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Examining the Influence of Efficacy Beliefs on Participation in a Residential Curbside Recycling Scheme: Implications for the Use of Persuasive Messaging to Promote Sustainable Behaviours

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EXAMINING THE INFLUENCE OF EFFICACY BELIEFS

ON PARTICIPATION IN A RESIDENTIAL CURBSIDE RECYCLING SCHEME:

IMPLICATIONS FOR THE USE OF PERSUASIVE MESSAGING

TO PROMOTE SUSTAINABLE BEHAVIOURS

by

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Examining the Influence of Efficacy Beliefs on Participation in a Residential Curbside

Recycling Scheme: Implications for the Use of Persuasive Messaging to Promote

Sustainable Behaviours

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Abstract

This thesis examines participation in a household curbside recycling scheme and the

influence that beliefs around the consequences of this behaviour have on participation.

Using the Fishbein and Ajzen's (2010) Reasoned Action Approach to create a model of the

factors influencing behaviour, quantitative data are collected examining a variety of beliefs

around the advantages and disadvantages of participation. Economic beliefs negatively

correlate with behaviour while beliefs about reducing waste to landfill and preserving

natural resources positively correlate with behaviour. A discussion of Ontario's current

recycling framework is also included and suggestions on areas for improvement are put

forward.

Acknowledgements

Table of Contents

List of Tables

List of Figures

List of Equations

CHAPTER ONE: INTRODUCTION

1.1 - Do Recycling Efficacy Beliefs Influence Curbside Recycling Participation?

The excuse most often cited when I ask someone why s/he does not put his/her waste material into a recycling bin is that s/he does not believe that it "makes a difference": that materials placed into a recycling container will end up at the landfill regardless. The media perpetuates this belief, highlighting the recycling and organics scams (Welsh, 2009).

Having worked at a materials recycling facility (MRF), I know that recycling household waste materials is a profitable, sustainable business venture that contributes to minimizing the environmental effects of our consumption-based society. My hypothesis is that individuals who truly believe and understand the inherent sustainability benefits of participating in recycling schemes are themselves better recyclers: they recycle more materials, more often. This thesis investigates if belief in the efficacy and sustainability benefits of a household curbside recycling system has a positive effect on participation in that system.

Research on the determinants of recycling behaviour began in the early 1970s, coinciding with the rise of the first environmental movement. This early literature examines citizens' participation in material depoit schemes. Curbside recycling schemes, one of the earliest of which was the Ontario blue box program, became popular in the 1980s, and led an explosion in studies investigating curbside recycling and other pro-environmental behaviours in subsequent decades.

Pro-environmental actions such as recycling are often grouped in with other behaviours that require immediate personal costs but provide only global, indirect benefits are labeled social dilemmas: "a choice situation in which short term rationality impels people to act for their own benefit at the expense of the collective" (Harland, Staats, & Wilke, 1999, 2517). Social dilemmas generally display a knowledge-action gap (KAG): when individuals an issue but do not carry out the personal actions that would contribute to alleviating the problem (Knussen, Yule, Makenzie and Wells, 2004). The KAG appears to be a result of inherent cognitive biases and limits to human rationality, which have recently caught attention with the advent of behavioural economics. The influence of morality or altruism is an area of great interest around these dilemmas.

Consumer behaviour, social marketing literature and the efficacy of persuasive messaging provide insight into the types of interventions that can effectively influence pro-social behaviour. "Social marketing is the application of commercial marketing concepts and tools to influence the voluntary behaviour of target audiences to improve their lives or the society of which they are a part" (Andreasen, 1994, 109). Transformational Consumer Research (TCR) is the new moniker for consumer behaviour research with the lofty goal of moving society towards sustainability and reflecting "the new social conscience of marketing" (Andreasen, Goldberg and Sirgy, 2012, 25). Construal Level Theory (CLT), a relatively recent development in the field of cognitive psychology, postulates that behavioural evaluations are informed by the construal level of the decision alternatives, and that increasing an individual's psychological distance from an object increases his/her tendency to construe the object in high-level terms (Liberman, Trope and Stephan, 2007). CLT corroborates cognitive biases as a root cause of the KAG and offers direction on how to bridge the KAG in persuasive messaging (White et al., 2011; Fujita et al., 2008).

