UNIVERSIDADE CATÓLICA PORTUGUESA

ASCRIPTION OF RESPONSIBILITY, RECYCLING BEHAVIOURS AND TRUST: A MODERATION ANALYSIS

Dissertation submitted to Universidade Católica Portuguesa to obtain a Master's Degree in Master in Psychology in Business and Economics

By

Varaidzo Abigail Anita Ndebele

Faculty of Human Sciences

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Under the supervision of Dr. Ian James Scott

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Dedication

To Auntie Cees.

Acknowledgements

To my advisor, Professor Ian, thank you for being so patient with me, through all the setbacks I faced throughout this journey;

To all the participants, thank you all so much;

To the wonderful team at CLOO Behavioral Insights Unit, thank you for giving me the space to supplement my learning (special mention to Vasco Brazão for all your wise and very last minute (sorry!) counsel);

To Mum, Dad and Tee, even though we couldn't celebrate this together, you've always been my number one cheerleaders;

To my wonderful family, this dissertation is as much mine as it is yours. I would not be here if not for all your love and faith in me;

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To Krystian, thank you especially for sitting up with me that autumn night;

To Nick, the words are few, and the gratitude is anything but;

Ale, *grazie per tutto caro;*

And last, but certainly not least, to Ana. *Volim te zauvijek*.

Abstract

This dissertation arose out of a curiosity in the relationship between trust in institutions and recycling behaviours, and how the concept of ascription of responsibility affects this relationship. From the literature on recycling behaviours and trust, there is an element of duty and responsibility attached to why individuals engage in recycling. As such, the main hypothesis focused on the relationship between institutional trust and recycling behaviours, and if this relation was moderated by ascription of responsibility, but it has not been tested as a moderator. A survey was constructed and distributed using Qualtrics software, combining the three variables discussed above, and the results were analysed using moderation analysis in R programming language. The main hypothesis results proved not statistically significant, and some correlates were analysed. The inability to prove the main hypothesis was in contrast with the literature, which perhaps could be explained better if the entire ascription of responsibility scale was used instead of the two factors chosen. A study using an updated form of the ascription of responsibility questionnaire that incorporates a measure on altruism, as well as integrating a game theory element to the research would be recommended for future research.

Keywords: community recycling, behavioural economics, ascription of responsibility

Resumo

Esta dissertação surgiu de uma curiosidade pela relação entre a confiança nas instituições e os comportamentos de reciclagem, e de como o conceito de responsabilidade influencia tal relação. Partindo da literatura sobre reciclagem e confiança, há um elemento de dever e responsabilidade ligado ao porquê os indivíduos se envolverem na reciclagem. Como tal, a principal hipótese concentrou-se na relação entre confiança institucional e os comportamentos de reciclagem, e se essa relação foi moderada pela atribuição de responsabilidade, mas não foi testada como moderadora. Um questionário foi construído e distribuído através do software Qualtrics, composto pelas três variáveis mencionadas acima, e os resultados foram analisados a partir duma análise de moderação em linguagem de programação R. Os resultados principais da hipótese revelaram não ser estatisticamente significativos, e foram analisadas algumas correlações. A incapacidade de provar a hipótese principal contrastava com a literatura, que talvez pudesse ser melhor explicada se toda a escala de atribuição de responsabilidade fosse utilizada em vez dos dois fatores escolhidos. Para futuras pesquisas recomenda-se a repetição do estudo com a utilização de um formulário atualizado de atribuição ao questionário de responsabilidade que incorpora uma medida sobre o altruísmo, e integrar um elemento de teoria dos jogos.

Palavras-chave: reciclagem comunitária, economia comportamental, atribuição da responsabilidade

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Chapter 1: Introduction

How responsible do you feel about your local environment? How far does this sense of responsibility extend? Does it only apply to your household, or does it apply to your building complex? Your neighbourhood? Your country?

A sense of responsibility, as a psychological construct, has been linked to many topics, from personal norms and conspicuous helping behaviour (Schwartz, 1973) to information avoidance levels regarding carbon emissions (Edenbrandt et al., 2021), but, in general, most people do feel some sense of responsibility for their environment. As we all benefit from a clean and safe environment, and attribute some degree of personal responsibility in keeping it that way, it is important to recognise the mechanisms and conditions under which this feeling of responsibility is present.

Furthermore, as a majority of the environments in which we live are provided and maintained by local governing bodies, if we trust them to do their jobs, will we be more incentivised to carry out responsibilities to our communities? And how does this trust interact with our sense of responsibility?

To examine these questions we can look at our recycling behaviour. It is no surprise that many factors explain recycling behaviours in individuals, and this research is an attempt to ask about (and gain insight to) the mechanism through which an aspect of recycling behaviour (waste reducing and sorting household waste behaviour) can be explained.

The aim of this dissertation is to determine if the level of trust an individual has in institutions has a significant effect on waste reducing or recycling behaviours, and if this effect is moderated by ascription of responsibility.

Trust in institutions is known to be a determinant for a variety of factors: people who are satisfied with public services are more likely to have higher level of trust in institutions, as are people who have a higher level of education, and degree of engagement in political systems (Christensen & Lægreid, 2005). It is worth mentioning that trust in institutions is a complex subject, with a large variety of factors that interact with each

other, and so this dissertation aims to contribute to the field of potential factors that influence trust in institutions[1].

One such candidate factor relates to responsibility. Ascription of responsibility is an interesting concept regarding recycling: how much responsibility are people willing to assume for the environment, and consequently, their actions? That sense of responsibility is important in understanding how people treat their environment: if people believe that their actions don't matter, they may feel disinclined and unmotivated to put in the work to contribute to recycling efforts.

Harring and colleagues (2019) identified that further research into the relationship between institutional trust and recycling behaviours as observed in high and low trusting conditions should be conducted. Ascription of responsibility has been identified as both a mediator and a moderator variable within norm activation models such as the Theory of Planned Behaviour and the Theory of Reasoned Action, and furthermore, it has been identified as a relevant factor in people's decision to recycle or not: there is a social element to it (not trust, per se, but certainly related to norms about feeling like one could be punished for recycling incorrectly; Brekke et al., 2009).

This research aims to start a discussion around institutional trust, and how policymakers can leverage these factors in designing policies that encourage recycling behaviour. This information would be useful for policymakers and municipalities, as it could help focus community engagement on building trust in institutions, among neighbours.

Understanding the behaviours behind recycling is important, as a lot of people want to contribute to a better environment, but can fail to realise this desire. By having a more detailed knowledge of behaviours, for example, trust and ascription of responsibility, that are strongly associated with recycling, policies aimed at individual and community recycling efforts can be more effective, both helping communities to recycle more efficiently and also empowering individuals and communities to make the right choice for themselves.

The research questions are then as follows:

[1] This is addressed further in the literature review.

RQ_1: If individuals show trust, both generally and in local government institutions, will they show high waste reducing recycling behaviours?

RQ_2: Does ascription of responsibility affect the relationship between people's waste reducing recycling behaviour and level of trust, both in general and institutional trust?

This dissertation is structured as follows: the literature review follows the introduction section, and contains a methodological review of the chosen research method, followed by the methodology, the results, the discussion, the conclusion and references and the appendices end off the document.

Chapter 2: Literature Review

Getting people to act in their own best interests is difficult, and aiming to change behaviours is even more challenging, as we default to the status quo and choose the path of least resistance when possible. In this way, recycling can be an added stressor in everyday life, causing negative feelings such as worry (Ojala, 2008)[2] and fear (Meneses, 2010) (which is a part of many pro-environmental campaigns) which, in turn, makes people less likely to want to engage in it, despite the long-term environmental benefits.

This section is divided into two parts: the first, the theoretical review, focuses on a discussion of behavioural economics, the foundation under which this work takes place, followed by a review of the four constructs that will be assessed in this research (ascription of responsibility, trust in institutions, general trust and waste-reducing recycling behaviour). The subsequent section looks into a review and justification of the chosen statistical analysis.

2.1 Theoretical Review

2.1.1 Behavioural Economics

As this research aims to understand a behaviour that is associated with public policy, a brief discussion of behavioural economics follows.

Behavioural economics is a heterodox theory of economics that studies how people systematically deviate from neoclassical economic ideas of rationality and decision making, specifically related to questioning utility theory and preferences (Kahneman & Tversky, 1979). In neoclassical economic theory, preferences are exogenous (they are not determined or influenced by other factors) and stable (they don't change), and individuals are both consistently "selfish" (they aim to increase their individual satisfaction and happiness at all costs) and rational.

Take altruism. Traditional economics states that the usefulness or personal satisfaction (described as utility[3]) gained from giving to a charity, for example, can be fully

[2] The author notes that people can suffer from environmental-related worry when it comes to engaging in pro-environmental behaviours.
[3] For a more detailed analysis of the concept of utility, see (Broome, 1991)

captured within an indifference curve, if one assumes that anyone who derives a lot of utility from giving money away to charity is in fact acting selfishly, because, ultimately, they are engaging in the behaviour to feel good about themselves, not necessarily to benefit others[4] (Simon, 1993). This demonstrates how utility can be (mis)interpreted in multiple ways, and so it begs the question, how can we come to an agreed upon definition of utility? All this is not to say that the overall impact of doing a 'good' deed is lessened by the knowledge of the motivation, as in comparison to an individual who gives their time and money to causes in which they would otherwise gain no tangible financial or metrically calculable variable, the effect is much the same, and the morality of doing something good for your own benefit is not necessarily wrong in this context, due the overall net positive impact. [5]

Behavioural economics provides a much more nuanced answer to this particular issue. It assumes that individuals are boundedly rational, we have social preferences, we learn socially, we are motivated by factors other than money (intrinsic and extrinsic motivation), we decide quickly and use heuristics to do so, we are not very good at risky decision making and forward planning and that individual differences are relevant.

The endowment effect illustrates how individual preferences are endogenous (people can and do change their preferences) and unstable: people exhibit a change in preference due to ownership of an item (Kahneman et al., 1990; Knetsch, 1989; Marzilli Ericson & Fuster, 2014; Reb & Connolly, 2007). Additionally, individuals have inconsistent time preferences: according to Strotz (1955), we face an intertemporal tussle between our patient and impatient selves, which is known as hyperbolic discounting. Mischel and Ebbesen's (1970) marshmallow experiment describes this well, especially in illustrating how temptation creates internal conflict. Resisting temptation involves tangible

[4] Altruism can also be thought of as what Simon (1993) calls 'a sacrifice of fitness'. In this interpretation, giving away thousands of dollars can be understood as either selfish or altruistic, depending on the effect that the donated money has on whomever is receiving it. I would also want to argue that people do in fact engage in altruistic behaviour for their own benefit (selfishly so) to a certain extent: for more information, see Ferguson, Farrell & Lawrence (2008) and Newman & Cain (2014).

[5] Perhaps what is missing from this argument is the knowledge of the intentions by the receiving party, which is an avenue to explore within another dissertation.

short term costs which stop us from achieving future goals. The value of future outcomes is discounted steeply close in time to an outcome, but more gently further away.

The history of the development of behavioural economic theory can be divided into 'old' and 'new' (Sent & Heukelom, 2017). The former focuses on the works of what can be considered the predecessors of BE theory, namely Herbert Simon and George Katona and 'new' is associated with Tversky and Kahneman.

'Old' behavioural economics was born out of organisational policy: Sent and Heukelom (2017) contend that this movement began in the 1950s and 1960s with Herbert Simon, Cyert, and March. Simon developed the notion of bounded rationality, which implies that individuals do not have access to all of the necessary information to make a decision, and as such cannot consistently make fully rational decisions. Furthermore, organisations were viewed as settings in which individuals did not have access to complete information and all available knowledge, and so these individuals used organisations as a means to make decisions and reduce their uncertainty.

Of the 'new' camp in behavioural economic thought, one of its core ideas is Prospect theory, put forth by Kahneman and Tversky (1979), which follows the assumption that individuals react more strongly to losses than to gains of the same amount, in relation to a reference point. It is a direct critique of expected utility theory in traditional economics, which stipulates that individuals make use of all relevant and available information, people use relatively complex mathematical tools to ensure utility maximisation and that choices are consistent once a decision is made. Two concepts that illustrate this are the Allais Paradox and the Ellsberg Paradox (Allais, 1990; Segal, 1987).

The Allais Paradox demonstrates that people's choices under risky conditions are often inconsistent, and in the Ellsberg paradox, most people will avoid an ambiguous option if presented with a set of options, even if the potential gains are larger in the more ambiguous option. Prospect Theory is essentially a model of risk; we make judgments about the value of different options in particular ways which are not consistent with traditional economics as captured by expected utility theory. This theory also led to the formation of the ideas of cognitive biases and heuristics. Prospect theory is also a utility

function in the sense that it measures individual preferences (Carmichael & MacLeod, 2002).

Behavioural economics also follows the idea of libertarian paternalism put forth by Richard Thaler, which aims to improve people's lives, but still give them the choice to either engage or participate in the structures that aim to change behaviour. This led to the concept of nudging in policy and behavioural design. The concept of nudging implies that there is no neutral architecture: the environment is built to shape individual behavioural choices either for the individual's benefit or for the benefit of a third party (Edwards, 2016).

As such, this section outlined the backdrop against which the subsequent concepts (ascription of responsibility, recycling behaviour and trust) are situated, as behavioural economic theory is paramount to policy making that integrates psychological mechanisms.

2.1.2 Ascription of Responsibility

This section will discuss the ascription of responsibility, its theoretical underpinnings and how it is relevant for this research.

Ascription of responsibility, hereafter AR, is a personality factor that describes an individual's willingness to assign a focused sense of duty and responsibility, as opposed to a diffuse sense of responsibility (Hakstian et al., 1986), and also describes an individual's willingness to assume responsibility, both specific (e.g. owning up to breaking your mum's vase) and more general (feeling responsible for the environment) (Octavia et al., 2018; Stern, 2000).

Responsibility has been documented as a predictor for ecological behaviour (Kaiser & Shimoda, 1999), pro-environmental behaviour (Milfont et al., 2010), waste-preventing behaviour (Heidari et al., 2020) and waste-reducing behaviour (Ebreo et al., 2003). As displayed, its importance in understanding ecological and pro-environmental behaviour cannot be discounted, as feelings of responsibility towards the environment are an integral component of understanding how and why people choose to engage in pro-environmental behaviours.

This construct has been shown to mediate the relationship between willingness to help others and actual observed help given, meaning that AR has been shown to explain the relationship between the trait of willingness to help and the observed behaviour of actually helping others (Schwartz, 1973).

Suffice to say, what are the theoretical underpinnings of ascription of responsibility, and how can we better explain the mechanisms under which it works? Norm Activation Theory, discussed below, can provide us with a few answers.

