climate change. We need more people to engage in pro-environmental behaviours in order to prevent further damage to the Earth (Kollmuss & Agyeman, 2010). In this study, we therefore wanted to investigate whether failure to conform to pro-environmental norms negatively affects impression formation. If this is found to be true, we can use this knowledge to implement behaviour change by encouraging people to conform to these norms, so that a negative impression is not formed of them.

The pro-environmental behaviour we investigated was using reusable items over single-use plastic versions. The previously mentioned paper by O'Neill et al. (2013) found that imagery is a powerful tool in the fight against climate change. We therefore set up a series of images of people (our models) next to or holding single-use and reusable items. The plastic items we used were bags, bottles and coffee cups, since, as discussed in the opening, these are the most commonly used and disposed of single-use plastic items (Jambeck et al, 2015). As Maxwell (2002) argued, peers are particularly influential in the context of climate change. Our participants were university students. It was explained to the participants that the models in the pictures were fellow university students, to create this peer-relationship. We measured impression formation using a judgement questionnaire, measuring several different impressions. We measured how 'similar', 'caring' and 'cool' the models in the images were rated to be by participants. We chose these three characteristics because in friendship literature it is argued that one of the key factors an individual assesses when deciding whether to be friends with someone is similarity (Duck & Lea, 1982). Similarity is also a useful tool in gaging norms and their influence; if an individual sees someone pictured with a single-use item, will they see this as being out of their social norm and therefore judge this person as being dissimilar to them? 'Coolness' was also used, as again it is a common trait in friendship literature (O'Donnell & Wardlaw, 2000).

Furthermore, there is an argument that using reusable items has become 'trendier' amongst young people (Buranyi, 2018), who made up most of the participants for this study. We wanted to investigate this by studying whether someone would rate someone else as being less 'cool' for using a single-use item. The final trait we investigated was 'caring'. Within the friendship literature, this is also an important trait upon which friendship is based (Roberts-Griffin, 2011), so we thought it would be beneficial to use. Furthermore, being caring is also linked to pro-environmental behaviour. As discussed earlier, altruism is a value held by those who engage in pro-environmental behaviour, and caring is a characteristic associated with altruism (Nordlund & Garvill, 2002). In summary, we used three traits and then an overall judgement to assess the impression participants had of the models in the images.

We could then compare these impressions based on what item the model in the image was pictured with.

We also wanted to further investigate the idea of individual differences in relation to environmentalism. Nature connectedness has already been discussed as an individual difference in predicting pro-environmental behaviour (Nisbet, Zelenski & Murphy, 2009). We wanted to investigate a similar concept in the form of ocean connectedness. Ocean connectedness is a new concept that focuses specifically on how much someone feels the ocean is part of their identity (Nuojua, 2019). We chose to use this concept as opposed to nature connectedness because we are specifically investigating plastic pollution, which, as previously mentioned, mainly impacts the ocean. We used an unpublished questionnaire by Nuojua (2019) to investigate ocean connectedness.

Based on the literature discussed, two key hypotheses were made, as well as some smaller predictions. Due to the literature surrounding young people's engagements in environmentalism, such as the study by Reinhart (2018), we predicted that reusable plastic use would be common amongst the university population that formed our participant group and could therefore be argued to be a norm. This leads on to our first main hypothesis. Due to the literature suggesting that norms influence impression formation, we predicted that those photographed with single-use plastic items would be rated more negatively (i.e. receive lower ratings for 'similarity', 'coolness' and 'caring') than those pictured with reusable items.
Furthermore, due to the findings by researchers such as Nisbet, Zelenski & Murphy (2009), our second key hypothesis was that those with higher ocean connectedness scores would hold more extreme versions of these impressions, as they would be more concerned about the impact the single-use items are having on the ocean they identify with. Therefore, it was predicted that those with high ocean connectedness scores would rate those pictured with single-use items even more negatively, and those pictured with reusable items even more positively, than those with lower ocean connectedness scores. Though not a key hypothesis of ours, we also investigated marine litter awareness, again using a new questionnaire by Nuojua (2019). It was predicted that those with more marine litter awareness, would follow the same judgement pattern as those with higher ocean connectedness scores.

Methodology

Participants

One hundred and sixty-five psychology students from Plymouth University participated in this study. They were made up of 143 females and 22 males. The age range of these students was 18 to 52 years, with the average age being 20.99. One participant was absent for the ocean connectedness questionnaire and marine litter awareness questionnaire. In photoset one there were 82 participants and 83 were in photoset two.

Materials

Participants sat in front of a standard computer with a monitor and used a standard mouse and keyboard to input their responses. Participants were divided by screens so it was assured that other participants' judgements in the room should not affect their own judgments.

The technology department at The University of Plymouth helped to design the computer programme participants used. The computer contained an opening screen in which participants had to fill our a brief form to gather some demographic data. Participants were then instructed that they would see a series of eight profiles, and after each one they should rate that profile. Each of the eight profiles contained a series of four pictures, shown at the speed of one picture every 5 seconds. Each profile was presented with a fictional name and age, alongside the fact that model attended the University of Plymouth. The profiles were of people known to the researchers, who took photographs of these people in different places around the University of Plymouth campus. The profiles moved along automatically in a swiping motion in an attempt to imitate already popular applications of a similar nature and concept, such as dating or friendship applications like Bumble. However, these profiles were not exactly like those found on similar sites. Instead, these images contained a number of key items. Alongside the model on campus, three out of four of the images contained a 'target' item. The three target items were a bag, a coffee cup and a bottle. The fourth image in each profile set was a control images, containing none of the target items. Each profile therefore contained four images; one was a control image, one contained a bag, one contained a coffee cup and one contained a bottle.

The profiles were split into photoset one and photoset two. Both sets contained the same eight models in the profiles, all in the same location, wearing the same clothes, with the same facial expressions. In every profile, across both sets, the control image was just a neutral picture of that model, containing none of the target items. The only thing that changed across the sets was the type of target item present in the image. For each of the profiles in one set, the target items present were reusable versions of the target items. In the other set, these items were single-use versions of the target items. Photoset one and photoset two both contained four profiles containing single-use items, and four profiles containing reusable items. Participants were randomly assigned to either photoset one or photoset two. The profiles were counterbalanced across the two sets, so it wasn't the model present in the picture itself that should affect the participants responses, rather the items present in the images. Figure 1 shows an example of one model's profile, with both a reusable and a single-use version of this profile. All the images used in the study can be found in Appendix C, for further clarification as to how the photosets were set up.