Andreasen et al. (2012) suggest that interventions to transform consumers need to be guided by theory-based research. A psychological paradigm is well suited for analyzing beliefs associated with recycling efficacy. Ajzen's Theory of Planned Behaviour (TPB) models have been applied to a wide variety of behavioural choices, social dilemmas and otherwise and a number of studies employ the TPB to test the influence of beliefs around recycling. Ajzen's (1985) Theory of Planned Behaviour (TPB) (Figure 1) postulates that performance of a behaviour is directly influenced by the intention to perform that behaviour, which in turn is influenced by three main variables: attitudes, subjective norms, and perceived behavioural control. Other models applied to pro-social behaviour and substantiated in the literature include Schwartz's altruism model and Stern's (1999) ABC theory, both of which show validity in predicting behaviour. They are applied where appropriate in this thesis in an attempt to create a robust behavioural model. A modified TPB is used to test the influence of Torontonians beliefs around participating in the municipal household blue box recycling system on participation in that system.

DM Attitude

Social Norms

Behavioural
Intention

Behaviour

Perceived
Behavioural
Control
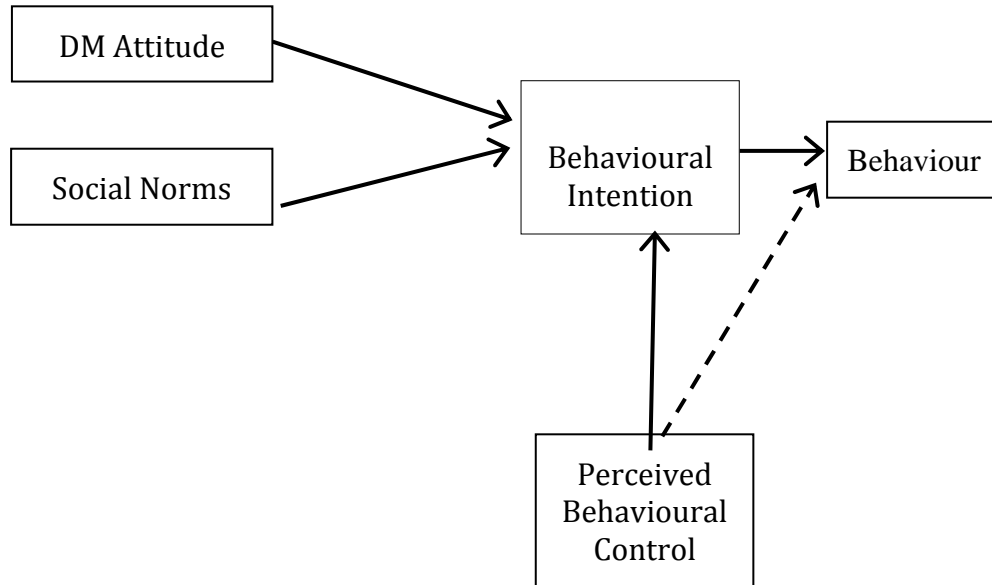
Figure 1. The Theory of Planned Behaviour (adopted from Ajzen, 1985)

Employing the TPB model requires operationally defining the behaviour in question, which in this case is a surprisingly difficult task. The verb to recycle is defined in the dictionary as "to pass through a system again for further treatment or use" and also "to reclaim for further use" (Collins English Dictionary).

While reviewing the history of the Toronto blue box program, what quickly becomes evident is the interdependency of this cycle among the citizen, the city's civic services, and the recycling industry itself. Recycling inherently represents a continuous loop with no set start or finish; the mobius loop is used to symbolize recycling and is indicative of the interdependence among participants in a closed system. The individual Torontonian is responsible for placing his/her waste materials curbside for recycling collection, the municipal government is responsible for collecting, transporting, and aggregating the materials so that they can be appropriately sorted and private industry acquires these materials and repurposes new goods available for purchase by companies and private citizens. Ideally the cycle loops back on its self as the individual citizen consumes goods made from recycled materials.   The Blue Box Program was built upon an uneasy and unusual public/private partnership that almost saw the acclaimed system discontinued in

until industry partners agreed to a new funding scheme for the program (Canadian Institute for Environmental Law and Policy, 2008).