2.1.2.1 Norm Activation Theory. The moral implications of having a sense of responsibility towards oneself and others is not to be overlooked: interpreting responsibility as a moral obligation to oneself and to others, it stands to reason that psychological processes are at work in explaining how and why we choose to feel responsible for events and actions in our lives. AR comes out of attribution theory, which focuses on internal versus external AR (Suedfeld et al., 1985), and within psychology, responsibility is a fundamental concept regarding literature in moral behaviour. One such line of thinking comes from the norm activation theory (Schwartz, 1970, 1977). This theory focuses on the idea that two conditions must be present for a norm to be activated. These two conditions are that a) an individual has to accept that there is a public consequence[6] of their private actions and b) the individual must ascribe responsibility for those actions. In a paper by Brekke and colleagues (2009), the researchers assume that if a person is in doubt about what the right thing to do is in a given situation, they will infer their individual responsibility by looking at (and subsequently trusting) what other people around them are doing. The results highlight a mediation effect of social interaction on recycling behaviour through AR, which is important in this research, as using AR as a moderator instead of a predictor will shed light on the nature of this relationship further, by examining a different causal pathway of determinants of recycling behaviours.

Based on these studies, the first two hypothesis is put forward as follows:

H_1: There will be a positive relationship between trust and self-reported waste reducing recycling behaviours;
H_{1a}:There will be a positive relationship between institutional trust and self-reported waste reducing recycling behaviours,

[6] This consequence does not necessarily have to just be negative, it can also be a positive consequence.

H_{1b} :There will be a positive relationship between general trust and self-reported waste reducing recycling behaviours;
H_2: There is a positive relationship between ascription of responsibility and self-reported waste reducing recycling behaviours.

2.1.3 Trust

If the global pandemic has taught us anything, it is that humans really are social animals, and we thrive off our social connection (see also Baumeister & Leary, 1995). A fundamental component of social interactions is how much trust we have in the people around us, as that affects both the kinds of relationships we have with others, and how we interact in social situations. Furthermore, trust is a multifaceted idea that encompasses different forms: for example, trust in institutions is a form of trust that has been studied in research on public administration and citizen involvement. Thus, the following section will discuss both general trust, and institutional trust, and how they relate to ascription of responsibility and recycling behaviours.

2.1.3.1 Trust as Intention. General trust, for the purposes of this research, will be defined as "a cognitive bias in the evaluation of (potential) partners" (Yamagishi & Yamagishi, 1994, p. 139). In this way, trust is considered a trait variable, implying that some people are more trusting overall than others. An early definition of trust as a trait variable by Rotter (1967) defines trust as "an expectancy held by an individual or a group that the word, promise, verbal or written statement of another individual or group can be relied upon." (Rotter, 1967, p. 651)

Barber (1983) makes the distinction of trust being both the expectation of "technically competent role performance from those involved with us in social relationships and systems," and the expectation that "partners in interaction will carry out their fiduciary obligations and responsibilities, that is, their duties in certain situations to place others' interests before their own." (Barber, 1983, p. 9)

Following on from this, trust can be interpreted as either an intention or an action: state or trait aspects of personality can be explained as *intentions*, which are measured with attitudinal scales, and trust games, as seen in behavioural game theory, illustrate how trust works as an *action*.

On one hand, viewing trust as a trait makes it easier to measure, as it captures an individual's current state: this would be particularly useful for studying long term effects of trust, as people's opinions and circumstances are subject to change, and so having trust as a trait variable makes it easier to identify changes in trust.

On the other hand, trust can also be considered as a state variable, where it is "associated with a decision in a situation of risk" (Siegrist et al., 2005, p. 146), specifically when dealing with trust in a specific entity, and this is seen most within the field of risk perception[7], a field of much interest in behavioural economics.

General trust therefore contributes substantially to the discussion of recycling, as communal recycling requires collective effort to be of use, and so the relationships that individuals have (as conceptualised through trust) with those in their household and their neighbours are crucial in understanding how trust affects recycling efforts; Brekke and colleagues (2010) explain this idea in terms of *duty-orientation*, which is the idea that an individual's self-image is directly linked to their perceived capability as a socially responsible person, and forming trusting bonds is one such mechanism through which individuals can maintain that sense of personal responsibility. From a philosophical standpoint, the relationship between trust and AR can be explained by the obligation-ascription thesis (Nickel, 2007). This stipulates that "if one person trusts another to do something, then she takes him to be obligated to do that thing" (Nickel, 2007, p. 310)**.**

This sense of obligation thus informed the reasoning as to why this construct (trust) was measured: the first being that trust is already established as a predictor of recycling (Cohen et al., 2021; Harring et al., 2019; Rompf et al., 2017; Scafuto et al., 2018). Secondly, as there is reasonable evidence that trust and AR are related (Blamey, 1998; Nickel, 2007), it would be useful to see if the relationship between trust and recycling behaviour remains consistent if AR was used as a moderator and not simply as a predictor of recycling behaviour.

[7] See Sjöberg (1999; 2001) for more information

Trust, as shown above, is defined and explored within many contexts in psychology. As we live in communities, and have responsibilities to one another, the following hypothesis is presented:

H_{1b}: There will be a positive relationship between general trust and self-reported waste reducing recycling behaviours

It is no surprise that how much we trust our governments and local municipalities affects our relationship with them, and so the next section will look at institutional trust as a variable, and how that is relevant for this research.

2.1.3.2 Trust in Institutions. This dissertation aims to contribute to the growing literature around how best to implement and maintain recycling behaviours within communities, as well as further examining the factors that contribute or impede recycling efforts at the individual level. The efficacy of any local recycling institution is central to any and all discussions about recycling behaviours. How likely are you to engage in recycling if you know that your local municipality will not dispose of your waste properly? For this reason, institutional trust was added to the research question, as a way to further understand how trust interacts with recycling behaviours.

Institutional trust is defined as "the security one feels about a situation because of guarantees, safety nets and other structures" (McKnight et al., 1998, p. 475).

Christensen and Lægreid (2005) discuss in their paper the relationship between trust in government and other correlates. They mention that demographic characteristics such as age, level of engagement in political matters, place of employment (civic or private employment), have a stronger effect on levels of trust in government than other measures, such as satisfaction with public services.

To add on to this, a multilevel analysis of trust and institutions by Wang and Gordon (2011) showed that demographic characteristics such as individual and group level effects of religious affiliations and nationality significantly predict trust in institutions. Furthermore, the researchers posit that trust can be promoted by the recognition of a high quality of national legal systems.

The aforementioned importance of the effect of demographic variables on institutional trust lend credence to the idea that for the purposes of this research, trust is a

multifaceted concept, and multiple factors (both general and institutional trust) should be considered for analysis.

Similar to general trust, institutional trust, in this analysis is considered to be an intention rather than an action: it is "an individual-specific and situation-specific concept. It is a property or state of a person directed to another person or persons" (Wang & Gordon, 2011, p. 584). Allum and colleagues[8] (2010) found that the relationship between both general and institutional trust is not affected across multiple demographic characteristics, such as income, age and gender, adding to the idea of trust being considered a personality variable.

Hudson (2006) found that institutional performance has a significant effect on subjective well-being, along with other correlates such as age: institutional trust increases with age overall, and trust in specific institutions, namely the United Nations, unions and the European Union, to name a few, decreases then increases, from the ages of 44 and 56. They also found that institutional trust increases with level of education and household income.

Given that institutional trust has similar correlates (age and education) with general trust, and based on the aforementioned interpretation as institutional trust as an intention, the following hypotheses are proposed:

H_3: The relationship between trust and self-reported waste reducing recycling behaviours will be moderated by ascription of responsibility,

H_{3a}: The relationship between general trust and self-reported waste reducing recycling behaviours will be moderated by ascription of responsibility;

H_{3b}: The relationship between institutional trust and self-reported waste reducing recycling behaviours will be moderated by ascription of responsibility.

2.1.3.3 Behavioural Economic Theory Contribution: Trust as an Action.

Aside from attitudinal measures (as seen above), the use of trust games as a measurement of trust as an *action* are a key contribution of behavioural economic theory.

[8] In their research, they also found that life satisfaction was a strong predictor of both types of trust. They also looked at the relationship between general trust and civic engagement, and found it to be not strongly related.

These interactive games aim to elicit trusting behaviour in individuals. The typical format of these games involves two players, with one player (Person A) owning a certain amount of money, and then deciding how much of their money to give to their partner (Person B). Person B then has the choice to return a portion of the money given back to Person A. In this way, trust is measured by either the amount of money transferred between players, or whether money is transferred (Berg et al., 1995; Güth et al., 1997).

A key element of understanding how trust works in these games is reciprocity, where people will respond to an action with an equivalent response (Fehr & Gächter, 2000) (either positively, i.e., if I do something kind for a friend, they are likely to return the favour in kind, or negatively, i.e., if I do something awful, like eat all their chocolate, they may then decide to stop being my friend). It deviates from a rational economic standpoint, as there is no economic exchange or, in most cases, economic benefit involved in reciprocity.

An important distinction between the behavioural economic theory description of trust and the psychological is that trust, in the behavioural economic sense, is explained by a different set of factors, including betrayal aversion and risk-taking (Fehr, 2009).

2.1.4 Recycling Behaviours

For this research, the question arises, how can we measure recycling behaviours? A simple question asking how many times a week you engage in recycling behaviours alone cannot fully capture the reality of recycling behaviour, as so many factors are at play in describing this phenomenon.

It is no secret that recycling is an everyday feature of our lives: from the prevalence of climate change mitigation strategies to communal campaigns to influencers and celebrities promoting a more environmentally conscious lifestyle, recycling is everywhere.

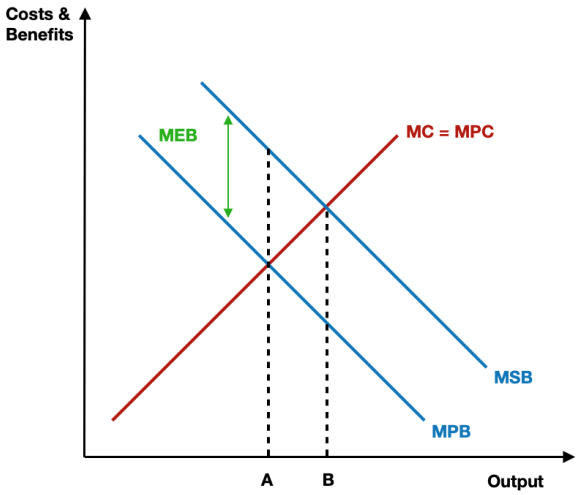
From a microeconomic perspective, recycling behaviour by individuals creates a delayed positive externality, and a functional recycling system can be considered a public good that benefits this generation and the next (Duggal et al., 1991).[9] Furthermore, the environmental benefits to an individual from recycling, from an economic standpoint, are

[9] Examples of positive externalities being reduced landfill costs and clean environment.

non-rival, non-excludable, and not immediately noticed by the individual. The associated Kaldor-Hicks[10] improvement entails that the private marginal benefit of recycling will be both less than the marginal social benefit and the socially optimal level of recycling, as individuals will assign less value to recycling due to its unforeseen and not as instantaneous benefit, and consequently individuals will not want to recycle as they feel that their deeds are not being (immediately) compensated. Figure 1 depicts a graphical representation of this.

Figure 1

Positive Externalities Associated with Recycling



1. *Note*. The above diagram is a representation of the positive externality created by recycling. MC stands for Marginal Cost, MPC stands for Marginal Private Cost, MSB for Marginal Social Benefit, MPB for Marginal Private Benefit and MEB for Marginal External Benefit, also known as the positive externality created from recycling. Output level A is the actual amount of recycling done (market equilibrium) and point B is the socially optimal level of recycling.

The aforementioned outcome leads to two main problems that encourage unsustainable behaviours: a) the free rider problem (Samuelson, 1954) and b) the tragedy of the commons. Regarding the former, at the individual level, the decision of whether or not to recycle has no noticeable impact for neither other individuals nor for the community at large, so individuals would most likely choose not to recycle. Additionally, those who

[10] From economists Kaldor and Hicks, this differs from a Pareto improvement in the sense that the former entails a total improvement in social welfare and the latter outlines the condition that at least one person is better off and no one is worse off as a result of the externality (Ellerman, 2014).

feel that making the effort to recycle is too burdensome, will aim to avoid the full costs of their choice to not recycle, and thus will end up relying on the goodwill of others in their community (Xu et al., 2018; Yau, 2010). Market failures such as the tragedy of the commons encourage unsustainable recycling behaviour in the sense that there is little to no incentive on the part of the individual to protect the environment through making the effort to recycle, and so this prioritisation of personal over societal gain will eventually lead to the depletion of our natural resources.

2.1.4.1 Behavioural Economic Explanation of Recycling Behaviours. This analysis is in line with behavioural economic thought, as due to hyperbolic discounting, recycling efforts by individuals will be difficult to realise. A behavioural economics interpretation would explain the failure of consistent recycling behaviours in terms of self-control and intertemporal decision making, known as a dual-process theory (Evans & Stanovich, 2013). The dual-process theory argues that people have two clear-cut ways of thinking: one is quick and intuitive, known as a Type 1 process, and the other is much slower, and requires more energy, as it requires an individual to pull from working memory (Type 2). In a recycling context, this could be illustrated as wrestling between prioritising the instant gratification received from not spending the time and energy recycling (Type 1) and taking the time to recycle, thus benefiting future generations (Type 2).

2.1.4.2 Recycling in Portugal. Potential solutions to this market failure are government regulation on making recycling mandatory within cities and countries and the use of incentives. In Portugal, aside from the pre-existing recycling centres within every city (known as ecopontos) there are other initiatives that encourage recycling behaviour, using varied incentivising methods. One such initiative, known as the Environmental Global Facilities, has invested approximately 2.6 million euro in a program that gave economic incentives to those who separated their packaging before disposal. This program comprised four initiatives: a) a mobile application (APP Recycle BinGo) which gave those who recycled at their local recycling centre points that could be redeemed for movie tickets, and other vouchers; b) ECOEVENTOS, an initiative that partners with local festival and event planners, that supports and certifies sound environmental practises during festivals and

other community based event; c) COMÉRCIO A RECICLAR, an informative campaign rolled out in Lisbon county that focuses on providing information about the benefits of commercial recycling and d) ECOVALOR, which focuses on providing environmentally conscious education within schools. This also includes an incentive scheme for rewarding good environmental behaviour, by providing €0.50 to schools for each bag of plastic, metal and beverage package recycled. (*EGF - Recycling Incentives*, n.d.)

2.1.4.3 What Explains Recycling Behaviours? Hines and colleagues (1987) focuses on the issue of predictors of responsible environmental behaviour. This problem involves barriers to responsible environmental behaviour, in particular personal responsibility, locus of control and attitudes. As a solution, the authors developed one of the first known models of predictors of pro-environmental behaviour, based on the results of their meta-analysis. A strength of this paper was that the model has paved the way for research regarding motivating factors in pro-environmental behaviour. One weakness in this study is that it did not assess the relationships between the variables in the model and their potential impact (or lack thereof) on pro-environmental behaviour. The results from this paper have further been supported in research: Bamberg and Möser (2007) conducted a meta-analysis, which confirmed that pro-environmental intention mediated all other variables that predicted pro-environmental behaviour. The meta-analysis also confirmed that personal moral norm, along with attitude and behavioural control, are predictors of pro-environmental behaviour intention.