In order to avoid any confounding variables affecting participants' judgements, we tried to remove as much branding as we possibly could from the images in the profile. Figure 2, for example, shows how we attempted to remove the Nike branding from a model's jumper. Figure 3 shows how we attempted to remove the branding from a single-use Costa coffee cup. We felt that having brands present in the images may affect the ratings participants gave. For example, a participant may rate someone wearing a Nike hoodie as 'cooler', irrespective of whether they are pictured with a single-use plastic item.

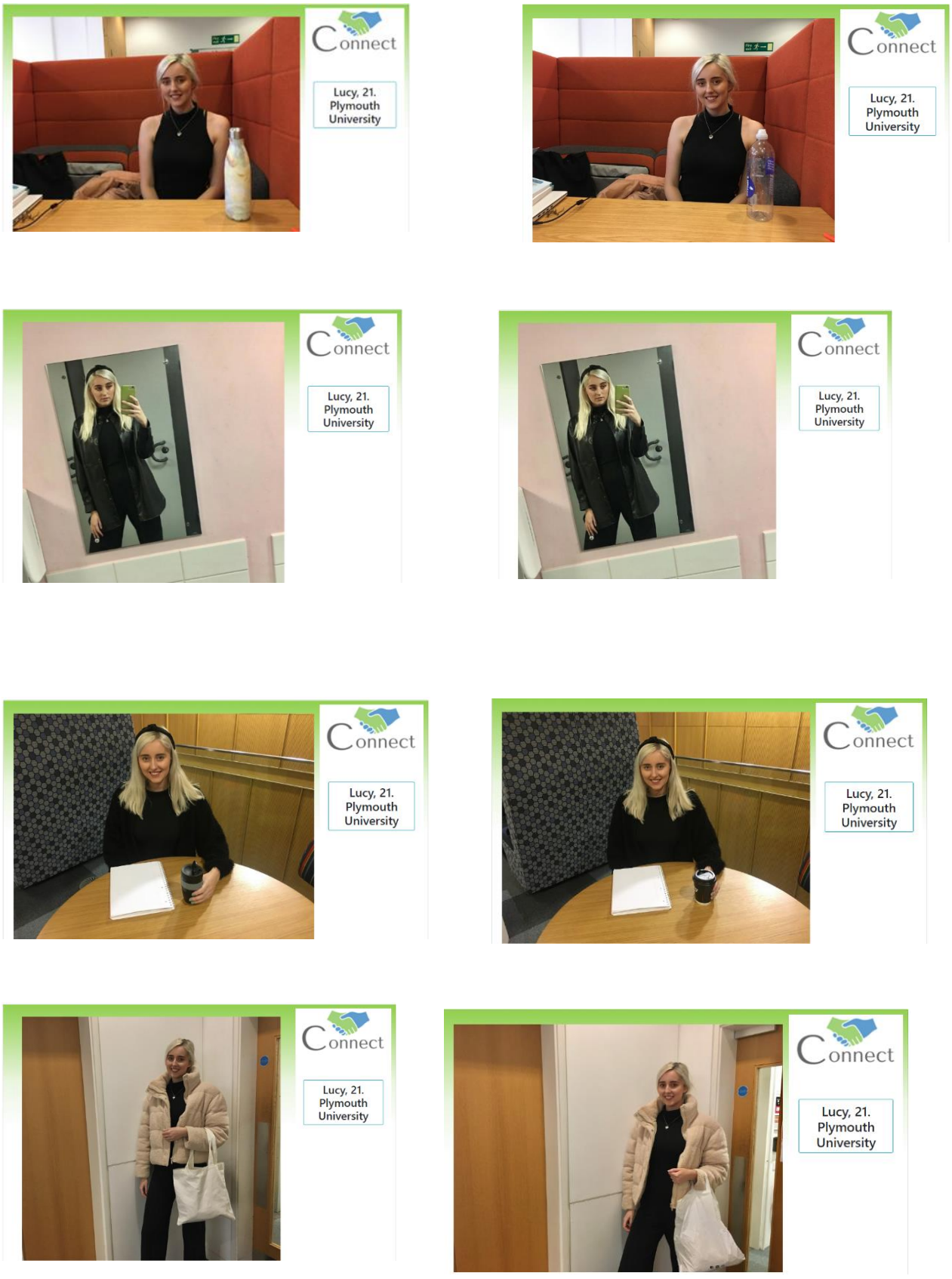

Figure 1: Example profiles of 'Lucy' from The University of Plymouth. The left displays her reusable item profile whilst the right is her single-use plastic item profile. One profile can be found in photoset one whilst the other is in photoset two.

Figure 2: An example of how a Nike label was removed from a jumper in the control images of a profile. The left image shows how the Nike label is clearly present, whilst the right image shows this logo edited out of the image.

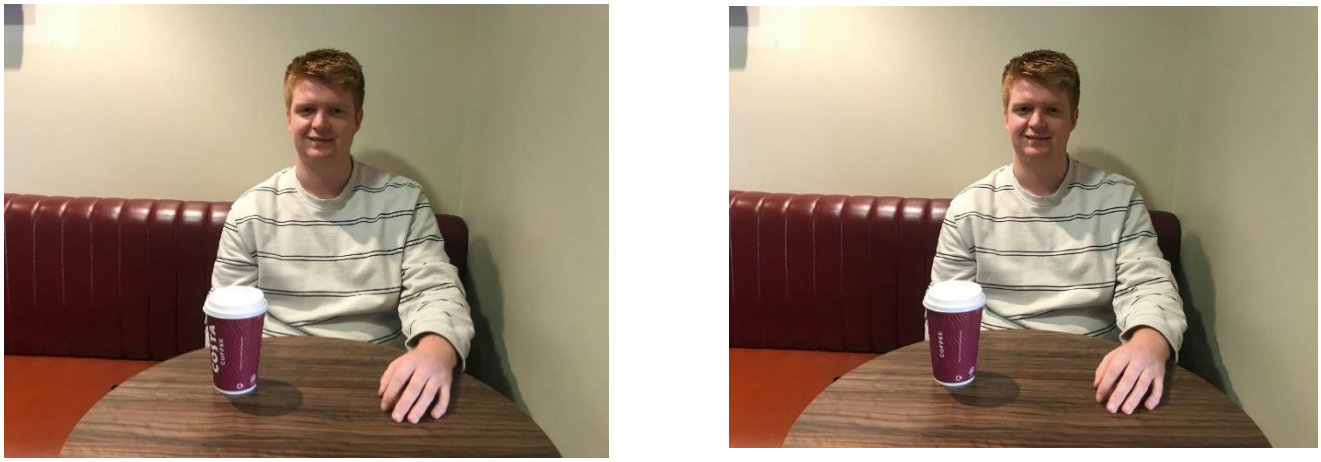

Figure 3: An example of how branding was removed from the images in the profiles. The left shows how a Costa coffee logo was visible on the cup, whereas the right shows how this label was removed.