Consequently, the research question was operationalized through an examination of respondents' beliefs around the consequences of their participation in a Toronto's curbside household recycling scheme. Due to the inherent cycling nature of the recycling system, the influence of efficacy beliefs on participation must be examined with regards to how it relates to the three participatory stakeholder groups (i.e. citizens, municipal services, and private industry). Indeed, consumers are becoming accustomed to hearing about the recycling benefits associated with consuming various products: e.g., Pepsi highlighting that their plastic bottle made of 15% plant material (Appendix 1); Sun Chips advertising their new biodegradable chip bag (Appendix 2); and Cascades paper company promoting their 100% recycled paper towels as saving seven litres of water (Appendix 3). Re-orienteering consumers' consumption behaviours towards effective recycling could decrease the severity of many of humanity's most detrimental environmental affects.

Using attitude assessment techniques to measure respondents' beliefs around the consequences of their participation, and correlating these measurements to behaviour offers empirical insight into the influence of beliefs on participation.

The results indicate that beliefs around the consequences of participation in the recycling scheme are one of many factors that influence recycling behaviour. Salient beliefs around the ability of recycling to reduce the amount of waste that goes into landfill and to help preserve natural resources correlate with increased levels of participation in the Toronto blue box program, while salient beliefs around the economic consequences of participation correlate with reduced participation levels. Interestingly, the way in which global, indirect benefits are communicated to the public appears to play an important role in the efficacy of persuasive messaging. The current funding structure of the recycling public/private partnership unfortunately serves to undermine the efficacy of recycling and in the province of Ontario.

A better understanding of the beliefs that positively influence recycling behaviour can be useful in tailoring persuasive advertising and behaviour change campaigns that

promote recycling and the interdependent relationships of the players, as a sustainable solution in our consumption-based society.

1.2 - Objectives of this Thesis

Building on the work of Tonglet, Phillips and Read (2004) that examines the influence of attitude and knowledge of consequences on recycling behaviour, the purpose of this thesis is to investigate the relationship between beliefs around the consequences of participation in a curbside recycling program and actual household recycling behaviours.

1.3 - Structure of this Thesis

Chapter one has introduced the overarching themes of this thesis, while chapter two summarizes the established literature relevant to promoting sustainable behaviours. Chapter three outlines the methodology that was used to establish a research question and gather data. Chapter four highlights the analysis and results derived from these data. Chapter five provides a discussion on the application of these results and suggests topics for further investigation.

CHAPTER TWO: LITERATURE REVIEW

Chapter two examines the scientific literature relevant to this thesis, including the general common antecedents of all behaviour, traditional methods employed to promote sustainable behaviours and the associated challenge of affecting pro-social behaviour provided by the knowledge-action gap, and finally the cognitive psychological models that serve as the foundation for behavioural experiments.

2.1 – The Antecedents of Sustainable Behaviours

While there is a seemingly infinite number of variables that influence behavioural performance, the antecedents of recycling behaviour can be grouped into three broad categories: psychological factors, contextual variables, and capability factors (Hines, Hungerford and Tomera, 1986). There is a great deal of overlap (Barr, Gilg, and Ford, 2001) and interaction (Stern, 2000; Fishbein and Middlestadt, 2012) both within and among these categories. Ecologically responsible actions must be examined on a specific-behaviour basis in order to effectively apply behavioural models (Lindsay and Strathman, 1997): no general underlying factor links pro-environmental behaviours together (Tracy and Oskamp, 1983/4). In fact, Oskamp et al. (1991) show a negative correlation between participation in a recycling scheme and other environmental behaviours.

Behavioural research can be classified into two categories: interventionist studies, which manipulate independent variables to evaluate their impact on the dependent variable of behaviour, and correlational research, which correlates variance between observed independent and dependent behavioural variables. Correlational research will be employed in this thesis.

Behavioural Intention versus Behaviour as the Dependent Variable

In studying the antecedents of behaviour, debate exists around the use of behavioural intention as a proxy for behaviour as the dependent variable. Sometimes the two correlate quite closely (Fishbein et al., 2010), while other studies find little to no correlation (Webb and Sheeran, 2006). Research using both is reviewed in this thesis because behavioural intention can serve as a useful proxy when measuring behaviour is not possible; however, the degree to which the intention is well formed needs to be considered because well formed intentions mediate the influence of attitude on behaviour, whereas poorly formed

intentions may not (Bagozzi and Yi, 1989). While Boldero (1995), Barr et al. (2001) and Cheung et al. (1999) find that measurements of behavioural intention significantly and positively correlate with objective measures of recycling behaviour, Davies et al. (2002, 37) cautions that "only under the most grueling conditions of situational consistency can the required correlation correspondence between measures of intention and measures of behaviour be demonstrated."