It is inconsistent with traditional economics because any individual who acts in a pro-environmental manner creates a public good, where other individuals benefit from that act without taking on any of the associated burden of doing so themselves. This relates to the free-rider problem, as following a traditional economics mindset, any individual interested in their own self-interest will free ride, given the chance (Xu et al., 2018; Yau, 2010).

Measuring pro-environmental behaviour comes with its own set of challenges: not all other variables in an individual's life can be held constant. Using determinants of pro-environmental behaviour to determine the frequency of recycling, for instance, may be

useful if undergoing personality assessments, but otherwise cannot be considered a worthwhile endeavour.

2.1.4.3.1 Predictors of Recycling behaviour. Other ways to combat the limitations of pro-environmental behaviour as a measure are to look at other predictors. A combination of external and internal factors contribute to the literature on established predictors of recycling behaviour: Kaplan Mintz and colleagues (2019) discuss how cultural factors and environmental systems (national regulations regarding sorting and recycling household waste) are moderators of recycling behaviour, along with perceived behavioural control (Liu et al., 2021) and effort (Schultz & Oskamp, 1996). Finally, gender, which moderated the relationship between market incentives (which was measured by statements that captured support for the government's ability to perform waste recycling and sorting) and willingness to sort and recycle waste in both males and females (Labib et al., 2021), is also considered as a predictor of recycling behaviour.

Sujata and colleagues (2019) found that the role of NGOs (when higher) was a predictor of the strength of the positive relationship between recycling intentions and recycling behaviours, however, the role of governments as a moderator was not supported in their analysis.[11] On the other hand, Dhir and colleagues (2021) contend that value compatibility (how well a service or product meets a consumer's needs), environmental concerns, and the perceived benefits of engaging in recycling behaviour are moderators of the relationship between recycling intentions and recycling behaviour.

[11] The authors note that the use of a single item construct could have influenced these results, and called for future research to review this relationship under different contexts.

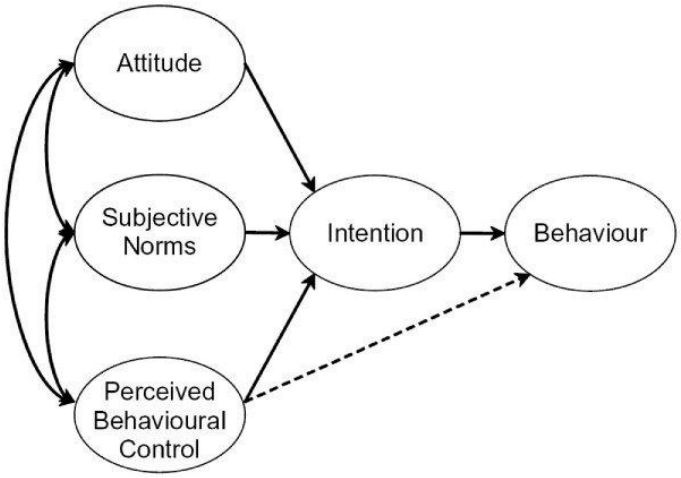
2.1.4.4 Behavioural Economic Explanation of Pro-Environmental Behaviours. The environmental poverty trap (Corrado et al., 2020) states that the worse the state of the local environment, the less an individual respects recycling rules, leading to a vicious cycle wherein the lack of respect causes further environmental degradation, which causes less respect for the environment and so on. This mimics the prisoner's dilemma, as it would be more beneficial to the individual (and society at large) if they would respect recycling rules, but as individuals are acting in their own self-interest and are unwilling (or unable to) cooperate, this suboptimal outcome is achieved.

Corrado and colleagues (2020) go on to explain that this occurs for two main reasons: the first being that people infer norms about how to act and behave regarding their environment from the state of the environment and then imitate and integrate those ideas and behaviours. The second focuses on loss aversion and the status quo bias: if the state of the environment is regarded as something of value, then individuals will react to the idea of losing something valuable (in this case, a clean environment) as a potential trigger for pro-environmental action. Regarding the status quo bias, if the environment is a well-maintained one, then individuals will assume that it is supposed to be that way, and will work to maintain that level of care, as the alternative is considered to bring disutility. That is to say, people would rather maintain a clean environment than improve a degraded one; a paper by Keizer and colleagues (2013) highlighted how witnessing prosocial behaviours had a direct positive impact on others prosocial behaviour.

2.1.4.5 Theory of Planned Behaviour. According to Ajzen (1991), the intention to perform a given behaviour is the best predictor of observed behaviour in individuals. This is determined by a) the individual's specific attitude towards the behaviour; b) their perceived behavioural control and c) the subjective norms, which is the individual's perception of support from important people in their lives. It was developed out of the theory of reasoned action, which suggested that human behaviour was not simply a reflection of attitudes, but that subjective norms and intentions are important in predicting observed behaviours (Sniehotta et al., 2014).

Figure 2

Theory of Planned Behaviour, Ajzen (1991)



The Theory of Planned Behaviour has recently been criticised for not having a lot of predictive power when applied; it is both too focused on the individual's behaviour while concurrently paying insufficient attention to respondent identity, and in particular, the issue of 'inclined abstainers' (Orbell & Sheeran, 1998), individuals who form an intention and then fail to act on that intention, has largely not been addressed. Furthermore, its utility has been questioned of late: the intention-behaviour correlation diverges considerably in research, and as such, casts doubt on the model's ability to predict behaviour. More concerning, a low-intention behaviour correlation, which is commonly associated with the amount of time between the measurement of intention and the observation of a behaviour (Ajzen, 2011) points to the limits of the theory's utility.

As shown above, recycling behaviours are influenced by a multitude of factors, both economic and psychological, and this leads to the proposal of the final hypothesis:

H_3: The relationship between trust and self-reported waste reducing recycling behaviours will be moderated by ascription of responsibility,

H_{3a}: The relationship between general trust and self-reported waste reducing recycling behaviours will be moderated by ascription of responsibility,

H_{3b}: The relationship between institutional trust and self-reported waste reducing recycling behaviours will be moderated by ascription of responsibility.

To reiterate, all the hypotheses in this research, as discussed in the literature review, are as follows:

H_{1a} There will be a positive relationship between institutional trust and self-reported waste reducing recycling behaviours,

H_{1b} There will be a positive relationship between general trust and self-reported waste reducing recycling behaviours;

H_2: There is a positive relationship between ascription of responsibility and self-reported waste reducing recycling behaviours;

H_3: The relationship between trust and self-reported waste reducing recycling behaviours will be moderated by ascription of responsibility,

H_{3a}: The relationship between general trust and self-reported waste reducing recycling behaviours will be moderated by ascription of responsibility,

H_{3b}: The relationship between institutional trust and self-reported waste reducing recycling behaviours will be moderated by ascription of responsibility.

The subsequent section will contain a review of the methodology chosen, along with its accompanying literature.

2.2 Methodological Review

2.2.1 Moderation Analysis

The chosen analysis in this study will be moderation analysis, which is a statistical method that uses a variable that explains when two other variables are related: in this research, ascription of responsibility is the moderator, and it will be used to uncover under which conditions trust and recycling behaviour are related.

This analysis was chosen for this research because an effect has already been proven to exist in previous research between trust and recycling behaviour (Nickel, 2007), and ascription of responsibility and recycling behaviour (Brekke et al., 2009).

Moderators can have multiple effects: they can be a) enhancing, where increasing the moderator would increase the effect of the predictor variable on the outcome variable; b) buffering, where increasing the moderator would decrease the effect of the predictor variable on the outcome variable or c) antagonistic, where increasing the moderator would reverse the effect of the predictor variable on the outcome variable (Memon et al., 2019).

Norm activation theory, previously discussed in the literature review, provides the basis for considering AR as a moderator, and AR would therefore strengthen the relationship between trust and recycling behaviour, as a component of trust is a sense of obligation to other people (Barber, 1983). This, therefore, rules out the inverse interaction where trust moderates the relationship between AR and recycling behaviour, as AR is integral to trust and falls under its umbrella.

2.2.2 Moderation Analysis with Regression

Moderation analysis can be conducted using a regression analysis, which is " a statistical tool for the investigation of relationships between variables" (Sykes, 1993, p. 1).

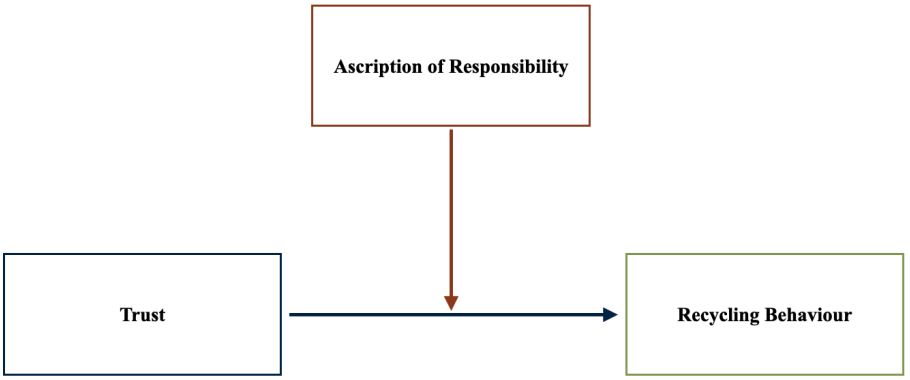
A moderation regression analysis can be explained by the following equation:

$$Y = b_0 + b_1x_1 + b_2x_2 + b_3(x_1 \times x_2) + \varepsilon \textbf{ (1)}$$

where Y is the outcome variable (recycling behaviours), b_0 is the intercept, x_1 is the input variable (general and institutional trust) and x_2 is the moderating variable (ascription of responsibility). Figure 3 below shows a conceptual model of how a moderation analysis is conducted.

Figure 3

Moderation Conceptual Model



Chapter 3: Research Design

3.1 Research Overview

This section of the dissertation looks at the methodology and design of this research. It begins with a discussion of the procedures used, followed by the methods of data collection.

3.2 Data Collection

3.2.1 Prior Power Analysis

G*Power software (Erdfelder et al., 1996) was used to calculate the sample size required to detect a medium effect size for a regression analysis ($f^2 = 0.15$). To achieve 80% of power, with an α level of 5%, the estimated sample size for a critical F of 2.7 was 77 participants.

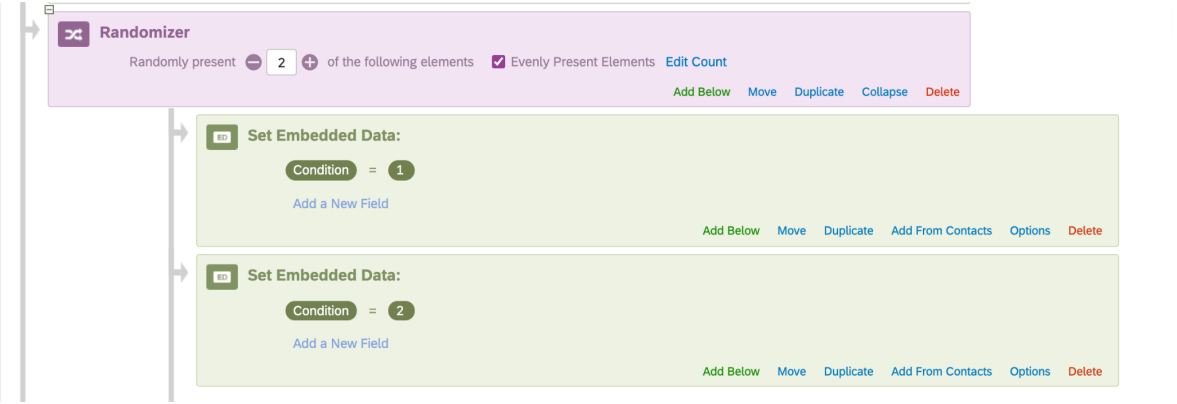
3.2.1.1 Software and Packages Used. To create the survey, Qualtrics software (Qualtrics, n.d.) was used. Code for data analysis was generated using R (R Core Team, 2020) and RStudioSoftware (RStudio Team, 2020).

For the data visualisations, R packages *ggplot2* and *rockchalk* (Johnson, 2022; Wickham, 2016, p. 2) was used, and various packages such as *tidyverse, polycor, rethinking, stargazer* and *car* (Fox, 2022; Fox & Weisberg, 2019; Hlavac, 2022; McElreath, 2021; Wickham, 2016) were used for data cleaning and analysis.

Data was collected with a survey in Qualtrics (See Appendix D for the ful survey), conducted between December 2021 and January 2022, with a sample size of 127. Question order was randomised for all participants, meaning that both the questions within each block and each block of questions (before the 'Demographics' section) were randomised. To protect users anonymity, the option 'Anonymize responses', which is described as 'Don't record respondents' IP Address, location data, and contact info.' was selected in Qualtrics. To achieve counterbalancing in the survey, the participants were randomised to one of two conditions in Qualtrics (Qualtrics, Provo, UT) using the Embedded Data function: Condition 1 would display the Recycling Questionnaire first followed by ascription of responsibility, and in Condition 2, ascription of responsibility would be displayed first followed by Recycling Questionnaire (see Figure 4 below).