After each profile, participants were presented with a judgement questionnaire about the profile they had just seen. The first two questions, along with the response scale, can be found in Table 1.

Table 1: The first two questions of the profile judgement questionnaire participants answered after viewing each profile.

	Not At All	Slightly	Somewhat	Quite	Very
How similar do you think this person is to you?					
How cool do you think this person is					
How caring do you think this person is?					

The final judgement question was 'Would you like to be friends with this person?' Participants had to choose either 'yes', 'no' or 'I don't know'.

Participants also completed a questionnaire about their reusable plastic habits. This questionnaire contained three questions. The first two questions used a five-point scale where participants had to respond with: 'never', 'rarely', 'sometimes', 'often' or 'always'. The first two questions were 'How often do you use reusable products?' and 'How often do you make a conscious effort to reduce your plastic use?' For the third question, participants had to tick from a list of reusable products to indicate which they used. The items in the list were: bottles, bags, straws, coffee cups, cutlery, containers, sanitary items, 'other items' or 'none'.
Participants also had to complete a questionnaire about ocean connectedness, full details of which can be found in Table 2, on the following page.

Table 2: Ocean connectedness questionnaire.

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
1. I have a passion for the ocean					
2. I feel very close to the marine environment					
3. I have a clear understanding of how my actions affect the ocean.					
4. I often feel a sense of oneness with the ocean around me					
5. I usually feel disconnected from the ocean					
6. I recognise and appreciate the intelligence of living marine organisms					

A questionnaire about marine litter awareness was also completed by participants. The full questionnaire can be found in Table 3 on pages 21 and 22. Participants then completed two final questions as part of a funnel debrief. The first being 'What do you think this study was about?' and the second 'Did the items present in the photos influence your responses?'

Table 3: *Marine litter awareness questionnaire.*

Question	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
I am very concerned about the impact of marine litter					
Marine litter is an important issue					
Keeping the marine environment litter free is an important issue					
The use we get out of modern packaging materials outweighs any negative effects they might have on the marine environment					
Marine litter is a future environmental threat rather than a present one					
There is not enough evidence to properly conclude that marine litter is a problem					
Question	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Marine litter is a problem elsewhere but not in my country					
The quantity of litter on the coast and in the sea is increasing					
Marine litter is only a problem for coastal communities					
The oceans are so large, it is unlikely that marine litter will cause lasting damage					
We should tackle the marine litter problem even if this means slower economic growth					
The marine litter problem is not as serious as some people claim					

Procedure

The study used a mixed measures subject design. Participants signed up to gain 'points' as part of their degree qualification and took part in the study in a laboratory on campus at The University of Plymouth. The study took around 15 minutes to complete, though 30 minutes was allocated for each participant.

Participants came to the lab and were briefed. Full details of the brief can be found in Appendix A. There was a small amount of deception involved in this study. On signing up to the study, participants were under the impression that they were taking part in the trial of a new friendship application, called 'Connect'. They were told that the application's aim was to make it easier to make friends at university. The profiles shown, however, instead featured either reusable or single-use plastic items, and this was the variable of interest to us. The participants first had to fill out a form on the computer, stating their age and gender. They then also had to generate a participant number that was personal to them, to enable us to remove their data should they wish to withdraw from the study. Participants were randomly allocated to either photoset one or photoset two: upon entering their details at the computer, the system randomly allocated them to either photoset. After participants had seen the full eight profiles and answered eight sets of judgement questions, they then were asked to recall three items they had seen in any of the profiles. After this recall, participants completed the habits questionnaire, followed by the ocean connectedness questionnaire. Then, participants completed the marine litter questionnaire before answering the final two questions. After answering these questions, participants were debriefed. The full debrief can be found in Appendix B.

The data was gathered and analysed. Participants' responses to all of the questionnaires were recorded and coded to be analysed in SPSS.

Data Preparation

To prepare the data for analysis, we first had to combine two datasets. The datasets originally were divided into two; one containing the responses to the profile judgements for all eight profiles for all participants, the other containing the responses to the remaining questionnaires. To do this, we matched the ID variable and copy and pasted them into one document.

Once we had one data set, we then had to make sure all variables were numerical. Many of the responses were in text. The responses to the profile judgement questionnaire were coded as the following: 'not at all' became 1, 'slightly' became 2, 'somewhat' became 3, 'quite' became 4 and 'very' became 5. Question four of this questionnaire did not follow a scale like the others, so it should be treated with caution in the analysis. A reduced set of response options was given, but the 'I don't know' response provided a middle ground, helping to form somewhat of a scale. For this question, the 'yes' response was coded with a 3, 'I don't know' was given a 2 and 'no' was given a 1.

The responses to the habits questionnaire were also in text; here, 'never' became 1, 'rarely' became 2, 'sometimes' became 3, 'often' became 4 and 'always' became 5. For the third question of the habits questionnaire, where participants had to tick from a list, a 2 was given if they did use it and a 1 was given if they did not use it. For both

the ocean connectedness and the marine litter questionnaires, ‘strongly disagree’ became 1, ‘disagree’ became 2, ‘undecided’ became 3, ‘agree’ became 4 and ‘strongly agree’ became 5. Some of the questions for these two questionnaires had to be reverse coded. This is so that the responses were in the same direction and could be combined into one score. For the ocean connectedness questionnaire, question 5 had to be reversed coded; ‘strongly disagree’ became 5, ‘disagree’ became 4 and so on. For the marine litter awareness questionnaire, questions 4, 5, 6,7, 9, 10 and 12 had to be reverse coded.