Formative Recycling Research

The relevance of early recycling research as it relates to this thesis is questionable as it examines recycling drop-off deposits where the behavioural costs of participation are much greater and participants often receive monetary rewards; indeed, previous recycling for monetary rewards does not predict participation in curbside recycling (Oskamp et al., 1991). Nonetheless, in one of the earliest studies on recycling behaviour, Arbuthnot (1977) contrasts frequenters of a recycling deposit against rural Ohio church members on measurements of environmental knowledge, attitudes, and personality orientations. He finds the best predictors of recycling deposit use are education level, environmental knowledge, general conservatism, and lack of personal control -- the latter two exhibiting a negative correlation with behaviour -- and concludes that recyclers are younger and have higher socio-economic standing. Interestingly, both populations hold equal pro-ecological attitudes, but recyclers have more concern for future environmental consequences and feel greater ecological responsibility. Frequenting a recycling depot positively correlates positively to personal satisfaction in being frugal, being self-sufficient, and participating in a program where one's actions make a difference (Arbuthnot, 1977); deposit-users state that helping to conserve natural resources is their most important motive for participation (DeYoung, 1986).

Introduction of Psychological and Personal Factors

Psychological and personality factors encompass the influence of attitudes, of innate personality dimensions such as orientations towards conservatism and individualism, and of value orientations, including moral values. Perceived convenience, space, or time to perform behaviour can also be considered psychological variables because they are measured subjectively and relate to personality dimensions such as self-efficacy.

Persuasive messaging often aims to influence beliefs, which form the basis of attitudes (Fishbein et al., 2010) and so the role of attitudes in behavioural decision-making is of specific interest for this thesis.

Motivations for Recycling Behaviour

Motivation is an overarching psychological factor. Many studies have investigated the motives distinguishing recyclers from non-recyclers. Recyclers demonstrate greater intrinsic motivation for the behaviour than non-recyclers (Oskamp et al., 1991).

Motivation for participation in a curbside recycling scheme loads on five factors: environmental concerns, nuisance, social reasons, household consequences and economic motives (Vining et Ebreo, 1990); similarly, when asked his/her primary motivation for recycling, 40% of respondents say general environmental concern, 33% say saving landfill space; 8% say economic concerns, and 6% cite social pressure (Scott, 1999). Recyclers and non-recyclers rate environmental concerns as equally important and social concerns as least important (Vining et al., 1990).

Examination of the Influence of Attitudes

There is general agreement in the psychology field that attitudes are "a latent disposition or tendency to respond with some degree of favourableness to a psychological object" (Fishbein et al., 2010, 76). While the concept of attitude was established in the 1920s, by the 1960s "fewer than 50 studies had been published in which investigators tried to use measures of attitude to predict actual behaviour" (Fishbein et al., 2010, 256). The research continues to remain inconclusive on the exact effect of attitudes on behaviour. Wicker (1969), in one of the earliest studies on the antecedents of behaviour, concludes that attitudes do not exert a strong influence, while Balderjohn (1988) finds that specific environmental attitudes do predict conservation behaviours. Stern (1999) suggests that the predictive value of attitude variables is dependent on situational factors, while Barr et al. (2001) suggest that environmental values, situational variables, and psychological variables moderate the link between environmental attitudes and actions.

The Difference Between Instrumental and Experiential Attitudes

Some researchers distinguish between the cognitive and affective aspects of attitude (Ajzen and Driver, 1992; East, 1993), asserting that cognitive (also known as instrumental)

attitudes evaluate the positive or negative consequences associated with an object, whereas affective (also known as experiential) attitudes evaluate the positive or negative subjective experience associated with an object. In the first study to examine these two types separately, Ajzen and Driver (1992, 222) suggest that "people seem to evaluate leisure behaviour in terms of its instrumental costs and benefits as well as in terms of the positive or negative feelings it engenders." Attitudes are perhaps best considered hierarchical "in which the instrumental and experiential components constitute first-order factors and the overall evaluative attitude is a second-order factor" (Fishbein et al., 2010, 85), which is predicated on high internal consistency and correlational results between measurements of instrumental and experiential attitudes evaluating the same object (Bagozzi, Lee and Van Loo, 2001; Hagger and Chatzisarantis, 2005).