Figure 4

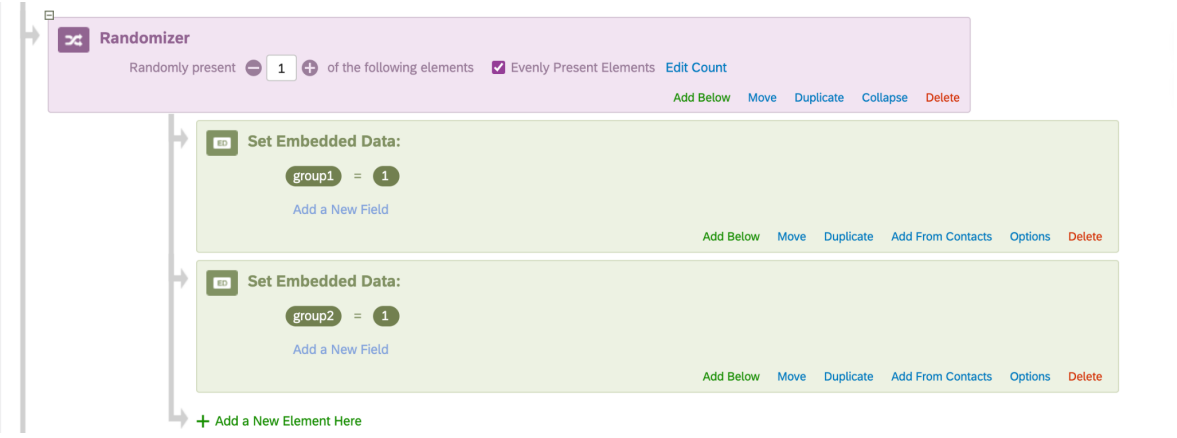
Survey Logic Containing Conditions in Qualtrics



This was to ensure that the ordering of the questions was randomised for each participant, eliminating potential order effects. Additionally, the ordering of each questionnaire was randomised per participant, as seen below:

Figure 5

Randomised Ordering in Qualtrics

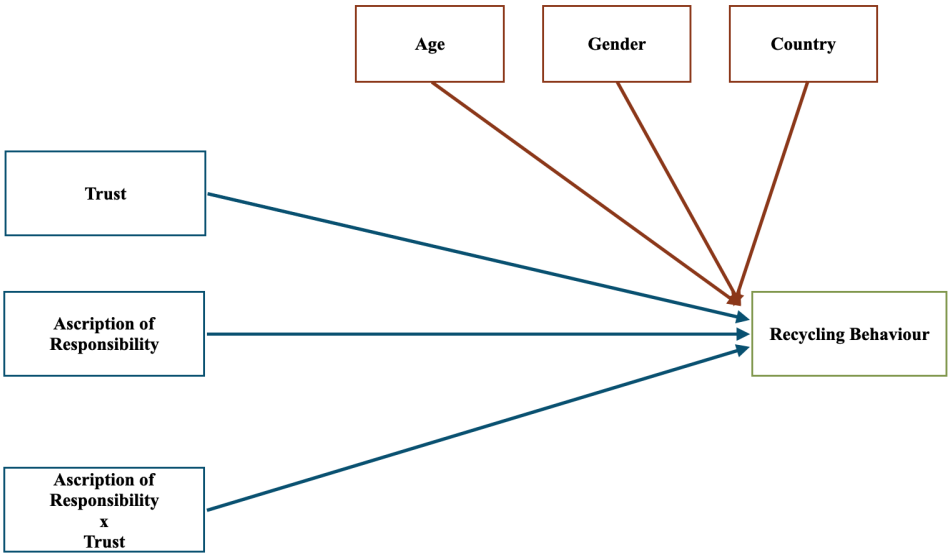


3.2.2 Procedures

3.2.2.1 Description of the Analysis. The analysis was carried out using R statistical software (R Core Team, 2020) (see Appendix A for code). To ensure that the data was internally consistent, all of the main variables (Trust, Ascription of Responsibility and Recycling) were standardised. Standardising is the process whereby the attributes within a factor are rescaled so that the mean of is 0 and the variance is 1, without distorting the differences in the range of values. Figure 6 below shows the regression structure of this analysis.

Figure 6

Regression Moderation Analysis Conceptual Model with Control Variables



3.2.3 Further Statistical Analysis

3.2.3.1 Control Variables. The following variables will also be added to the regression as covariates: age, Gender and Country (the country lived in for the longest period of time, not current country of residence), as to limit potential confounding effects in order to further establish the causal pathway of the moderation analysis. This will be analysed using ANOVA, as the inputs are categorical variables.

Due to the nature of Qualtrics questionnaire inputs, the means and the totals of each variable were calculated, and then standardised, in order to account for NA values that would arise (for example, in the Institutional Trust question that was rated on a sliding scale from 1-10 (IT1), if an individual picked '0', but did not move the slider, Qualtrics would record the answer as NA, when in fact it meant 0. The construct question is available for viewing in Appendix B.

3.3 Measures

This section looks into the scales used in this analysis: all questions used from the constructs discussed below are documented in Appendix B: Survey Items with Constructs, and the code for the processing of the data from these constructs is in Appendix A: Data Analysis in R.

3.3.1 Ascription Of Responsibility

The ascription of responsibility scale (Hakstian et al., 1986; Suedfeld et al., 1985) consists of 40 questions measured on a Likert scale grouped into four factors: *Traditional Focused Responsibility, Diffused Responsibility, Exercised Responsibility* and *Individual Focused Responsibility*. For this research, only constructs 3 (Exercised Responsibility) and 4 (Individual Focused Responsibility) were chosen for analysis. Some of the survey questions include: *I have a lot of responsibility in my present job and extracurricular activities*, *Society should only reward merit* and *I enjoy taking charge of things.*

The reasons for truncating this scale to just the two factors were related to survey length and the relevance of some of the items in the scale. If all 40 questions had been included in the survey, the length of the entire survey would have exceeded 15 minutes, which is an unreasonable ask of respondents. Furthermore, the variables in the first two constructs included questions on religious beliefs (*Human destiny is ordained by a Supreme Being; I attended church often as a child*) and other topics (*When a country has done its utmost, but does not have the resources to maintain itself, it is the responsibility of other countries to come to its aid; All old people should get a pension*) that were not deemed relevant for this research, and could have confused respondents.

3.3.2 Trust

3.3.2.1 Generalised Trust. This was measured with a 9-item questionnaire that uses general statements to measure general individual beliefs about honesty and trustworthiness of others (Yamagishi & Yamagishi, 1994). Questions include: *In general, you can trust people,* and *Nowadays, you can't rely on anybody.*

3.3.2.2 Institutional Trust. This was measured with two scales: one measured levels of trust in ten different government and private institutions (Organización de Cooperación y Desarrollo Económicos, 2017), and the other measured attitudes towards government and private institutions (Oliveira et al., 2017). Questions include: *I value the trustworthy characteristics of services provided by my municipality* and *I like the reliability of services provided by my municipality.*

3.3.3 Waste-Reducing Recycling Behaviours. Recycling efforts were measured using questions adapted from a survey conducted from Ma and colleagues (2019). This factor consisted of four questions, which measured individual beliefs around waste-reducing recycling behaviours. Questions include: *I have high involvement in recycling activities, I tend to buy products which can be recycled in the future* and *I have high adherence levels to separating and disposing of recyclable materials.*

To obtain the scores used in the analysis from the aforementioned scales, the total (sum of each row) of each relevant construct was calculated. Additionally, to compensate for NA/missing values that may have arisen in the data, the means of each construct total were calculated, and also used in the analysis.

Chapter 4: Results

This research aimed to find the extent of ascription of responsibility as a moderator of the relationship between trust and recycling behaviour. This section begins with a description of the sample, followed by the results from inferential analysis of the dataset.

4.1 Descriptive Data

4.1.1 Participants

The study consisted of a total of 127 participants, with 56% who identified as female, 40% identified as male, 4 idenitifed as non-binary and 1 chose the response 'Prefer not to say'. Participants' ages ranged from 21 to 68 years (M = 30.3, SD = 9.7), with the most frequent (the mode) ages occurring at 25 and 26 years (See Figure 7). Figure 8 shows the total number of participants by country. Further information regarding the demographics of the participants is available in Appendix C.

Figure 7

age Distribution

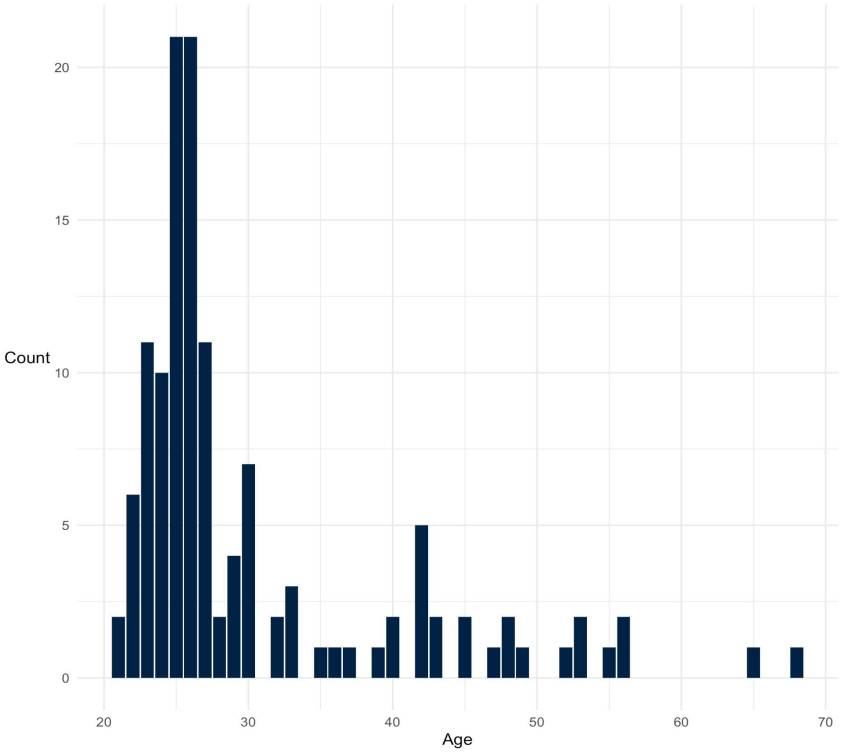
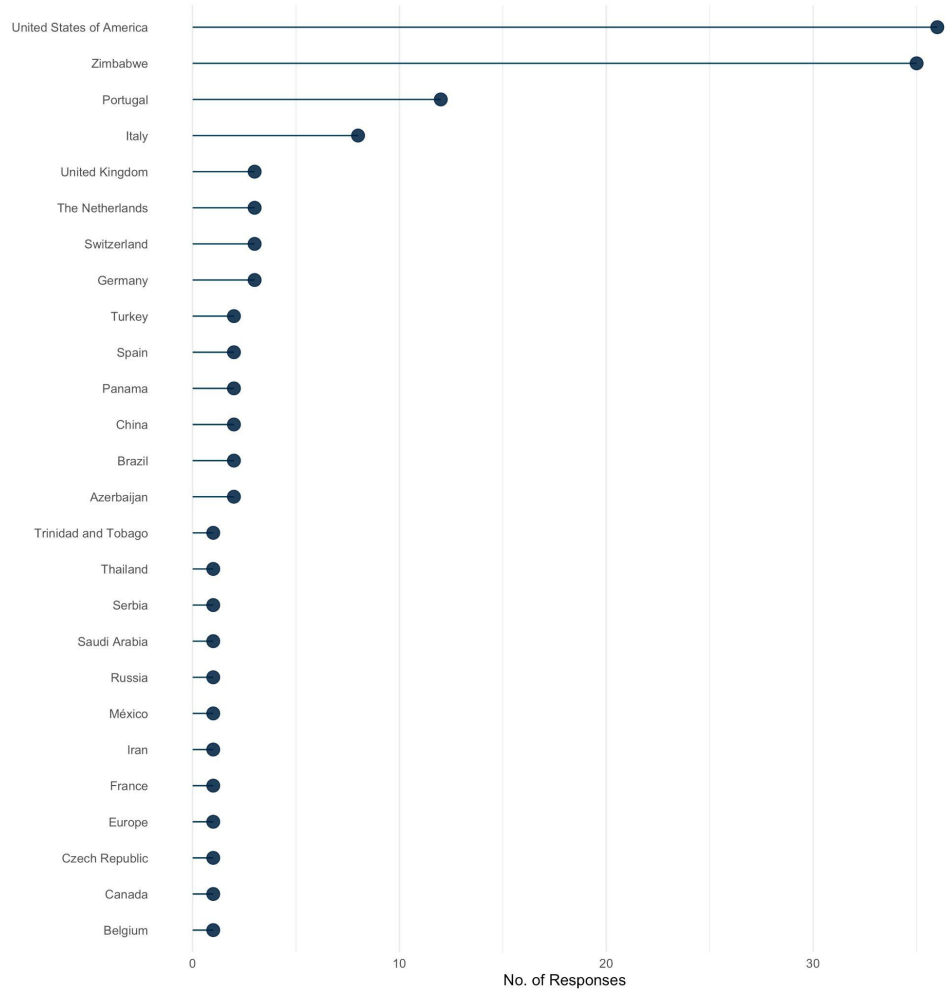


Figure 8

Distribution of Responses to the Question "In which country are you currently living in?"



4.2 Results of Statistical Testing

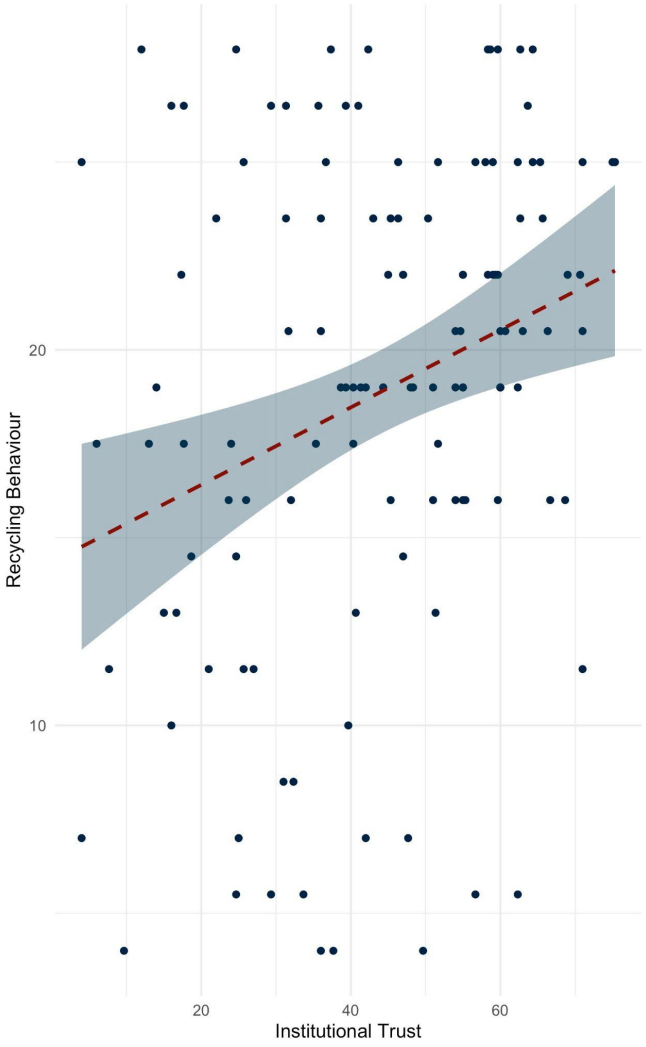
Hypothesis 1 will be discussed in this section, and the results of hypotheses 2 and 3 will be discussed in the subsequent section.

H_{1a}: There will be a positive relationship between institutional trust and self-reported waste-reducing recycling behaviours in the presence of ascription of responsibility.

A correlation analysis revealed a weak positive correlation between institutional trust and waste-reducing recycling behaviours, with $r^2 = 0.28$ (significant at $p<0.01$), supporting the hypothesis. Figure 9 illustrates this effect.

Figure 9

Linear Relationship Between Institutional Trust And Waste-Reducing Recycling Behaviours With Ascription Of Responsibility As A Mediator



For the ANOVA analysis with the control variables (Figure 6) Country, age and Gender, the analysis found a statistically-significant difference in waste-reducing recycling behaviour only by Country ($f(21) = 1.74$, $p < 0.05$).