We also ran reliability tests for the ocean connectedness scale and the marine litter awareness scale to see if the questions we used formed a reliable scale. The Cronbach alpha for the ocean connectedness scale was .77 and for the marine litter awareness scale it was .81. For these two scales we divided the responses into two for each: those with a high score and those with a low score. We calculated a median split to create categories for each. For the ocean connectedness scale, we split it on 3.67, so anyone below that was classed as having a low score and above was classed as a high score. The same was done for the marine litter questionnaire, but here it was split on 4.50. Seventy-one participants fell into the low score category, whilst 93 fell into the high score category for both questionnaires. We did this so we could draw an artificial distinction and treat them as groups in order to conduct the ANOVAs.

Results

Hypothesis 1: ANOVAs- Single-Use vs Reusable Judgment Questions

Similarity

The first question participants were asked after each profile was how ‘similar’ they thought the models in the image were to them. There was a significant difference between the average ‘similarity’ ratings for models pictured with single-use items and the average ‘similarity’ ratings for models pictured with reusable versions of these items, F (1, 163) = 8.60, p = .004. However, it was also revealed that there was an interaction between these ratings, and which photoset the participants saw, F (1, 163) = 8.22, p = .005. However, further analysis reveals photoset was not an overall significant defining factor in how ‘similar’ to themselves participants rated the profiles, F (1, 163) = .62, p = .43.

Figure 4 further demonstrates this interaction between which products the models in the images were pictured with, how ‘similar’ they were rated, and which photoset participants were in. For those in photoset one, there was a noticeable difference in how ‘similar’ they rated the models to themselves, depending on what items they were pictured with. Those pictured with single-use items were rated a lot less ‘similar’ than those pictured with reusable items. The same cannot be said for photoset two, however, with only around 0.01 difference between the ratings for those pictured with reusable items and those with single-use items.

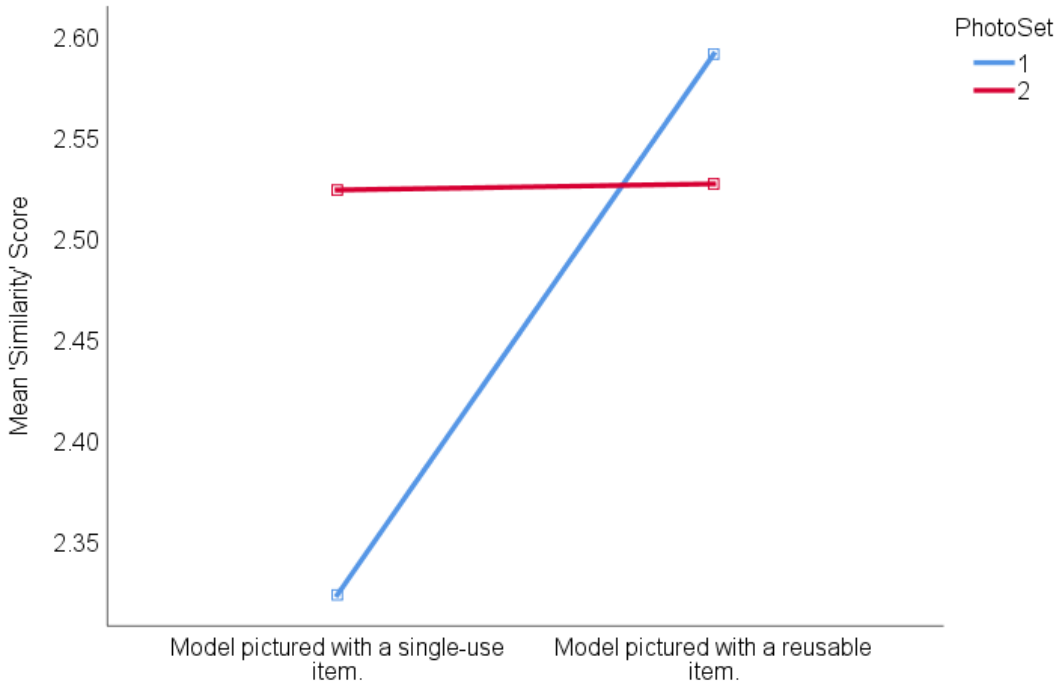

Figure 4: Line graph showing the mean 'similarity' scores for single-use item profiles and reusable item profiles across photoset one and two.

A post hoc t-test revealed that for photoset one, there was a significant difference between 'similarity' scores, t (81) = -4.32, $p < 0.001$. The mean scores reveal that single-use scores were lower at 2.32 (SD= 0.61), whilst the scores for the reusable item profiles were 2.59 (SD= 0.69).

As seen in Figure 4, the same pattern cannot be observed for photoset two. there was not a significant difference between 'similarity' scores for the two types of item in photoset two, t (82) = 1.04, p = .97. For this photoset, the mean single-use item score was 2.52 (SD= 0.65), whilst the mean score for reusable items was 2.53 (SD = 0.57).

Coolness

The second question after each profile asked participants to rate how 'cool' they thought the models in the images were. There was not a significant interaction between what items the models were pictured with and how 'cool' participants rated them to be, F (1, 163) = 3.56, p = .06. However, like question 1, there was a significant interaction between what items the models were pictured with and how 'cool' they were rated to be, depending on which photoset participants were in, F (1, 163) = 102.48, p = .001. Overall, photoset was not a significant factor in participant ratings on its own, F (1, 163) = .83, p = .37.

As seen in Figure 5, those in photoset one rated those pictured with single-use items to be less 'cool' than those pictured with reusable items. However, those in photoset two rated models pictured with single-use items as 'cooler' than those with reusable items.