The Role of Moral Values

 Understandably the influence of altruism and morality values figures prominently into research on behaviours such as recycling that have global, indirect benefits. Research is inconclusive on the ability of values to guide people's behaviour (Eyal and Liberman, 2010). Energy conservation (Black, 1978; Heberlein, 1975; Stern et al. 1985), littering (Heberlein, 1975), purchasing lead-free gas (Heberlein, 1975), and yard-burning (Van Liere and Dunlop, 1978) all show influence from an underlying moral norm (also known as personal norm) component. Behavioural models (Schwartz, 1977) have successfully tested the morality construct associated with ethical behaviour choice questions. Some researchers have shown that global moral principles underlie moral decisions (Lammers and Stepel, 2009; Tanner et al. 2008). Thogersen (1996) suggests that individuals evaluate environmental behaviours as moral decisions (i.e. right versus wrong) rather than economic (i.e. cost versus benefit) analysis. Valle et al. (2005) assume altruistic motives are required for recycling behaviour because of the social dilemma involved. In their test on five pro-environmental behaviours, Harland et al. (1999) find that variance in behaviour attributed to attitude decreased when personal norm was added as a predictor variable.

Individuals will compromise personal values when harm is relative to magnitude of benefit, implying some type of cost/benefit analysis (Eyal and Liberman, 2010). Moral rules are applied immediately and spontaneously and only if reflective reasoning is

invoked will contextual factors be taken into account (Haidt, 2001). Stern (2000) found that personal norm was the only psychological variable of fourteen to correlate with three types of non-activist environmentalism. Hopper and Nielsen (1991) show that personal norm measurements positively correlate with recycling behaviour but only when knowledge of behavioural consequences is high.

The General Influence of Attitudes on Curbside Recycling Behaviour

Measurements of attitude positively predict recycling behaviour (Terry et al., 1999; Tonglet, 2002; Valle et al., 2004) and behavioural intention to recycle (Terry et al., 1999; Knussen et al., 2004; Chen et al., 2010) though Gamba et al., (1994) find that attitudes exert less influence on recycling behaviour than other variables. The strength of influence is stronger for participants who had not performed the behaviour regularly in the past (Terry et al., 1999), while the Knussen and Wells (2004) results contradict this and find the relationship stronger for those who had recycled all or most of their household waste in the past.

Belief in the Efficacy of Participation in a Curbside Recycling Scheme

Perceived efficacy of behaviour is important in influencing behavioural choice (Berger and Corbin, 1992). Relative advantage, a construct that measures perceived cost/benefit of recycling behaviour, strongly influences attitude (Taylor and Todd, 1995). Recycling positively correlates to the belief that it is effective in preserving the environment (Gamba and Oskamp, 1994); belief in the benefits of recycling positively correlates with intention to recycle (Boldero, 1995). Recyclers do hold stronger beliefs that newspaper recycling conserves natural resources and increases the number of recycled products made (Boldero, 1995). Boldero (1995) finds that when participants rate a list of recycling's disadvantages, they load on two general factors: inconvenience and lack of conviction in the efficacy of recycling. The benefits of recycling do not predict recycling behaviour but the evaluation of the recycling program does predict behaviour (Boldero, 1995). Similarly, Tonglet et al. (2002) find that a construct based on the outcomes of recycling behaviour is a significant predictor of behavioural intention but not behaviour.

Barr et al. (2001) finds that recyclers and non-recyclers do not differ in terms of their beliefs in the value of recycling behaviour, nor do they differ in terms of awareness of

recycling benefits (Valle et al., 2004). The only significant attitudes beliefs found by Gamba et al. (1994) being perceived seriousness of the household waste problem and intrinsic motivation to recycle.

Mediators of the Attitude-Behaviour Link

A variety of factors may influence the attitude-behaviour relationship, including "such aspects as confidence in one's attitudes, involvement with the attitude object, it's centrality or importance, attitudinal ambivalence, the attitude's accessibility in memory and its temporal stability" (Fishbein et al., 2010, 118). Those authors suggest that attitude strength is an important moderating factor, and that strong attitudes do predict behaviour better than weak attitudes, although this may not always be the case.

Attitudinal ambivalence--the coexistence of both positive and negative reactions to an object--may also moderate the influence of attitudes on behaviour and can also be conceived by examining both the positively and negatively evaluated beliefs associated with the object. Health behaviour beliefs often display attitudinal ambivalence with a positive instrumental attitude but negative experiential attitude. Attitudinal ambivalence has important implications for behavioural interventions as Armitage and Conner (2000) find that while ambivalent attitudes are both more likely to change over time and are more susceptible to persuasive appeals, overall they are less likely to guide behaviour than non-ambivalent attitudes.