4.2.1 Moderation Effects Using R

In this research, the aim was to test if the relationship between trust and waste recycling behaviour was moderated by ascription of responsibility. R software was used to

test a moderation model (See Equation 2) using the *lm* package (R Core Team, 2020). Specifically, the analysis used tested whether institutional trust would predict more positive recycling behaviour as a function of AR. This is in relation to H_2:

There is a positive relationship between ascription of responsibility and self-reported waste reducing recycling behaviours.

4.2.1.1 Trust. Recalling H_1*: There will be a positive relationship between trust and self-reported waste reducing recycling behaviours,* the results of the interaction of the relationship between institutional trust and waste-reducing recycling behaviour, we can say that there is a significant weak positive relationship between institutional trust and recycling behaviour (*p-value* < 0.01), with a 0.28-unit (+/- 0.09) increase in recycling behaviour for every unit increase in institutional trust.

The same holds true for general trust: the results showed (*p-value* < 0.01), with a 0.22-unit (+/- 0.09) increase in recycling behaviour for every unit increase in general trust.

4.2.1.2 Ascription of Responsibility. For the relationship between ascription of responsibility and recycling behaviours there was no significant relationship between ascription of responsibility and recycling behaviour (*p-value* = 0.65), with a near zero unit (+/- 8.937e-02) increase in recycling behaviour for every unit increase in ascription of responsibility.

4.2.1.3 Ascription of Responsibility Moderating the Role of Trust in Recycling. The results disproved H_3 (The relationship between trust and self-reported waste reducing recycling behaviours will be moderated by ascription of responsibility) overall: there was no significant relationship in the interaction effect of ascription of responsibility on trust and recycling behaviour: for institutional trust (*p-value* > 0.01), there was a 0.05-unit (+/-0.09) decrease in recycling behaviour for every unit increase in institutional trust. For general trust, the results showed a 0.10-unit (+/-0.09) increase in recycling behaviour for every unit increase in general trust.

Tables 1 and 2 below go into more detail.

Table 1

Summary of Moderation Analysis of Means and Totals on Institutional Trust on Recycling Behaviour by Ascription of Responsibility

Characteristic	Beta	95% Confidence Interval	Standard error	*t*-value	f^2	*p*-value
Institutional Trust Mean	0.28	0.11, 0.45	0.09	3.22	NA	0.002**
Ascription of Responsibility Mean	-0.03	-0.21, 0.15	0.09	-0.35	NA	0.7^{-}
Institutional Trust Mean * Ascription of Responsibility Mean	-0.05	-0.22, 0.12	0.04	-0.74	0.9	0.5^{-}

1. *Note.* The significance levels are as follows: *** means $p<0.001$; ** means $p<0.01$; * means $p<0.05$; $^{-}$ means $p<0.1$

Table 2

Summary of Moderation Analysis of Means and Totals on General Trust on Recycling Behaviour by Ascription of Responsibility

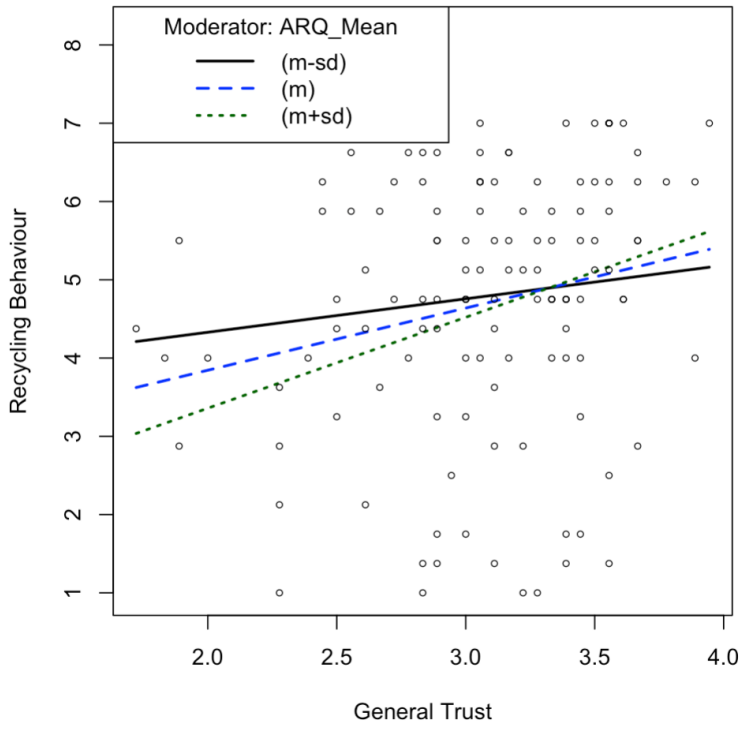
Characteristic	Beta	95% Confidence Interval	Standard error	*t*-value	f^2	*p*-value
General Trust Mean	0.22	0.04, 0.40	0.09	2.47	NA	0.015*
Ascription of Responsibility Mean	-0.05	-0.23, 0.12	0.09	-0.61	NA	0.5^{-}
General Trust Mean * Ascription of Responsibility Mean	0.10	-0.08, 0.28	0.04	0.56	0.9	0.3^{-}

2. *Note.* The significance levels are as follows:*** means $p<0.001$; ** means $p<0.01$; * means $p<0.05$; $^{-}$ means $p<0.1$

The two figures that follow show slopes of the moderating effect, with three lines. The two of them labelled (m-sd) and (m+sd) show the values 1 standard deviation (SD) above and 1 SD below the mean, and the one labelled (m) shows the average.

Figure 10

Moderation Effect with General Trust

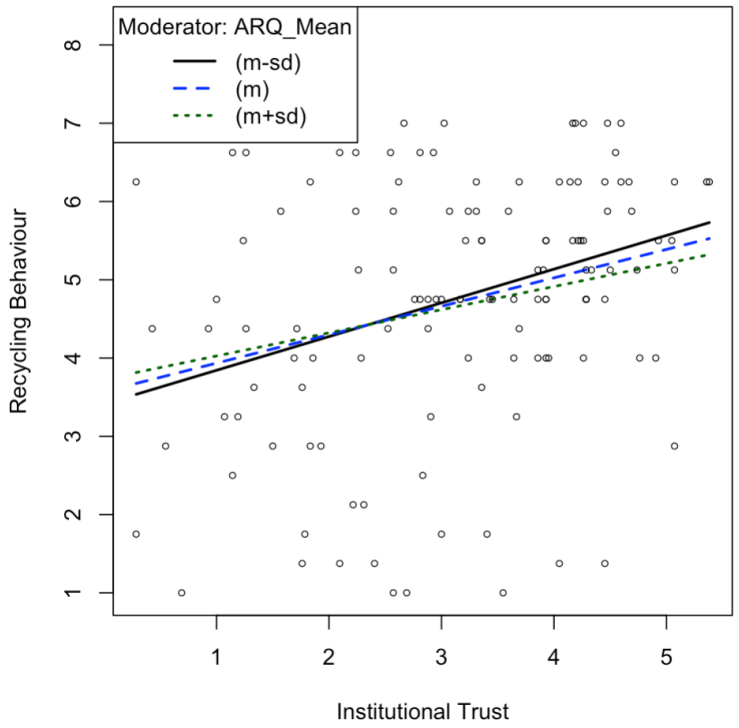


This figure above shows that those who had less AR (the black line) displayed higher waste-reducing recycling behaviour, as general trust increases, in comparison to the average (the blue line) and individuals who had higher AR (the green line). However, as the black line starts off lower than the average and the results of individuals who had higher AR, this shows that if an individual has low trust, then having lower AR will increase your recycling behaviour, but only up to a certain point of general trust. At this point (~3.3 trust), the relationship shows that for those with a lower level of AR, as trust increases, so does recycling behaviours. This relationship was not statistically significant,

as the difference overall in the slopes for those who had lower or higher AR shows that AR does not moderate the relationship between trust and waste-reducing recycling behaviours.

Figure 11

Moderation effect with Institutional Trust



Regarding Figure 11, the reverse effect seems to be taking place in comparison to Figure 10. For individuals with low AR, as institutional trust increases, so does recycling behaviour, but at a certain point (~2 Trust), it seems that individuals with lower AR display higher recycling behaviours than the average and those who have higher AR. This effect, however, is very minor (*p-value* = 0.02).

In their research, Suedfeld and colleagues (1985) identified age, gender and level of education as having a positive correlation with ascription of responsibility factors. To recall from earlier, Factor 3 of the Ascription of Responsibility scale focuses on Exercised Responsibility and Factor 4 measures Individual Focused Responsibility. Table 4 details the results of the correlations, as a comparison.

Table 3

Correlation Matrix

	Ascription of Responsibility	Institutional Trust	General Trust	Waste reducing recycling behaviours
Ascription of Responsibility	1			
Institutional Trust	-0.09	1		
General Trust	0.03	0.27*	1	
Waste reducing recycling behaviours	-0.04	0.28*	0.23	1

4. *Note.* The significance levels are as follows:*** means $p<0.001$; ** means $p<0.01$; * means $p<0.05$; - means $p>0.1$

Table 4

Correlates with Factors 3 and 4 of the Ascription of Responsibility scale

Demographic Variable	Ascription of Responsibility Factor	
	Exercised Responsibility	Individual Focused Responsibility
Age	0.23*	0.46*
Gender	0.07	-0.17
Level of Education	0.05	-0.02

5. *Note.* The significance levels are as follows:*** means $p<0.001$; ** means $p<0.01$; * means $p<0.05$; - means $p>0.1$

Age, while correlated with AR (see Table 4), is not significantly correlated with recycling behaviour (Pearson's Correlation test: $t = -0.609$; $df = 124$, $p\text{-}value = 0.54$; 95% CI: -0.227, 0.121), with a correlation of -0.05.

Chapter 5: Discussion

This section focuses on the discussion of the results, and contains a recapitulation of the hypotheses.

5.1 Hypotheses

H_1, H_{1a} and H_{1b} were supported, while H_2, H_3, H_{3a} and H_{3b} were not supported. A refresher of the hypotheses is referenced in Table 5 below.

Table 5

Hypotheses and Decisions

Hypothesis	Status
H_1: There will be a positive relationship between trust and self-reported waste reducing recycling behaviours	Supported
H_{1a}: There will be a positive relationship between institutional trust and self-reported waste reducing recycling behaviours	Supported
H_{1b}: There will be a positive relationship between general trust and self-reported waste reducing recycling behaviours	Supported
H_2: There is a positive relationship between ascription of responsibility and self-reported waste reducing recycling behaviours	Not supported
H_3: The relationship between trust and self-reported waste reducing recycling behaviours will be moderated by ascription of responsibility	Not supported
H_{3a}: The relationship between general trust and self-reported waste reducing recycling behaviours will be moderated by ascription of responsibility	Not supported
H_{3b}: The relationship between institutional trust and self-reported waste reducing recycling behaviours will be moderated by ascription of responsibility	Not supported

5.2 Discussion

The following section will reiterate the research questions and discuss the results from the analysis.

5.2.1 Research Questions

RQ_1: If individuals show trust, both generally and in local government institutions, will they show high waste reducing recycling behaviours?

The analysis showed a weak positive relationship ($r = 0.28$) between institutional trust and recycling behaviours. The results from H_1 show that this relationship was statistically significant, meaning that there is a relationship between institutional trust and recycling behaviours, and that as institutional trust increases, people show high waste-reducing recycling behaviours. This is important, as creating policies that tap into feelings of trust (perhaps as an action, such as in using game theory) may be the way forward for policy makers, in conjunction with other measures. This does not, however, determine that there is a causal relationship between institutional trust and recycling behaviours: more research into potential causal pathways should be conducted.

While there was a weak positive relationship with institutional trust and recycling behaviours, the relationship between general trust and recycling behaviours was not significant (though it was also weakly positively associated, at $r = 0.23$). This shows that general trust is not a predictor of waste-reducing recycling behaviours. This could be due to a number of reasons: individuals may place a higher value on the quality of services provided by a municipality than on the strength of the relationships they have with their neighbours and families when recycling is involved. Again, this is important for policymakers, as more policies could focus less on individual and social campaigns, but instead focus on improving local recycling services.

RQ_2: Does ascription of responsibility affect the relationship between people's waste reducing recycling behaviour and level of trust, both in general and institutional trust?

From this research, there was no significant relationship in the interaction effect of ascription of responsibility on both general and institutional trust and recycling behaviour, meaning that ascription of responsibility is not a good moderator for said relationship and

the relationship between the variables can be interpreted as little more than random. That is not to discard its usefulness; perhaps it would operate better as a mediator, or as part of a different causal pathway altogether in the context of predictors of recycling behaviours. A possible explanation for this could have been due to only using part (and not the entire) ascription of responsibility scale. Furthermore, ascription of responsibility showed almost no correlation with general trust, institutional trust and recycling behaviours (r = 0.03, -0.09 and -0.04 respectively).

5.2.2 Regression and Correlates

5.2.2.1 Regression with Control Variables. The results from the ANOVA analysis showed that only one of the variables in the regression analysis, country, had any significant relationship in the model, while gender and age did not. Country being a variable that affects recycling behaviour is interesting, as it points to a need for cross-cultural research, and how these differences in country affect recycling behaviour, which, though not fully related to the research conducted by Kaplan Mintz and colleagues (2019), seems to be a pre-established causal relationship in recycling behaviour literature.

5.2.2.2 Correlates with AR. Contrary to the literature, level of education and gender did not show a significant correlation to AR, but age did. While the famous statistical adage of 'correlation does not imply causation' certainly applies here, as shown in the regression, it is nonetheless interesting to see the correlation showing that as age increases, AR increases slightly as well. If this can be proven to have a causal relationship within future research, it would help policy makers develop campaigns targeted at more elderly individuals that focus on a sense of duty and responsibility, for example.

5.3 Relation to Theory

This research brings up the question if perhaps it would be more useful to treat trust as an action; in this research, trust was measured as a trait variable, whereas a combination of both types of measurement would yield a more conclusive result.

Regarding recycling behaviours, the criticisms of the theory of planned behaviour put forth by Ajzen (2011) manifested in the research: a low intention (ascription of

responsibility) - behaviour (recycling behaviour) correlation was present in this study (-0.04), which has been attributed to the theory being too focused on individual behaviour instead of of respondent identity.

It is difficult to say if the results from this research can fully capture the norm activation theory of ascription of responsibility: the associations produced in the analysis were inconclusive, but this serves as a call for more research to be done in uncovering the underlying mechanisms of this theory.

5.4 Implications and Recommendations

5.4.1 Survey Limitations

For survey questions Country1 (In which country have you spent most of your life?) and Country2 (In which country are you currently living in?), the questions should have been formatted as a 'drop down menu', not a text entry, as for data analysis, some of the same countries were written differently by the participants (e.g. UK, United Kingdom and USA, United States of America, America), which took more time to clean up in R, than if there was a standardised drop down menu. Furthermore, for AR, the question options were input as 5 point Likert scale items instead of 7, and thus had to be transformed to rectify the issue.[12]

The research only used two out of the four constructs from the AR scale, due to limitations on the survey length (if all four constructs were to be used, the survey would have been well over 10 minutes long, which would have hampered respondent rates). As such it is likely that using this truncated version of the scale could have also negatively impacted the results.