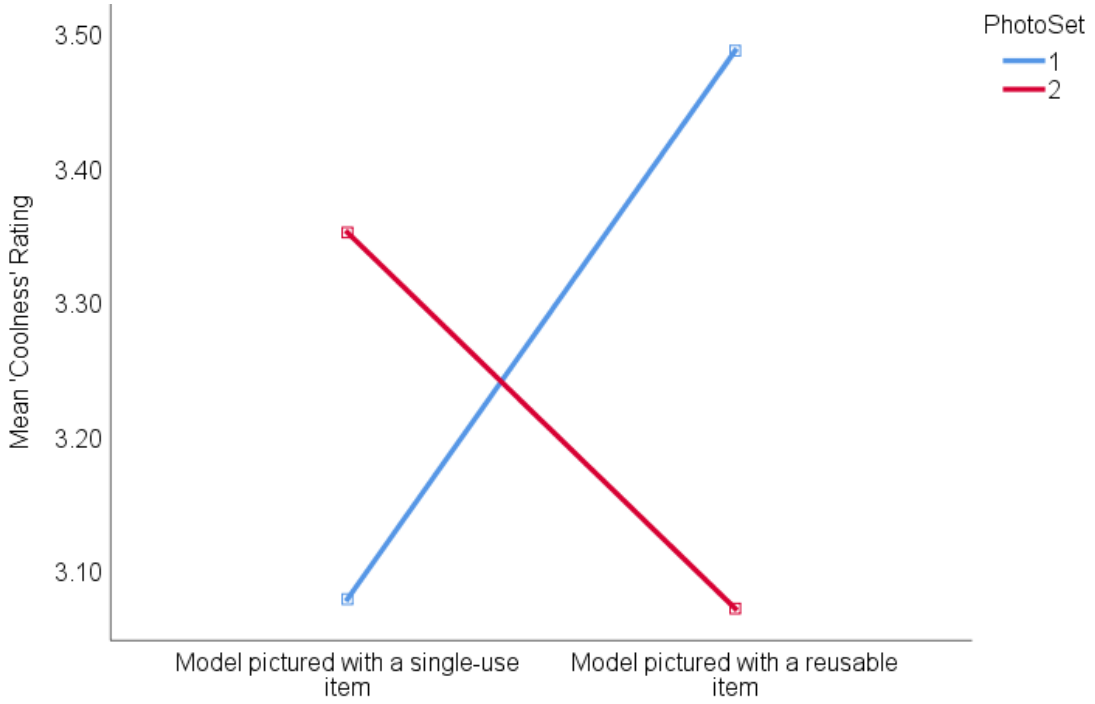

Figure 5: Line graph showing the mean 'coolness' scores for single-use item profiles and reusable item profiles across photoset one and two.

A post hoc t-test revealed that there was a significant difference between 'coolness' scores dependent on the item present in the images, t (81) = -8.31, $p < 0.001$. For photoset one, the mean 'coolness' score for models pictured with single-use items was 3.08 (SD= 0.62), whilst the mean score for reusable items was 3.49 (SD= 0.50). For photoset two, there again was a significant difference between the 'coolness' scores based on what items were present in the images, t (82) = 5.96, $p < 0.001$. However, the mean scores for this photoset reveal that the pattern goes in the opposite direction to that found in photoset one. The mean single-use score stands at 3.35 (SD= 0.53) whilst the mean reusable score is lower at 3.07 (SD = 0.53).

Caring

The third question was regarding how 'caring' participants thought the models were. There was not a significant interaction between how 'caring' the models were viewed and whether they were pictured with a single-use or a reusable plastic item, F (1, 163) = 1.38, p = .24. Again, however, there was a significant interaction found between 'caring' ratings and the items the models were pictured with depending on the photoset, F (1, 163) = 4.21, p = .04. Overall, photoset was not a significant factor in *participant ratings on its own, F (1, 163) = .16, p = .60.*

Figure 6 shows that those in photoset one rated those pictured with single-use items as more 'caring' than those pictured with reusable. However, in photoset two, they rated those pictured with single-use items as less 'caring' than those pictured with reusable items.

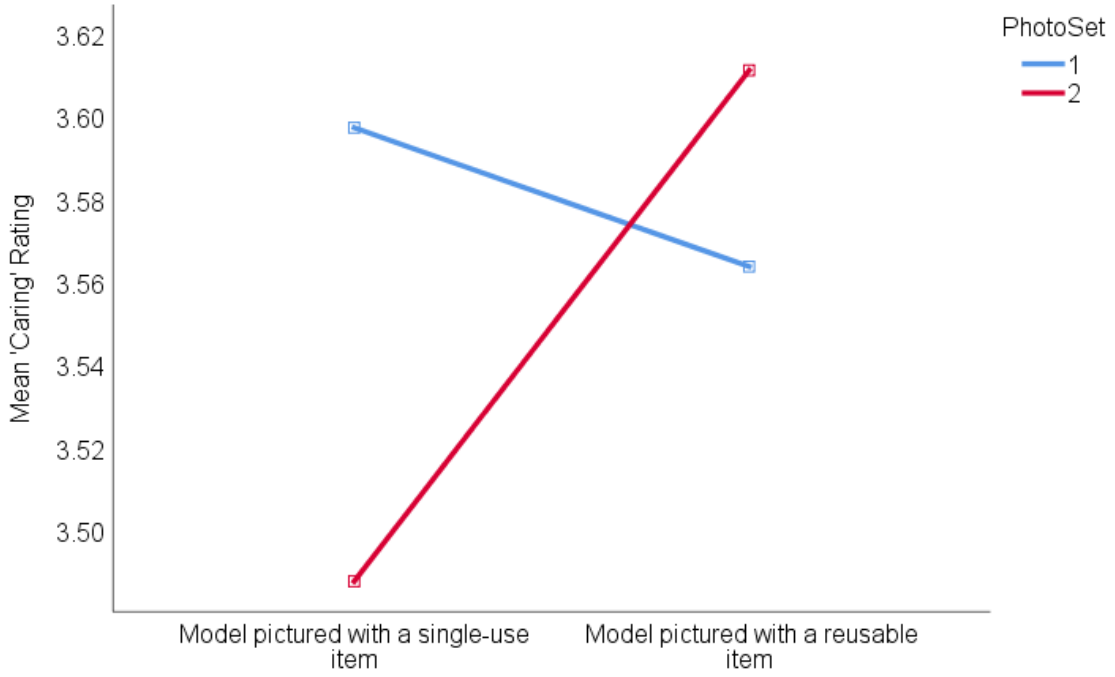

Figure 6: Line graph showing the mean 'caring' scores for single-use item profiles and reusable item profiles across photoset one and two.

Post hoc analysis revealed that for photoset one, there was not a significant difference between what item the model was pictured with and participants 'caring' rating, t (81) = .77, p = .44. The mean single-use score was 3.60 (SD= 0.59) whilst the mean reusable score was slightly lower at 3.56 (SD= 0.56). However,
For photoset two, the opposite pattern was found; a t-test revealed that the difference was approaching statistical significance, t (82) = -1.97, p = .05. The mean 'caring' score for single-use profiles was 3.49 (SD = 0.59), whilst the reusable profile score was slightly higher at 3.61 (SD = 0.51).