Other Psychological Factors Influencing Behaviour

Emotions are also considered psychological factors and have been shown to play a role in determining behaviour; the stronger an individual is emotionally involved with an environmental problem, the more likely s/he is to engage in pro-environmental behaviours.

Locus of control and self-efficacy beliefs are personality factors that influence the performance of environmental behaviours. Stern (2000) mentions that egotistic values and traditional conservative values (e.g., obedience, self-discipline, family security) negatively correlate with pro-environmental behaviours. Stern (2000) finds that individuals with prosocial value orientations, rather than individualistic or competitive orientations, demonstrate more environmental behaviour, and Kollmuss et al. (2002) note

that individuals who strongly believe in growth and the benefit of technology are less willing to engage in pro-environmental behaviours that require lifestyle changes. High self-efficacy positively correlates to pro-environmental behaviours (Huebner and Lipsey, 1981; Webster, 1975).

Introduction of Contextual Factors

Contextual factors are variables external to the individual that influence his or her behaviour and include advertising, community norms, legal issues, physical aspects of design, technology, public policy and economic factors (Stern, 2000). A number of demographic factors exhibit reliable influence on recycling behaviour across a wide variety of studies, although Barr et al. (2002) find no demographic factors of significance in their study on curbside recycling behaviour.

Socio-demographic variables serve as proxies of background factors that can influence behaviour (Stern, 2000); however, there is minimal agreement on the role demographics play in determining behaviour. Some authors conclude that demographics hold little explanatory value for pro-ecological behaviours (Van Liere et al., 1980; Samdehl and Robertson, 1989) while others suggest that gender (Kollmuss et al., 2002), education level (Van Liere et al., 1980) and age (Mohai and Twight, 1987; Van Liere et al., 1980) show demonstrate influence. Household income positively correlates to recycling rates in a variety of studies (Vining et al., 1990; Oskamp et al., 1991; Gamba et al., 1994), although Valle et al. (2004) show no influence for this factor on household recycling. Similarly, home ownership positively correlates with recycling behaviour (Oskamp et al., 1999). Level of education also positively correlates with recycling behaviour (Davies et al., 2002), although again Valle et al. (2004) do not replicate this finding. Age shows a generally reliable positive correlation with recycling behaviour (Vining et al., 1990; Scott, 1999; Knussen et al., 2004), although an exception is Thogersen (1994), in examining a newly implemented scheme, suggests that older participants find a newly implemented curbside recycling scheme complicated. Gamba et al. (1994) show that the number of individuals in a household positively and significantly correlated to participation frequency; related, Davies et al. (2002) find that married individuals are more likely to recycle than non-married participants.

Social pressure is considered a contextual factor mediated by personality attributes such as collective values and susceptibility to social pressure. Harland et al. (1999) suggest that focus on attitudes tends to overshadow the tremendous power of perceived social pressure. The particular influence of social norms on recycling behaviour shows vast discrepancies across studies, perhaps because it is a subjectively-measured contextual factor. While some find social norms to positively predict recycling behaviour (Barr et al., 2001; Davies et al., 2002) and behavioural intention (Chen et al., 2010; Knussen et al., 2004), other studies find social norms to be predictive in the negative direction for behaviour (Scott, 1999) and behavioural intention (Taylor and Todd, 1995). Still others find no significance role whatsoever for social norms in predicting recycling behaviour (Knussen et al., 2004; Boldero, 1995) or behavioral intention (Terry et al., 1999).

Economic factors can have a huge influence on behaviour: Thogerson (1996) cites one municipality in Denmark that used monetary incentives for recycling and shows that perceived costs/benefits differ significantly from other municipalities not using monetary incentives. He found that more emphasis is placed on personal costs, less on the public benefit of behaviour, which negatively impacts intrinsic motivation, a finding supported by Lee et al. (1995). Economic influences confound with intrinsic motivation and moral values.