5.5 Recommendations for Further Research

A version of this experiment conducted with a manipulation of either trust or ascription of responsibility, for instance, using a trust game from game theory to

[12] The equation for transformation is as follows: $x_7 = (x_5 - 1)(6/4) + 1$, where x_5 corresponds to the original 5 point Likert scale value, and x_7 refers to the new adjusted value. Linear transformation maintains the same distance between the values, despite stretching the scales

manipulate individual trust. Furthermore, as trust can be defined as a cognitive bias, the application of behavioural economically informed policies should be considered.

Assuming that only this moderation model (See Figure 3) holds true would be improper practice, and so the possibility of there being other variables that could very well explain the relationship between trust and recycling behaviours, with ascription of responsibility moderating that relationship in any significant way must be taken into account. Furthermore, looking into the determinants of recycling intentions is just as important in understanding recycling behaviours: Chen and Tung (2010) discuss the use of the theory of planned behaviour as a moderator for recycling intentions.

Chapter 6: Conclusion

Throughout this research, it has been argued that ascription of responsibility provides an explanation, as a moderator, for the relationship between trust (measured as both institutional and general) and recycling behaviour. So, does ascription of responsibility have any effect on the relationship between trust and waste reducing recycling behaviours? The analysis above indicates not.

Trust is a multi-faceted construct, and while the results did not confirm the literature, it is still worth remembering that there is a unique relationship between trust and recycling behaviours that warrant further research: perhaps ascription of responsibility is better suited as a mediator, as put forth by Brekke and colleagues (2009).

Now, these results do not imply that a sense of responsibility is not relevant in the aforementioned relationship, it simply does not apply in this context. Understanding the causal pathways in complicated relationships between psychological variables is a useful endeavour for policy makers: feelings of responsibility could be a relevant factor to leverage in certain countries or communities to increase recycling behaviours

Despite the results, this research remains relevant as a discussion point on the difficulties of measuring and using psychological constructs. The ascription of responsibility questionnaire, for example, was developed in the early 1980s, and the version used in this dissertation is from 1984. This is not to say that the construct is poorly constructed; it is, however, concerning that no substantial additions and revisions to the scale have been made since, especially in light of the advancements in theories and processes in psychology, policy and environmental behaviour.

This project opened a discussion into the variety of factors that play into recycling behaviours, and how psychological processes are explained (and not explained) through these relationships. By using well known theories, this research calls for a look into alternative and perhaps more modern theories that can aim to better capture these relationships.

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Appendix

Appendix A: Data Analysis in R

As the data was collected with the promise of being analysed anonymously, the code for the data import and analysis will be displayed below, for anyone wishing to understand the process of data analysis taken, and also to verify the information was anonymised correctly. The outputs from the code can be made available upon request.

````
---
title: "Data Import"
author: "Varaidzo"
date: "12/19/2021"
output: html_document
---


```{r setup, include=FALSE}
knitr::opts_chunk$set(echo = TRUE)
```


```{r library}
library(tidyverse)
library(gt)
library(gtsummary)
library(here)
library(readxl)
library(rethinking)
library(polycor)
library(emmeans)
library(corrplot)
library(stargazer)
library(rockchalk)
library(car)
```
````

````
## Data Import


```{r data.import}
# read file
itshere <- "Trust, Recycling and AR_December 19, 2021_11.59.xlsx"


# select relevant headers
headers <-
  readxl::read_xlsx(
    path = here::here(itshere),
    sheet = "Sheet0",
    col_names = FALSE,
    na = c("", "-"),
    range = "A1:BX1"
  ) %>%
  # transpose
  t()


# data import with chosen headers
responses_raw1 <-
  readxl::read_xlsx(
    path = here::here(itshere),
    sheet = "Sheet0",
    col_names = headers,
    na = c("", "-"),
    skip = 2
  )


responses1 <- responses_raw1 %>%
  # filter out preview responses and respondents who chose "No I do not consent"
  dplyr::filter(DistributionChannel == "anonymous" & !(CONSENT == "No, I do not consent."))
````
````

```
# remove first row as that was a test
responses1 <- responses1[-1, ]

# make countries uniform in Country1 and Country2 columns: USA, UK, Turkey, Portugal,
Netherlands

responses1 <- responses1 %>%
  mutate(Country1 = dplyr::recode(Country1,
    "USA" = "United States of America", "US" = "United States of America", "USA!" = "United
States of America", "united states" = "United States of America", "United States" = "United
States of America", "USA 🇺🇸" = "United States of America",
    "Netherlands" = "The Netherlands",
    "portugal" = "Portugal",
    "turkey" = "Turkey",
    "Uk" = "United Kingdom",
    "UK" = "United Kingdom",
    "Zimbabwe 🇿🇼" = "Zimbabwe"
  )) %>%
  mutate(Country2 = dplyr::recode(Country2,
    "USA" = "United States of America", "US" = "United States of America", "USA!" = "United
States of America", "united states" = "United States of America", "United States" = "United
States of America", "USA 🇺🇸" = "United States of America",
    "Netherlands" = "The Netherlands",
    "portugal" = "Portugal",
    "turkey" = "Turkey",
    "England" = "United Kingdom",
    "Uk" = "United Kingdom",
    "UK" = "United Kingdom",
    "Zimbabwe 🇿🇼" = "Zimbabwe"
  )) %>%
  # make age column uniform (one respondent wrote in "56 years" instead of just 56)
  dplyr::mutate(age = dplyr::recode(age, "56 years" = "56"))
```

```
# make age column numeric
responses1$age <- as.numeric(as.character(responses1$age))

# gender column fix longer responses to be more uniform
responses1 <- responses1 %>%
  dplyr::mutate(Gender = case_when(Gender == "If your identity is not listed above, you may
specify in the text box below:" ~ "Male", TRUE ~ Gender))
```

```{r recoding.constructs}

# recycling
recoded <- responses1 %>%
  dplyr::mutate_at(
    c("REC1", "REC2", "REC3", "REC4"),
    funs(dplyr::recode(.,
      "Strongly disagree" = 1,
      "Somewhat disagree" = 2.5,
      "Neither agree nor disagree" = 4,
      "Somewhat agree" = 5.5,
      "Strongly agree" = 7
    ))
  ) %>%
  dplyr::mutate_at(
    c("GT1", "GT2", "GT4", "GT5"),
    funs(dplyr::recode(.,
      "Strongly disagree" = 1,
      "Somewhat disagree" = 2,
      "Neither agree nor disagree" = 3,
      "Somewhat agree" = 4,
      "Strongly agree" = 5
    ))
  ) %>%
```

```
  dplyr::mutate_at(
    "GT3",
    funs(dplyr::recode(.,
      "None at all" = 1,
      "A little" = 2,
      "A moderate amount" = 3,
      "A lot" = 4,
      "A great deal" = 5
    ))
  ) %>%
  dplyr::mutate_at(
    c("IT11", "IT12", "IT13", "IT14"),
    funs(dplyr::recode(.,
      "Strongly disagree" = 1,
      "Somewhat disagree" = 2,
      "Neither agree nor disagree" = 3,
      "Somewhat agree" = 4,
      "Strongly agree" = 5
    ))
  ) %>%
  dplyr::mutate_at(
    c("ARQF31", "ARQF32", "ARQF33", "ARQF34", "ARQF35", "ARQF36", "ARQF37", "ARQF41", "ARQF42",
"ARQF43", "ARQF44", "ARQF45", "ARQF46", "ARQF47", "ARQF48", "ARQF49", "ARQF410", "ARQF411"),
    funs(dplyr::recode(.,
      "Strongly disagree" = 1,
      "Somewhat disagree" = 2.5,
      "Neither agree nor disagree" = 4,
      "Somewhat agree" = 5.5,
      "Strongly agree" = 7
    ))
  ) %>%
  dplyr::mutate_at(
    c("IT1_1", "IT1_2", "IT1_3", "IT1_4", "IT1_5", "IT1_6", "IT1_7", "IT1_8", "IT1_9",
```

```
"IT1_10"),
    funs(dplyr::recode(.,
      "1" = 1,
      "2" = 1.666667,
      "3" = 2.333333,
      "3" = 3,
      "5" = 3.666667,
      "6" = 4.333333,
      "7" = 5,
      "8" = 5.666667,
      "9" = 6.333333,
      "10" = 7
    ))
  ) %>%
  dplyr::mutate_at(
    c("GT6_1", "GT6_2", "GT6_3", "GT6_4"),
    funs(dplyr::recode(.,
      "0" = 0,
      "1" = 0.5,
      "2" = 1,
      "3" = 1.5,
      "3" = 2,
      "5" = 2.5,
      "6" = 3,
      "7" = 3.5,
      "8" = 4,
      "9" = 4.5,
      "10" = 5
    ))
  ) %>%
  # Gender


  dplyr::mutate_at(
```

```
  "Gender",
  funs(dplyr::recode(.,
    "Male" = 1,
    "Female" = 2,
    "Non-binary" = 3,
    "Prefer not to say" = 4
  ))
) %>%
# Education

dplyr::mutate_at(
  "Education",
  funs(dplyr::recode(.,
    "High School Diploma" = 1,
    "Associate Degree" = 2,
    "Bachelor's Degree" = 3,
    "Master's/Graduate Degree" = 4,
    "PhD/Post-Graduate Degree" = 5
  ))
) %>%
# country2
dplyr::mutate_at(
  "Country2",
  funs(dplyr::recode(.,
    "Austria" = 1,
    "Belgium" = 2,
    "Canada" = 3,
    "France" = 4,
    "Germany" = 5,
    "Italy" = 6,
    "Mauritius" = 7,
    "Morocco" = 8,
    "New Zealand" = 9,
```

```
      "Peru" = 10,
      "Portugal" = 11,
      "Saudi Arabia" = 12,
      "Serbia" = 13,
      "South Africa" = 14,
      "Spain" = 15,
      "Switzerland" = 16,
      "The Netherlands" = 17,
      "Trinidad and Tobago" = 18,
      "Turkey" = 19,
      "Uganda" = 20,
      "United Kingdom" = 21,
      "United States of America" = 22,
      "Zimbabwe" = 23
    ))
  )
```

```{r recoding.to.numeric}
# change na to 0 because if someone didn't move the slider then Qualtrics would identify it as NA, not 0

# IT
recoded[c("IT1_1", "IT1_2", "IT1_3", "IT1_4", "IT1_5", "IT1_6", "IT1_7", "IT1_8", "IT1_9", "IT1_10")][is.na(recoded[c("IT1_1", "IT1_2", "IT1_3", "IT1_4", "IT1_5", "IT1_6", "IT1_7", "IT1_8", "IT1_9", "IT1_10")])] <- 0

# GT
recoded[c("GT6_1", "GT6_2", "GT6_3", "GT6_4")][is.na(recoded[c("GT6_1", "GT6_2", "GT6_3", "GT6_4")])] <- 0

# convert all variables that are characters to numeric
# ARQ
```

```
ARQ.num <- c("ARQF31", "ARQF32", "ARQF33", "ARQF34", "ARQF35", "ARQF36", "ARQF37", "ARQF41",
"ARQF42", "ARQF43", "ARQF44", "ARQF45", "ARQF46", "ARQF47", "ARQF48", "ARQF49", "ARQF410",
"ARQF411")

# convert to factor first
recoded[ARQ.num] <- sapply(recoded[ARQ.num], as.factor)

# then convert to numeric
recoded[ARQ.num] <- sapply(recoded[ARQ.num], as.numeric)

# GT
GT.num <- c("GT1", "GT2", "GT3", "GT4", "GT5", "GT6_1", "GT6_2", "GT6_3", "GT6_4")

recoded[GT.num] <- sapply(recoded[GT.num], as.factor)

recoded[GT.num] <- sapply(recoded[GT.num], as.numeric)
# IT
IT.num <- c("IT11", "IT12", "IT13", "IT14", "IT1_1", "IT1_2", "IT1_3", "IT1_4", "IT1_5",
"IT1_6", "IT1_7", "IT1_8", "IT1_9", "IT1_10")

recoded[IT.num] <- sapply(recoded[IT.num], as.factor)

recoded[IT.num] <- sapply(recoded[IT.num], as.numeric)

# REC

REC.num <- c("REC1", "REC2", "REC3", "REC4")

recoded[REC.num] <- sapply(recoded[REC.num], as.factor)

recoded[REC.num] <- sapply(recoded[REC.num], as.numeric)

# Recode as factors
```

```
# Gender
recoded$Gender.f <- factor(recoded$Gender)

# age
recoded$age.f <- factor(recoded$age)

# Education
recoded$Education.f <- factor(recoded$Education)

# Country2
recoded$Country2.f <- factor(recoded$Country2)
```

```{r totals and standardising}
# create total columns
## ARQ
recoded <- recoded %>%
  rowwise() %>%
  mutate(ARQ_Total = sum(c_across(35:52)))

## GT
recoded <- recoded %>%
  rowwise() %>%
  mutate(GT_Total = sum(c_across(26:34)))

## IT
recoded <- recoded %>%
  rowwise() %>%
  mutate(IT_Total = sum(c_across(12:25)))

## REC
recoded <- recoded %>%
  rowwise() %>%
```

```
  mutate(REC_Total = sum(c_across(54:57)))


## ARQF3
recoded$F3_Total <- rowSums(recoded[, c(35, 37, 39, 41, 43, 45, 47)], na.rm = TRUE)



## ARQF4

recoded$F4_Total <- rowSums(recoded[, c(36, 38, 40, 42, 44, 46, 48, 49, 50, 51, 52)], na.rm =
TRUE)

# create means columns
## ARQ
recoded <- recoded %>%
  rowwise() %>%
  mutate(ARQ_Mean = mean(c_across(35:52)))

## GT
recoded <- recoded %>%
  rowwise() %>%
  mutate(GT_Mean = mean(c_across(26:34)))

## IT
recoded <- recoded %>%
  rowwise() %>%
  mutate(IT_Mean = mean(c_across(12:25)))

## REC
recoded <- recoded %>%
  rowwise() %>%
  mutate(REC_Mean = mean(c_across(54:57)))

# standardize variables
```

```
# Means
recoded$G <- rethinking::standardize(recoded$GT_Mean)
recoded$R <- rethinking::standardize(recoded$REC_Mean)
recoded$A <- rethinking::standardize(recoded$ARQ_Mean)
recoded$I <- rethinking::standardize(recoded$IT_Mean)

#Totals

recoded$GT <- rethinking::standardize(recoded$GT_Total)
recoded$RT <- rethinking::standardize(recoded$REC_Total)
recoded$AT <- rethinking::standardize(recoded$ARQ_Total)
recoded$IT <- rethinking::standardize(recoded$IT_Total)
```