Overall friendship judgement.
The final question participants were asked after viewing the profiles was to decide whether or not they would be friends with the model in the picture. There was a significant interaction between whether the participants would be friends with the model and what item they were pictured with, F (1, 163) = 8.26, p = .005. Again, there was a significant interaction with the photosets and these ratings, F (1,163) = 5.98, p = .016. However, the photoset on its own did not produce a significant difference in scores, F (1, 163) = 1.96, p = .164.

Figure 7 reveals that for both photosets one and two, participants were more likely to be friends with someone who was pictured with reusable items, however this effect is much larger in photoset one.

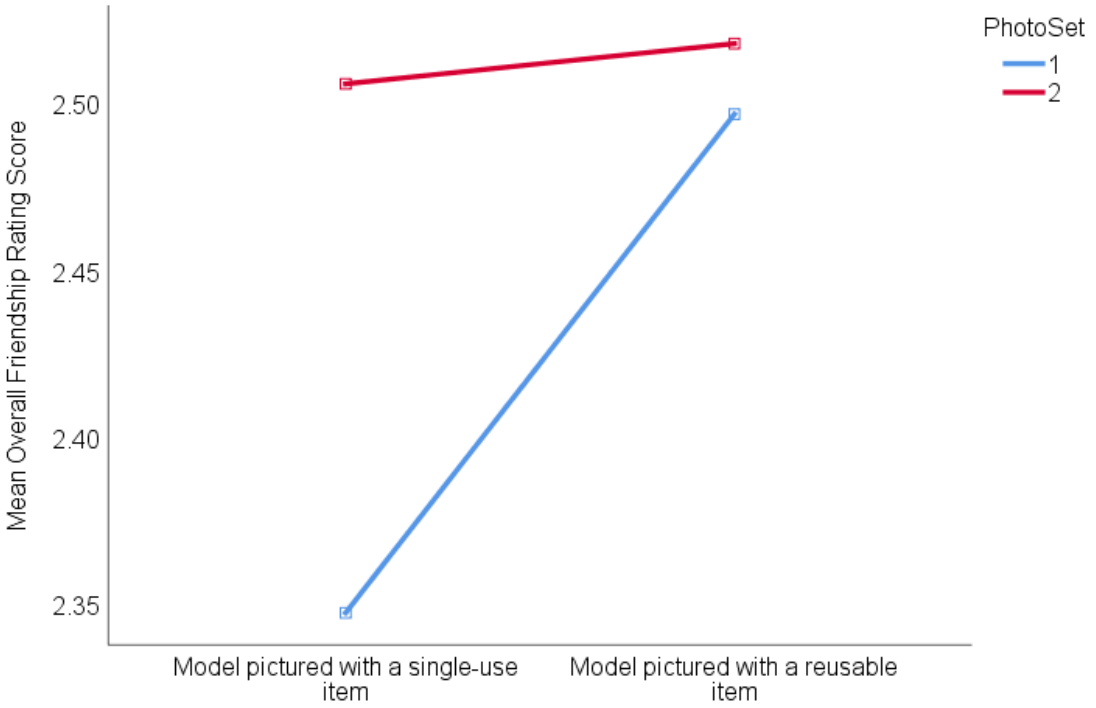

Figure 7: Line graph showing the mean overall friendship score for single-use item profiles and reusable item profiles across photoset one and two.

Post hoc analysis revealed that for photoset one there was a significant difference in whether participants would be friends with someone based on what they are pictured with, t (81) = -4.03, $p < 0.001$. The mean scores show that participants were less likely to be friends with someone if they were pictured with single-use items, with the mean score being 2.35 (SD = 0.46). Participants were more likely to want to be friends with someone if they were pictured with reusable items, with the mean score being 2.50 (SD = 0.46).
However, for photoset two, a t test revealed no statistical difference between participants oval friendship judgement and what item the model was pictured with, t (82) = -.29, p = .78.the mean scores were very similar. The mean score for single-use profiles was 2.51 (SD = 0.45) and the mean score for reusable profiles was 2.52 (SD= 0.42).

Hypothesis 2: Ocean Connectedness
The overall mean for ocean connectedness scores was 3.71 (SD = 0.66)**.** We can then explore whether there was an interaction between ocean connectedness scores and the ratings participants gave for each of the four questions.

Similarity
For judgement question 1, similarity, there was not a significant interaction between ocean connectedness scores and how ‘similar’ participants rated the models to themselves depending on what item the model was pictured with, F (1, 163) = 1.62, p = .21. No significant interaction was found between the ratings, ocean connectedness scores and the photoset, F (1, 160) = .76, p = .38.

The means displayed in Table 5 show there was not a large difference in how ‘similar’ participants with a high ocean connectedness score rated the models to be

to themselves, compared to those with a low ocean connectedness score, with the means ranging from 2.31 to 2.63. The standard deviations are all also very similar. Photoset did not appear to affect the ratings either.

Table 5: Mean scores showing how 'similar' those with both a low ocean connectedness score and a high ocean connectedness score rated the models in the images to be, depending on whether they were pictured with a single-use item or a reusable item.

Photoset	Ocean Connectedness Score	Single-Use vs Reusable	Mean 'Similarity' Score	Standard Deviation
1	Low	Single-Use	2.34	0.65
		Reusable	2.63	0.65
	High	Single-Use	2.31	0.57
		Reusable	2.60	0.73
2	Low	Single-Use	2.40	0.63
		Reusable	2.50	0.61
	High	Single-Use	2.63	0.65
		Reusable	2.56	0.55

Coolness

There was also no significant interaction between a participant's ocean connectedness score and how 'cool' they thought those pictured with reusable or single- use items were, F (1, 163) = .04, p = .85. There was also no significant interaction between a participant's ocean connectedness score and how 'cool' they thought the models were based on the item these models held, F (1, 160) = .16, p = .69.

Table 6 shows that the means 'coolness' ratings, are similar across ocean connectedness scores and the item pictured with the model.

Table 6: Mean scores showing 'coolness' ratings for single-use and reusable items based on low and high ocean connectedness scores and photoset.

Photoset	Ocean Connectedness Score	Single-Use vs Reusable	Mean 'Coolness' Score	Standard Deviation
1	Low	Single-Use	3.12	0.63
		Reusable	3.51	0.42
	High	Single-Use	3.04	0.61
		Reusable	3.47	0.57
2	Low	Single-Use	3.36	0.55
		Reusable	3.08	0.47
	High	Single-Use	3.36	0.53
		Reusable	3.07	0.58

Caring

There was no significant interaction between ocean connectedness scores and how 'caring' participants rated those pictured with single-use plastic items or reusable items to be, F (1, 160) = .25, p = .62. There was also no interaction between ocean connectedness scores, 'caring' ratings and photoset, F (1, 160) = .29, p =.59.