The Moderating Influence of Habit

The habitual nature of many sustainable behaviours is an interesting contextual variable that moderates the affect of other variables. Ouellette and Wood (1998) find a stronger relationship between past behaviour and behavioural intention for habitual behaviours, concluding that the relationship between attitudes and intention is weaker for habitual behaviour than non-habitual behaviour. Terry et al. (1999) argue that habitual behaviour should display greater influence from self-identity factors than non-habitual behaviours because repetition indicates that a behaviour is important to one's self-identity and Charng et al. (1988) find this to be true when comparing first time versus repeat blood donors. Macey and Brown (1983) report that past experience is found to be the best predictor of conservation behaviour. Novel behaviour may relay on social norms whereas habitual behaviour may rely more on personal norms because action has been internalized (Davies

et al., 2002). Past recycling behaviour shows the strongest and most definitive positive affect of any construct (Boldero, 1995; Terry et al., 1999; Tonglet et al., 2002); in fact, Cheung et al. (1999) find past behaviour predicts recycling behaviour even better than behavioural intention.

Not surprisingly, having a recycling bin has a positive, significant affect on behaviour (Guagnano, Stern, and Dietz, 1995). Program design factors show a strong reliable influence on recycling behaviour; a structured, institutionalized program is the most significant determinant of recycling behaviour (Derksen and Gartrell, 1993). A co-mingled recycling program produces more behaviour than source separation programs (Gamba et al., 1994). Subjective design factors also show a positive correlation to recycling behaviour and include availability of storage space (Boldero, 1995), and convenience of containers (Reid et al., 1976; Luyben et al., 1979), while Valle et al. (2004) show that the subjective rating of "difficulty" exhibits one of the strongest effects on recycling behaviour. Boldero (1995) and Barr et al. (2001) show that beliefs around storage space required and convenience are both significant predictors of behaviour in the expected directions.

Introduction of Capability and Control Factors

Capability and control factors are variables that either facilitate or impede the performance of behaviour. Knowledge--in it's various forms--is a capability factor because knowledge is required to understand how to perform a behaviour, to determine responsibility for the act, and to evaluate the behaviour's perceived effectiveness (Davies et al., 2002).

Control factors, often measured subjectively, will influence behaviour to some extent based on how closely the perception match objective reality (Fishbein et al., 2010). Control factors include access to the physical facilities required for behavioural performance and autonomy over the question of performance. Some studies show that perceived behavioural control positively correlates with recycling behavioural intention but not actual recycling behaviour (Terry et al., 1999; Knussen et al., 2004), while others find no significance for perceived behavioural control (Chen et al., 2010; Boldero, 1995), though this may be due to methodology difficulties in the way perceived behavioural control is measured (Davies et al., 2002). Perceived control and situational factors may be better suited to explain non-recyclers (Tonglet et al., 2002).

Knowledge of environmental issues has been investigated as an antecedent of environmental behaviours in a variety of studies and is most often found to poorly correlate with behaviour, if at all (Shrum et al., 1994; Stern and Oskamp, 1987). Kempton et al. (1995) show that general environmental knowledge is the same between individuals who consider themselves to be strong environmentalists and those who consider themselves strong anti-environmentalists. General ecological knowledge and associated environmental awareness also positively correlate with recycling behaviour (Oskamp et al., 1991) and recycling behavioural intention (Cheung et al., 1999). Individuals with strongly held environmental concerns recycle more types of material than those without (Derksen et al., 1993) and recyclers are significantly more likely than non-recyclers to acknowledge environmental problems (Oskamp et al., 1991). General environmental concern likely influences consumer behaviour indirectly through mediating constructs (Alwitt and Pitts, 1996).

Knowledge of specific action strategies is another knowledge-based factor, and one that is a prerequisite to environmental behaviours. Procedural information alone is a necessary but not sufficient factor in promoting lasting change around complex ecologically responsible behaviours (McKenzie-Mohr and Smith, 1999). Specific procedural knowledge of the recycling scheme, such as the ability to correctly identify items accepted into the program, and knowledge of services available, is well established as positively correlating closely with increased recycling behaviour (Vining et al., 1990; Gamba et al., 1994; Scott, 1999; Barr et al., 2001; Lansana, 1993; Simmons and Widmar, 1990; DeYoung, 1989; Tonglet et al., 2002), though Cheung et al. (1999) found that specific knowledge of waste paper recycling did not increase waste paper recycling behaviour.

Summary of the Antecedents of Sustainable Behaviour

A huge variety of factors can influence recycling behaviour and, as can be seen from this review, many – if not most – interact with each other. This confluence of variables make it difficult to separate out the influence of any one factor, never mind attempt to examine the specific influence of particular beliefs. Nonetheless, it is clear that any attempt to test the influence of behavioural beliefs on sustainable behaviour will need to account for psychological, contextual, and capability factors including attitudes, morality, social

influences, behavioural control, and past behaviour. An examination of traditional methods of promoting sustainable behaviours in the following section will shed further light on how persuasive messaging and other variables can influence curbside recycling behaviours.