Data Analysis

```{r data.analysis}
#Totals
# it on rec by arq
totals1 <- lm(RT ~ IT * AT, data = recoded)

summary(totals1)

gtsummary::tbl_regression(totals1)

# gt on rec by arq
totals2 <- lm(RT ~ GT * AT, data = recoded)

summary(totals2)

gtsummary::tbl_regression(totals2)
```

```
# Mean

# it on rec by arq

res2 <- lm(R ~ I * A, data = recoded)


summary(res2)


gtsummary::tbl_regression(res2)


# gt on rec by arq

res3 <- lm(R ~ G * A, data = recoded)


summary(res3)


gtsummary::tbl_regression(res3)


#AR on Rec

res4 <- lm(R ~ A, data = recoded)


summary(res4)


gtsummary::tbl_regression(res4)


# confidence interval for res2

confint(res2, level = 0.95)


confint(res3, level = 0.95)


# controls

# IT

model1 <- lm(R ~ I * A + Country2.f + age.f + Gender.f, data = recoded)

Anova(model1)


# GT
```

```
model2 <- lm(R ~ G * A + Country2.f + age.f + Gender.f, data = recoded)
Anova(model2)

model3 <- lm(R ~ G * A + Education.f + age.f + Gender.f, data = recoded)
Anova(model3)
```

```{r data.analysis using rockchalk}
# using rockchalk
# IT
stargazer(res2, type = "text", title = "Moderation Analysis")

ps <- plotSlopes(res2, plotx = "I", modx = "A", xlab = "Institutional Trust", ylab = "Recycling Behaviour", modxVals = "std.dev")

# GT
stargazer(res3, type = "text", title = "Moderation Analysis")

ps1 <- rockchalk::plotSlopes(res3, plotx = "G", modx = "A", xlab = "General Trust", ylab = "Recycling Behaviour", modxVals = "std.dev")

jpeg(file = "ps1.jpeg")

dev.off()
```

```{r data.analysis.correlation}
# correlations for AR, Recycling and Trust

cor1 <- cor.test(recoded$GT_Total, recoded$ARQ_Total, method = "pearson")

cor2 <- cor.test(recoded$IT_Total, recoded$ARQ_Total, method = "pearson")
```

```
cor3 <- cor.test(recoded$REC_Total, recoded$ARQ_Total, method = "pearson")

cor4 <- cor.test(recoded$GT_Total, recoded$REC_Total, method = "pearson")

cor5 <- cor.test(recoded$IT_Total, recoded$REC_Total, method = "pearson")

# select variables for correlation analysis
my_data <- recoded[, c(77, 78, 79, 80)]

# check the first 6 variables to see if everything is okay
head(my_data, 6)

# run correlation
cormatrix <- cor(my_data, use = "complete.obs")

round(cormatrix, 2)

## age, Gender and Education correlates with Factors 3 and 4 of ARQ
my_data_correlates <- recoded[, c(58, 60, 68, 81, 90)]

cormatrix2 <- cor(my_data_correlates, use = "complete.obs")

round(cormatrix2, 2)
```

Tables

```{r tables}

# summary statistics table
demos <- responses1 %>% dplyr::select(Employment, Gender, House_size, Education, Q124)
```

```
demos %>%
  gtsummary::tbl_summary() %>%
  gtsummary::italicize_levels()
```

Plots

```{r age}
# age distribution chart
plot_1 <- responses1 %>%
  # select the age column
  ggplot2::ggplot(aes(x = age)) +
  # change the colour of each bar to be the dark blue colour
  ggplot2::geom_bar(fill = "#002344") +
  # change the theme of the plot to be the minimal black and white theme
  ggplot2::theme_minimal() +
  # change the direction of the y axis label to be horizontal and not vertical
  ggplot2::theme(axis.title.y = element_text(angle = 0, vjust = 0.5, hjust = 1)) +
  # change the name of the x and y axis labels
  ggplot2::labs(
    x = "age",
    y = "Count"
  )

# save the plot as a jpeg for export
ggsave("age1.jpeg")
```

```{r country1}
# Country1 visualisation

# create an object that uses the counts of the Countries in the Country2 column
country <- responses1 %>% dplyr::count(Country1)
```

```
countrycheck <- dplyr::as_tibble(country)

plot2 <- countrycheck %>%
  dplyr::mutate(Country1 = forcats::fct_reorder(Country1, n)) %>%
  # map out the x and y variables
  ggplot2::ggplot(aes(x = Country1, y = n)) +
  # create a lollipop plot and change the colour of the lines
  ggplot2::geom_segment(aes(x = Country1, xend = Country1, y = 0, yend = n), color = "#00415d")
+
  # change the colour of the circles at the end of the lines
  ggplot2::geom_point(color = "#002344", size = 4, alpha = 0.9) +
  # change the theme of the graph to be minimal black and white
  ggplot2::theme_minimal() +
  # flip the co-ordinates so that the countries are on the y axis and the counts are on the x
axis
  ggplot2::coord_flip() +
  # fine tune elements of the theme, namely removing the axis ticks
  ggplot2::theme(
    panel.grid.major.y = element_blank(),
    panel.border = element_blank(),
    axis.ticks.y = element_blank()
  ) +
  ggplot2::xlab("") +
  # fix the labels of the axes
  ggplot2::ylab("No. of Responses")

# save the plot as a jpeg for export
ggsave("country.jpeg")
```

```{r}
# Country2 visualisation
```

```
# create an object that uses the counts of the Countries in the Country2 column
country2 <- responses1 %>% dplyr::count(Country2)

plot3 <- country2 %>%
  # select the country2 column from the data set
  dplyr::mutate(Country2 = forcats::fct_reorder(Country2, n)) %>%
  # map out the x and y variables
  ggplot2::ggplot(aes(x = Country2, y = n)) +
  # create a lollipop plot and change the colour of the lines
  ggplot2::geom_segment(aes(x = Country2, xend = Country2, y = 0, yend = n), color = "#00415d")
+
  # change the colour of the circles at the end of the lines
  ggplot2::geom_point(color = "#002344", size = 4, alpha = 0.9) +
  # change the theme of the graph to be minimal black and white
  ggplot2::theme_minimal() +
  # flip the co-ordinates so that the countries are on the y axis and the counts are on the x
axis
  ggplot2::coord_flip() +
  # fine tune elements of the theme, namely removing the axis ticks
  ggplot2::theme(
    panel.grid.major.y = element_blank(),
    panel.border = element_blank(),
    axis.ticks.y = element_blank()
  ) +
  # fix the labels of the axes
  ggplot2::xlab("") +
  ggplot2::ylab("No. of Responses")
```

```{r correlation matrix}
# create a function that calculates the p value of matrix
```

```
cor.mtest <- function(mat, ...) {
  mat <- as.matrix(mat)
  n <- ncol(mat)
  p.mat <- matrix(NA, n, n)
  diag(p.mat) <- 0
  for (i in 1:(n - 1)) {
    for (j in (i + 1):n) {
      tmp <- cor.test(mat[, i], mat[, j], ...)
      p.mat[i, j] <- p.mat[j, i] <- tmp$p.value
    }
  }
  colnames(p.mat) <- rownames(p.mat) <- colnames(mat)
  p.mat
}
# matrix of the p-value of the correlation
p.mat <- cor.mtest(my_data)


# correlation plot


colnames(cormatrix) <- c("Ascription of Responsibility", "General Trust", "Institutional
Trust", "Recycling Behaviours")
rownames(cormatrix) <- c("Ascription of Responsibility", "General Trust", "Institutional
Trust", "Recycling Behaviours")


jpeg(file = "corplot.jpeg")


corplot <- corrplot(cormatrix, type = "lower", tl.col = "black", tl.srt = 45, method =
"circle", p.mat = p.mat, sig.level = 0.01)


dev.off()
```


```{r correlation matrix}
```

```
# create a function that calculates the p value of matrix p value of matrix (2nd correlation
plot)

cor.mtest <- function(mat, ...) {
  mat <- as.matrix(mat)
  n <- ncol(mat)
  p.mat <- matrix(NA, n, n)
  diag(p.mat) <- 0
  for (i in 1:(n - 1)) {
    for (j in (i + 1):n) {
      tmp <- cor.test(mat[, i], mat[, j], ...)
      p.mat[i, j] <- p.mat[j, i] <- tmp$p.value
    }
  }
  colnames(p.mat) <- rownames(p.mat) <- colnames(mat)
  p.mat
}
# matrix of the p-value of the correlation
p.mat <- cor.mtest(my_data_correlates)
corplot <- corrplot(cormatrix2, type = "lower", tl.col = "black", tl.srt = 45, method =
"circle", p.mat = p.mat, sig.level = 0.01)
```
```{r}
# GT and REC
ggplot(recoded, aes(x = GT_Total, y = REC_Total)) +
  geom_point(color = "#002344") +
  geom_smooth(
    method = lm, linetype = "dashed",
    color = "darkred", fill = "#00415d"
  ) +
  ggplot2::theme_minimal() +
  ggplot2::scale_x_continuous(
    breaks = c(20, 25, 30),
```

```
    labels = c(
      "low",
      "medium",
      "high"
    )
  ) +
  ggplot2::scale_y_continuous(
    breaks = c(8, 18, 28),
    labels = c(
      "low",
      "medium",
      "high"
    )
  ) +
  ggplot2::labs(
    x = "General Trust",
    y = "Recycling Behaviour"
  )
# save the plot as a jpeg for export
ggsave("gtrecsmooth.jpeg")


# IT and REC
ggplot(recoded, aes(x = IT_Total, y = REC_Total)) +
  geom_point(color = "#002344") +
  geom_smooth(
    method = lm, linetype = "dashed",
    color = "darkred", fill = "#00415d"
  ) +
  ggplot2::theme_minimal() +
  ggplot2::labs(
    x = "Institutional Trust",
    y = "Recycling Behaviour"
  )
```

```
# save the plot as a jpeg for export
ggsave("ittrecsmooth.jpeg")


ggplot(recoded, aes(x = ARQ_Total, y = GT_Total)) +
  geom_point(color = "#002344") +
  geom_smooth(
    method = lm, linetype = "dashed",
    color = "darkred", fill = "#00415d"
  ) +
  ggplot2::theme_minimal() +
  ggplot2::scale_x_continuous(
    breaks = c(60, 80, 100),
    labels = c(
      "low",
      "medium",
      "high"
    )
  ) +
  ggplot2::scale_y_continuous(
    breaks = c(20, 40, 60),
    labels = c(
      "low",
      "medium",
      "high"
    )
  ) +
  ggplot2::labs(
    x = "Ascription of Responsibility",
    y = "General Trust"
  )
# save the plot as a jpeg for export
ggsave("arqgtsmooth.jpeg")
```

Appendix B: Survey Items With Constructs

Construct	Item	Description	References
Ascription of Responsibility			
Factor 3: Exercised Responsibility	ARQF31	I have often been a group leader	(Hakstian et al., 1986; Suedfeld et al., 1985)
	ARQF32	I enjoy taking charge of things	
	ARQF33	I have held many positions of responsibility in the past in my job(s) and extracurricular activities	
	ARQF34	I prefer following rather than leading	
	ARQF35	I often make suggestions	
	ARQF36	I was given a lot of responsibility as a child	
	ARQF37	I have a lot of responsibility in my present job and extracurricular activities	
Factor 4: Individual Focused Responsibility	ARQF41	Every sane individual is responsible for his every action	
	ARQF42	Robbery with violence should be severely punished	
	ARQF43	Your personality is what you make it	
	ARQF44	Society should only reward merit	
	ARQF45	Ability should be rewarded	
	ARQF46	Good behavior should be rewarded, bad behavior punished	
	ARQF47	Parents should not financially support offspring who could make a living for themselves	
	ARQF48	Most people on welfare are lazy	
	ARQF49	Justice is better than mercy	
	ARQF410	Society does not owe you a living	
	ARQF411	If a child insists on having a pet,	

			they should be responsible for its care	
Recycling Behaviour - Theory of Planned Behaviour				
Waste management behaviour (second order reflective-formative type)	**Waste Reducing Behaviour**	REC1	I usually separate and dispose of all recyclable material	(Ma et al., 2019)
		REC2	I have high involvement in recycling activities	
		REC3	I tend to buy products which can be recycled in the future	
		REC4	I have high adherence levels to separating and disposing of recyclable materials	
Trust				
General Trust		GT1	In general, you can trust people.	(Yamagishi, 1986; Yamagishi & Yamagishi, 1994)
		GT2	Nowadays, you can't rely on anybody.	
		GT3	How much do you trust strangers you meet for the first time?	
		GT4	When dealing with strangers, it's better to be cautious before trusting them.	
		GT5	Most people are trustful of others.	
		GT6	People in your family?	
			People in your neighbourhood?	
			People you work or go to school with?	
			Strangers?	
Institutional Trust		IT1	Your local Parliament?	(Organización de Cooperación y Desarrollo Económicos, 2017)
		IT2	The Courts?	
		IT3	Political Parties?	
		IT4	Politicians?	
		IT5	The Police	

	IT6	Armed Forces?	
	IT7	The Civil Services?	
	IT8	The Media?	
	IT9	Banks?	
	IT10	Major Companies?	
	IT11	I value the trustworthy characteristics of services provided by my municipality	(Oliveira et al., 2017)
	IT12	I like the reliability of services provided by my municipality	
	IT13	I find services provided by my municipality trustworthy	
	IT14	I like to trust services provided by my municipality	