Table 7 shows that the means across both high and low ocean connectedness scores are very similar, regardless of whether the model was pictured with a single-use item or a reusable item. This pattern is the same for both photosets.

Table 7: Mean 'caring' scores participants with both low and high ocean connectedness gave to those pictured with single-use and reusable items, across both photosets.

Photoset	Ocean Connectedness Score	Single-Use vs Reusable	Mean 'Caring' Score	Standard Deviation
1	Low	Single-Use	3.63	0.62
		Reusable	3.56	0.61
	High	Single-Use	3.57	0.57
		Reusable	3.57	0.52
2	Low	Single-Use	3.43	0.63
		Reusable	3.55	0.51
	High	Single-Use	3.55	0.55
		Reusable	3.67	0.49

Overall friendship judgement.
Again, there was no significant interaction between participants' ocean connectedness scores and how likely they were to be friends with someone pictured with a reusable or single-use item, F (1, 160) = .05, p = .83.
There was no significant interaction with the photosets, the ratings and ocean connectedness scores, F (1, 160) = .05, p = .83.

Table 8 shows a lot of similarity across the mean scores, with very little difference being found across photosets, ocean connectedness score and what item was pictured.

The same pattern was found for participants' marine litter awareness scores, with no significant interaction between how highly they scored and how harshly they rated those with single-use plastic items present and how positively they rated those with reusable item profiles. The full analysis for this can be found in Appendix D.

Table 8: Mean scores for how likely those with both low and high ocean connectedness are to be friends with someone based on if they're pictured with a single- use or a reusable item, across both photosets.

Photoset	Ocean Connectedness Score	Single-Use vs Reusable	Mean Score	Standard Deviation
1	Low	Single-Use	2.42	0.44
		Reusable	2.51	0.45
	High	Single-Use	2.28	0.48
		Reusable	2.48	0.48

2	Low	Single-Use	2.39	0.43
		Reusable	2.45	0.44
	High	Single-Use	2.59	0.44
		Reusable	2.57	0.40

Exploratory Analysis

Participant Recall

All participants were asked to recall three items that they had seen in the images. These recalled items were analysed to identify how many of these were target items. Target items were the single-use or reusable items posed in the images; bags, bottles and coffee cups. In total, 495 items were recalled. Of these 495 items, 312 were target items. Bags were recalled 126 times, bottles were recalled 110 times and coffee cups were recalled 76 times. Out of all the participants, six recalled no target items in their recall. Thirty-six people recalled one target item out of their three. Ninety-three participants recalled 2 target items out of their three recalled items. For 30 participants, all three of the items they recalled were target items.

Habits Questionnaire Analysis

Table 9 shows that very few participants never or rarely used reusable products, with most saying they often used them. For question two, the answers were slightly more spread. More participants said they 'always' tried to make an effort to reduce their plastic use, than those that said they 'always' used reusable products.

Table 9: Table showing how participants responded to the first two questions on the habit's questionnaire, in the form of a percentage.

	Response Scale				
	Never (%)	Rarely (%)	Sometimes (%)	Often (%)	Always (%)
How Often Do You Use Reusable Products?	0.60	1.20	22.40	69.10	6.10
How often do you make a conscious effort to reduce your plastic use?	1.20	6.10	24.20	43.00	24.80

*Figures given as the percentage of participants who gave that response. (N=165)

Habits Question 3: Reusable product usage

Participants were asked to tick from a list of reusable products to indicate which they used (Table 10).

Table 10: *Showing participants' responses to question 3 in the habits questionnaire, in which they had to tick from a list of reusable items which they used. Note, for the sanitary responses, the percentage is calculated from the female-identifying participants only.*

Reusable Item	Percentage (%) That Used It (N=165)	Percentage (%) That Didn't Use It (N=165)
Bottle	91.50	8.50
Bag	94.50	5.50
Straws	59.40	40.60
Coffee Cups	64.20	35.80
Cutlery	70.30	29.70
Containers	87.30	12.70
Sanitary Products	12.10	87.90
Other Items Not Listed	2.40	97.60

Reusable bags were the most commonly used item among participants, closely followed by reusable bottles. The least used items were reusable sanitary items, with almost 88% of female identifying participants not using them. The next least used item was reusable straws, however over 50% of participants still used them.

Photoset Interaction

All four profile judgement questions revealed an interaction between the ratings, the items held and photosets. Some further analysis was therefore carried out to try and explain this interaction.

Independent t-tests were carried out to explore the dispersion of those with high ocean connectedness, marine litter awareness and habits scores across the two photosets. For example, was the photoset interaction caused by more people with high habits scores falling into one photoset rather than the other?

Spread of ocean connectedness scores.

There was no significant difference between ocean connectedness scores across the two photosets, t (162)= -1.39, p = .17. The mean ocean connectedness score in photoset one was 3.64 (SD = 0.61). The mean ocean connectedness score in photoset two was very similar at 3.78 (SD = 0.70).

Spread of marine litter awareness scores.

There was no significant difference between marine litter awareness scores across the two photosets, *t* (162) = .42, *p* = .17. The mean marine litter awareness score for photoset one was 4.44 (SD = .45). The mean score for photoset two was also 4.44 (SD= .42).

Spread of habits scores

Habits Question 1.

There was no significant difference in scores for habits question 1 across the two photosets, t (162) = .79, p=.43. The mean score for habits question 1 in photoset one was 3.83 (SD = .61). For photoset 2 it was 3.76 (SD = .58).

Habits Question 2.
There was no significant difference in scores for habits question two across the two photosets, t (162) = -.09, p=.93. The mean score for habits question two in photoset one was 3.84 (SD = .88). For photoset 2 it was 3.85 (SD = .94).

Discussion

Firstly, looking at the data from the 'recall three items' question, it appears clear that the participants took notice of the target items. The three most commonly recalled items were in fact the target items, bags, bottles and coffee cups. Most participants recalled at least two in their responses. We can say that the participants took notice of the items and they were therefore salient enough to have had the potential to affect their impression of the models in the images.
The responses to the habits questionnaire show reusable product usage was high amongst participants. Less than 2% of participants said they never or rarely used reusable items. Furthermore, most participants said they made a conscious effort to reduce their plastic use, with only around 7% saying they rarely or never did. The responses to the final question revealed that over 90% of participants used reusable bottles and bags. Therefore, we can say reusable item use is high amongst the university population, and we could therefore draw the conclusion that using reusable products is the norm for this population. This further coincides with the literature mentioned in the introduction, which suggests that young people are engaged with environmentalism and engage in pro-environmental behaviours.

Hypothesis 1

Hypothesis one stated that, in the judgement questionnaire, participants would rate those pictured with single-use plastic items more negatively than the models pictured with reusable items. We may be able to cautiously accept this hypothesis. Significant interactions were found between what item the model was pictured with and the rating given for 'similarity' and overall friendship judgements, although not for 'cool' or 'caring' ratings. However, for all four judgement questions, a significant interaction was found between what item the model was pictured with, the judgement rating and which photoset participants were seeing. Photoset one appears to be the only photoset that confirms our hypothesis. For everyone in this photoset, across all elements of impression ('similarity', 'cool', 'caring' and an overall friendship judgement), participants rated those pictured with reusable items significantly more favourably than those pictured with single-use items. This therefore confirms our first key hypothesis.
As for photoset two, however, three of the impression judgements made were not significant. On the other hand, a post hoc t-test revealed a significant interaction for 'coolness' rating in photoset two. This interaction, however, is in the opposite direction to that hypothesised. Participants rated those with single-use items significantly cooler than those with reusable items. Therefore, the data from photoset two does not confirm our first key hypothesis.

Some additional analysis was carried out to try and rule out some possible causes for the photoset interaction. However, this analysis revealed that both photosets contained an even distribution of people with high and low ocean connectedness, marine litter awareness and habits scores. This, therefore, rules these variables out as possible explanations.

Hypothesis 2

The literature on nature connectedness argues those closely identified with natural environments care more about environmentalism (Schultz, 2002). We predicted, therefore, that those high in ocean connectedness would have been even more critical of those with single-use items, as they know what damage they do to the ocean. However, our data revealed no significant interaction between ocean connectedness scores and impression formation, meaning we therefore cannot accept our second hypothesis.

Ocean connectedness is a new concept with very little published research on it. The scale we used to measure this trait was unpublished and therefore has not been widely used and tested in much research. However, our predictions were based on a much more established area of research, concerning nature connectedness, which has an established scale that has been tested in a lot of research. Therefore, the scale we used may not be an accurate measure of ocean connectedness, and perhaps more research is needed into the concept to fully understand it and how it may differ from nature connectedness.

A further limitation concerns the items we used in the images. Despite trying to remove them, in recalling items multiple participants referred to brands of items present in the images. For example, several participants recalled seeing a Costa cup, whilst others recalled seeing an Aldi bag. Fennis and Pruyn (2007) argues brands can be a powerful influence over impression formation. For example, they argue a popular brand may draw more positive impressions, whilst a brand that may be notoriously disliked may make people form more negative impressions of those using it. This may explain the photoset interaction. The profiles were opposing across photosets, so for the profiles in one photoset that model would be pictured with a reusable item, and in the other photoset that same model would be pictured with a single-use item. However, not all items were recognised as specific brands. Therefore, there is the possibility that in one photoset a model could be seen with a single-use Costa coffee cup, but in the other photoset they were pictured with nondescript reusable items. Participants, therefore, may have made their impressions based on the brands in the images, rather than the items themselves. As brands may have only been visibly present in certain profiles, in certain photosets, this may go towards explaining why the same pattern was not found across photoset one and two. This could also go towards explaining the oppositional ‘coolness’ ratings found in photoset two. It may have been the case that participants picked up on the brands more for the single-use items present in photoset two, and the brands of reusable products may not have been as visible to them. Brands are commonly distinguished as being ‘cool’, ‘trendy’, or in style (Fennis & Pruyn, 2007). Therefore, participants may have picked up on some common, or trendy, brands present in the single-use images, and rated them as being more ‘cool’. Future research, therefore, should control the presence of brands, and perhaps use more undistinguishable, neutral products. Alternatively, future research could be carried out involving branded products, but in a controlled way. The procedure of our study could be replicated but for one set of participants, use strictly branded products, and for the other set use nondescript, neutral products. The results could then be compared to see if the branding affects the impression participants form, and if this impression differs across whether the products are single-use or reusable.

Despite some limitations in the materials of our studies, our findings may be applicable in implementing behaviour change. As discussed in the introduction, norms can influence behaviour change through people seeking positive validation from others (Zebrowitz,1990). We found that not only does using reusable items appear to be a norm for university students, but not doing so and using single-use items instead results in a negative impression being formed. Outside of the university population, the normalisation of using reusable products therefore needs to take place in order to promote positive behaviour change. Thomas and Sharp (2013) argued that recycling has become normalised due to the visible nature of the act. People see you doing or not doing so, and you see your neighbours doing the same. Therefore, if we make the use of reusable items more high profile, it may increase the normalisation of it. Celebrities and social media has already proven useful in the fight against climate change (Anderson, 2011). The recall data from our study also shows that people take notice of the products present in social-media style images. Celebrities can also act as 'models'; when they display a certain behavioural norm, others want to follow it (Lindenberg, Janneke & Diederik, 2011). Therefore, if celebrities started including reusable items in their images, it would help to further normalise the behaviour and push others to start using reusable items. In summary, our results have the ability to inform decisions about encouraging pro-environmental behaviour change.

Conclusions

To conclude, although our study did not show that ocean connectedness was an individual difference in the impression formation process, we did find that, for photoset one overall, using reusable products leads to a more positive impression being formed. Making the use of reusable products more of a societal norm, through the promotion of this behaviour by celebrities on their social media, will help to engage more people in this pro-environmental behaviour. Though there are some limitations, our study has the potential to spark some future research, such as into the branding of reusable and single-use items and the effect this has on impression formation. Any research is hugely beneficial; we need more explanations and suggested solutions to continue to engage people in environmentalism before our damage to the earth becomes irreversible.

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"We stand now where two roads diverge. But unlike the road in Robert Frost's famous poem, they are not equally fair. The road we have long been travelling is deceptively easy, a smooth super-highway on which we progress with great speed, but at the end lies disaster. The other fork in the road- the one 'less travelled by'- offers our last, our only chance to reach a destination that assures the preservation of our earth." – Carson (1962, p. xx)

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Appendices are available as 'supplementary files' (please see download area).