Appendix C: Participant Demographics

Table C1

Demographic Profile

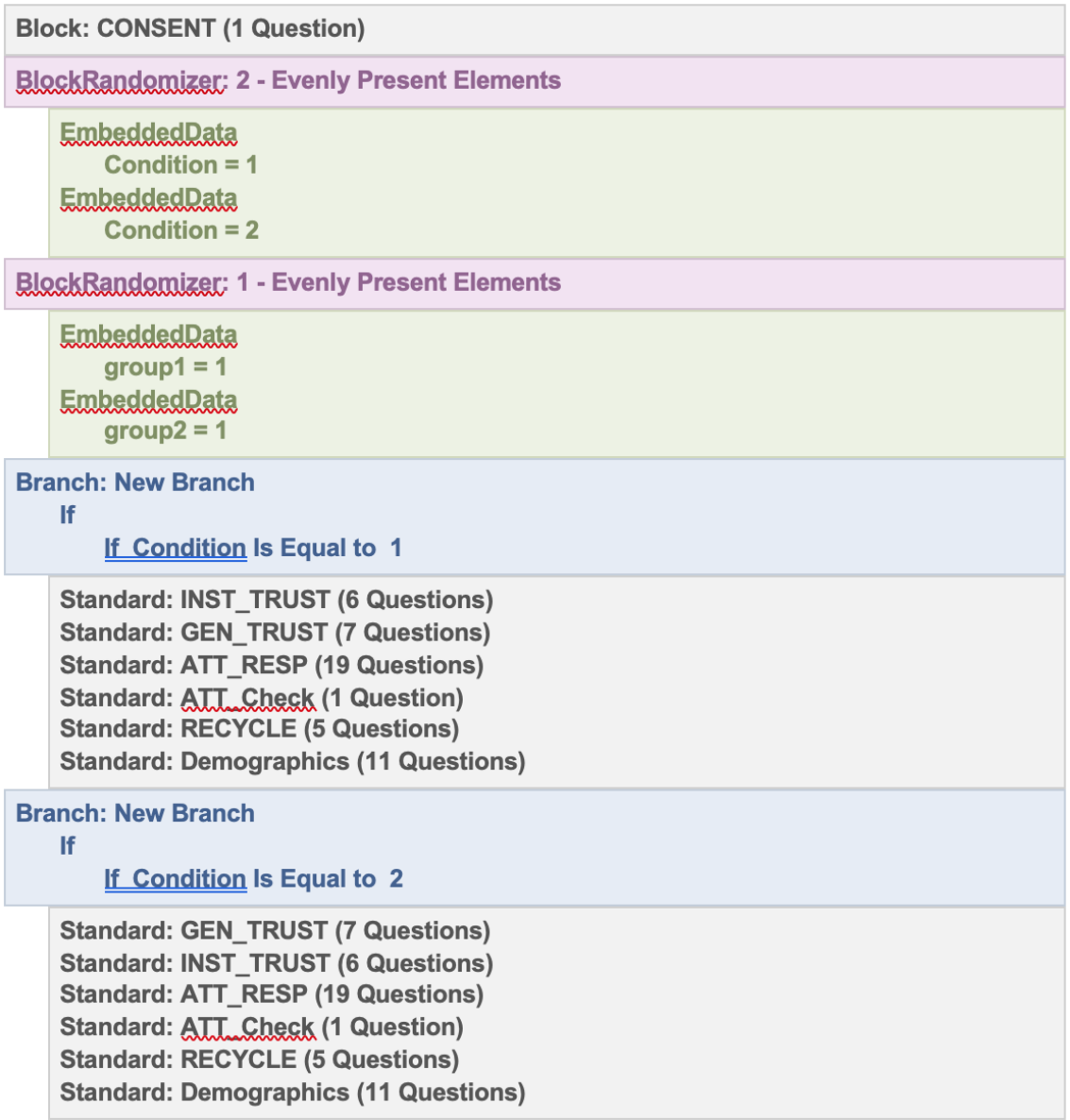
Characteristic	n	%
Employment		
Full time employee	66	52
Full time employee, Part time employee	2	1.6
Full time employee, Part time employee, student	1	0.8
Full time employee, Other	1	0.8
Full time employee, Student	3	2.4
Part time employee	15	12
Part time employee, Student	6	4.7
Other	3	2.4
Retired	1	0.8
Student	24	19
Student, Other	1	0.8
Unemployed, Looking for work	3	2.4
Unemployed, Looking for work, Student	1	0.8
Household Size		
1 person	20	16
2 people	40	31
3 people	26	20
4 people	19	15
5 and more people	22	17

Characteristic	n	%
Education Level		
High School Diploma	9	7.1
Associate Degree	1	0.8
Bachelor's Degree	54	43
Master's/Graduate Degree	55	43
PhD/Post-Graduate Degree	8	6.3
Do you recycle as often as you should?		
Definitely not	34	27
Probably not	29	23
Might or might not	12	9.4
Probably yes	36	28
Definitely yes	16	13

D1. Note. N = 127.

Appendix D: Questionnaire

Survey Flow



Page Break

Start of Block: CONSENT

CONSENT You are invited to participate in a web-based online survey on recycling habits. This is a research project being conducted by Varaidzo Ndebele, a master's student at Universidade Católica Portuguesa, as part of the fulfilment of the degree requirements for the Master in Psychology Applied to Business and Economics.

It should take approximately 10 minutes to complete.

The findings will be presented through a dissertation format and presentation for an academic jury.

CONFIDENTIALITY

All information you provide during the survey is kept confidential.

Only the researcher (Varaidzo Ndebele) and the supervisor (Dr. Ian Scott) will have access to and will analyse the raw data.

The data collected will only be used anonymously in the research reports.

No information that would potentially identify you (or other people) will be used in the analyses and/or results.

CONTACT

If you have questions at any time about the study or the procedures, or would like to know more about the results of the study upon its completion, feel free to contact me (Varaidzo Ndebele) at s-vndebele@ucp.pt.

PARTICIPATION

Your participation in this survey is voluntary.

You may refuse to take part in the research or exit the survey at any time without penalty.

You are free to decline to answer any particular question you do not wish to answer for any reason.

CONSENT

By clicking the 'Yes, I consent' button below, I understand the following:

·That my participation is voluntary and I may choose to refuse to participate or withdraw from the questionnaire at any time,

·That if I should choose to withdraw from the questionnaire, then all of the data I have provided, including the answers to the survey, will be deleted and not used in any way,

·That the data collected will only be used anonymously in research reports.

o Yes, I consent (1)

o No, I do not consent. (2)

Skip To: End of Survey If Landing page = No, I do not consent.

End of Block: CONSENT

Start of Block: INST_TRUST

Page Break

INTRO TRUST The next questions are about whether you have trust in various institutions in the country where you live in. Even if you have had very little or no contact with these institutions, please base your answer on your general impression of these institutions. 0 means you do not trust an institution at all, and 10 means you have complete trust. There are no wrong or right answers, just answer honestly.

IT1 How much trust do you have in...

0 1 2 3 4 5 6 7 8 9 10

your local parliament? ()

the courts? ()

political parties? ()

politicians? ()

the police? ()

the armed forces? ()

the civil service? ()

the media? ()

banks? ()

major companies? ()

IT11 I value the trustworthy characteristics of services provided by my municipality

- o Strongly disagree (1)
- o Somewhat disagree (2)
- o Neither agree nor disagree (3)
- o Somewhat agree (4)
- o Strongly agree (5)

IT12 I like the reliability of services provided by my municipality

- o Strongly disagree (1)
- o Somewhat disagree (2)
- o Neither agree nor disagree (3)
- o Somewhat agree (4)
- o Strongly agree (5)

IT13 I find services provided by my municipality trustworthy

- o Strongly disagree (1)
- o Somewhat disagree (2)
- o Neither agree nor disagree (3)
- o Somewhat agree (4)
- o Strongly agree (5)

IT14 I like to trust services provided by my municipality

- o Strongly disagree (1)
- o Somewhat disagree (2)
- o Neither agree nor disagree (3)
- o Somewhat agree (4)
- o Strongly agree (5)

End of Block: INST_TRUST

Start of Block: GEN_TRUST

Page Break

INTROGENTRUST This section of the survey that will be assessing your general views on trust. Remember, there are no wrong or right answers, just answer honestly.

GT1 In general, you can trust people.

- o Strongly disagree (1)
- o Somewhat disagree (2)
- o Neither agree nor disagree (3)
- o Somewhat agree (4)
- o Strongly agree (5)

GT2 Nowadays, you can’t rely on anybody.

- o Strongly disagree (1)
- o Somewhat disagree (2)

o Neither agree nor disagree (3)

o Somewhat agree (4)

o Strongly agree (5)

GT3 How much do you trust strangers you meet for the first time?

o None at all (1)

o A little (2)

o A moderate amount (3)

o A lot (4)

o A great deal (5)

GT4 When dealing with strangers, it's better to be cautious before trusting them.

o Strongly disagree (1)

o Somewhat disagree (2)

o Neither agree nor disagree (3)

o Somewhat agree (4)

o Strongly agree (5)

GT5 Most people are trustful of others.

o Strongly disagree (1)

o Somewhat disagree (2)

o Neither agree nor disagree (3)

o Somewhat agree (4)

o Strongly agree (5)

GT6 Using a scale of 0 to 10 where 0 means “not at all” and 10 means “completely”, how much do you trust each of the following groups of people:

0 1 2 3 4 5 6 7 8 9 10

People in your family? ()

People in your neighbourhood? ()

People you work or go to school with? ()

Strangers? ()

End of Block: GEN_TRUST

Start of Block: ATT_RESP

Page Break

INTROARQ This set of questions are related to your general feelings regarding responsibility. Remember, there are no wrong or right answers, just answer honestly.

ARQF31 I have often been a group leader.

o Strongly disagree (24)

o Somewhat disagree (25)

o Neither agree nor disagree (26)

o Somewhat agree (27)

o Strongly agree (28)

ARQF41 Every sane individual is responsible for his every action.

o Strongly disagree (14)

o Somewhat disagree (15)

o Neither agree nor disagree (16)

o Somewhat agree (17)

o Strongly agree (18)

ARQF32 I enjoy taking charge of things.

o Strongly disagree (14)

o Somewhat disagree (15)

o Neither agree nor disagree (16)

o Somewhat agree (17)

o Strongly agree (18)

ARQF42 Robbery with violence should be severely punished.

o Strongly disagree (14)

o Somewhat disagree (15)

o Neither agree nor disagree (16)

o Somewhat agree (17)

o Strongly agree (18)

ARQF33 I have held many positions of responsibility in the past in my job(s) and extracurricular activities.

- o Strongly disagree (14)
- o Somewhat disagree (15)
- o Neither agree nor disagree (16)
- o Somewhat agree (17)
- o Strongly agree (18)

ARQF43 Your personality is what you make it.

- o Strongly disagree (14)
- o Somewhat disagree (15)
- o Neither agree nor disagree (16)
- o Somewhat agree (17)
- o Strongly agree (18)

ARQF34 I prefer following rather than leading.

- o Strongly disagree (1)
- o Somewhat disagree (2)
- o Neither agree nor disagree (3)
- o Somewhat agree (4)
- o Strongly agree (5)

ARQF44 Society should only reward merit.

- o Strongly disagree (14)
- o Somewhat disagree (15)
- o Neither agree nor disagree (16)
- o Somewhat agree (17)
- o Strongly agree (18)

ARQF35 I often make suggestions.

- o Strongly disagree (14)
- o Somewhat disagree (15)
- o Neither agree nor disagree (16)
- o Somewhat agree (17)
- o Strongly agree (18)

ARQF45 Ability should be rewarded.

- o Strongly disagree (14)
- o Somewhat disagree (15)
- o Neither agree nor disagree (16)
- o Somewhat agree (17)
- o Strongly agree (18)

ARQF36 I was given a lot of responsibility as a child.

- o Strongly disagree (14)
- o Somewhat disagree (15)

o Neither agree nor disagree (16)

o Somewhat agree (17)

o Strongly agree (18)

ARQF46 Good behavior should be rewarded, bad behavior punished.

o Strongly disagree (14)

o Somewhat disagree (15)

o Neither agree nor disagree (16)

o Somewhat agree (17)

o Strongly agree (18)

ARQF37 I have a lot of responsibility in my present job and extracurricular activities.

o Strongly disagree (14)

o Somewhat disagree (15)

o Neither agree nor disagree (16)

o Somewhat agree (17)

o Strongly agree (18)

ARQF47 Parents should not financially support offspring who could make a living for themselves.

o Strongly disagree (14)

o Somewhat disagree (15)

o Neither agree nor disagree (16)

o Somewhat agree (17)

o Strongly agree (18)

ARQF48 Most people on welfare are lazy.

o Strongly disagree (14)

o Somewhat disagree (15)

o Neither agree nor disagree (16)

o Somewhat agree (17)

o Strongly agree (18)

ARQF49 Justice is better than mercy.

o Strongly disagree (14)

o Somewhat disagree (15)

o Neither agree nor disagree (16)

o Somewhat agree (17)

o Strongly agree (18)

ARQF410 Society does not owe you a living.

o Strongly disagree (14)

o Somewhat disagree (15)

o Neither agree nor disagree (16)

o Somewhat agree (17)

o Strongly agree (18)

ARQF411 If a child insists on having a pet, they should be responsible for its care.

- o Strongly disagree (14)
- o Somewhat disagree (15)
- o Neither agree nor disagree (16)
- o Somewhat agree (17)
- o Strongly agree (18)

Page Break

End of Block: ATT_RESP

Start of Block: ATT_Check

Att_check Recent research on decision making shows that choices are affected by context. Specifically, we are interested in whether you are taking the time to read each question. To show that you are paying attention, please write 'attention' as your answer.

_____

End of Block: ATT_Check

Start of Block: RECYCLE

Page Break

INTRO In this section, you will be faced with a series of questions related to recycling habits. There are no wrong or right answers, just answer honestly.

REC1 I usually separate and dispose of all recyclable material.

- o Strongly disagree (1)
- o Somewhat disagree (2)
- o Neither agree nor disagree (3)
- o Somewhat agree (4)
- o Strongly agree (5)

REC2 I have high involvement in recycling activities.

- o Strongly disagree (1)
- o Somewhat disagree (2)
- o Neither agree nor disagree (3)
- o Somewhat agree (4)
- o Strongly agree (5)

REC3 I tend to buy products which can be recycled in the future.

- o Strongly disagree (1)
- o Somewhat disagree (2)
- o Neither agree nor disagree (3)
- o Somewhat agree (4)
- o Strongly agree (5)

REC4 I have high adherence levels to separating and disposing of recyclable materials.

o Strongly disagree (1)

o Somewhat disagree (2)

o Neither agree nor disagree (3)

o Somewhat agree (4)

o Strongly agree (5)

End of Block: RECYCLE

Start of Block: Demographics

Page Break

Gender What is your gender identity?

o Male (1)

o Female (2)

o Non-binary (3)

o Prefer not to say (4)

o If your identity is not listed above, you may specify in the text box below: (5)

_____

Education What is your highest completed level of education?

o Not completed High School (1)

o High School Diploma (2)

o Bachelor's Degree (3)

o Associate Degree (4)

o Master's/Graduate Degree (5)

o PhD/Post-Graduate Degree (6)

COVID_habits Has the COVID-19 pandemic affected your recycling habits?

o No (1)

o Yes (2)

Skip To: COVID_Yes If Has the COVID-19 pandemic affected your recycling habits? = Yes

Skip To: House_size If Has the COVID-19 pandemic affected your recycling habits? = No

COVID_Yes If it has, how so?

_____

House_size What is the size of your household? (yourself included)

o 1 person (1)

o 2 people (2)

o 3 people (3)

o 4 people (4)

o 5 and more people (5)

Country1 In which country have you spent most of your life?

_____

Country2 In which country are you currently living in?

_____

Employment What is your current employment status? (Check all that apply to you)

- ▢ Employed full time (1)
- ▢ Employed part time (2)
- ▢ Unemployed looking for work (3)
- ▢ Unemployed not looking for work (4)
- ▢ Retired (5)
- ▢ Student (6)
- ▢ Other (7) _____

age What is your age? (in numbers)

_____

Q127 How often do you recycle the following items:

	Never (1)	Sometimes (2)	About half the time (3)	Most of the time (4)	Always (5)
Glass (1)	o	o	o	o	o
Paper (2)	o	o	o	o	o

Food/Compost (3)	o	o	o	o	o
Plastic (4)	o	o	o	o	o

Q124 Do you think you recycle as often as you should?

o Definitely not (1)

o Probably not (2)

o Might or might not (3)

o Probably yes (4)

o Definitely yes (5)

End of Block: Demographics