2.2 - Traditional Methods of Promoting Sustainable Behaviours

Interventions effective at influencing the performance of environmental behaviours shed light on the antecedents of these actions and again can be loosely gathered into three broad groups: those that influence contextual factors, psychological factors, and capability/control factors. Gardner and Stern (1996) suggest that there are four unique types of behavioural intervention: moral appeals to change behaviour for global benefit; educational information appeals to change attitudes and awareness; interventions that add a material incentive (or remove a disincentive); and community management of institutional structures to foster shared values, expectations and norms. The authors conclude that the first two have poor track records and the last two are not effective on their own, therefore intervention types should be combined to be most effective. Stern (1999) adds new technology implementation as a fifth type of intervention.

Manipulation of Psychological Variables

A variety of psychological variables have been manipulated in an attempt to influence performance of pro-social behaviours. The "failure of moral appeals for lasting societal change are well established and may be because they relay on prohibition which is not automatically or obviously self-beneficial" (Burroughs and Rindleisch, 2012, 258).

Pro-environmental behaviours are positively affected by personal commitment (Katzev and Johnson, 1987). Pardini and Katzev (1983/4) show how soliciting a commitment from an individual helps to ensure recycling behaviour continues when incentives are removed. They suggest that the commitment may have required people to find their own reasons to recycle and they may have started enjoying it.

The Efficacy of Persuasive Messaging

Advertising and the use of persuasive messaging is a common intervention technique used in attempt to influence a wide variety of consumer behaviours. Advertising primarily aims

to improve the attitudes associated with the behaviour in question but may also have a secondary effect of influencing social norms associated with the behaviour as well.

Hopper et al. (1991) conclude that more than reminders and information is needed to influence attitudes around recycling. Personality differences also influence the efficacy of persuasive messages in that individuals with high-self monitoring tendencies are more easily persuaded by messages that speak to a product's image over product quality (Snyder and Debono, 1985) and personality differences influence the weight assigned to the consequences of behaviour, which in turn predicts attitude change in response to various persuasive messages (Strathman et al., 1994).

Fugita et al. (2008) find that distant future purchases are influenced more by a persuasive message highlighting a positive environmental feature, while a near-future purchase is not influenced by the inclusion of that same positive environmental feature. "Persuasive arguments appealing to idealistic values appear to be more persuasive for temporally distant as opposed to near attitude objects." (Eyal et al., 2010, 15).

Manipulation of Contextual Factors

Legislation and extrinsic rewards (or punishments) are well-established as having a direct and significant impact on behaviour though neither is a panacea. Ferrara and Missios (2005) report that mandatory (versus voluntary) recycling programs have a significant positive affect on recycling rates. While legislation is an apparently easy fix, governments are hesitant to use these types of command and control tactics: when the Ontario government of the 1980s chose not to legislate mandatory use of refillable soda containers, a precedent was set "for a waste policy regime in Ontario that was based on voluntary compliance rather than regulation"(Canadian Institute for Environmental Law and Policy, 2008, 1).

Ferrera et al. (2005) also show that micro-economic measures significantly affect most waste management behaviours: user fees associated with garbage production positively affected diversion rates for all materials except toxic chemicals. Rewards are effective at temporarily increasing sustainable behaviours but behaviour is extinguished after the incentive is removed (Oskamp, et al., 1994; Witmer et al., 1976) because rewards tends to lose their novelty, other factors grow to outweigh them, or they may not be

meaningful in the first place. Geller et al. (1982) report that monetary incentives are the primary reason individuals use a recycling collection centre and that the recycling stopped when the incentive was removed. Rewards are probably most effective for non-recyclers (Schultz et al. 1995) but recycling incented this way does not generalize to other materials.

Interestingly, providing incentives may actually serve to diminish pro-environmental behaviours. Frey (1993) suggests that if an incentive is perceived as a token of approval, it will strengthen behaviour, but if perceived as payment, it weakens intrinsic motivation and possibly behaviour (De Young, 1986). Incentive schemes may reduce the feeling of moral obligation and reframe the activity as economic, where means-end analyses apply (Thogersen, 1996).

Schnelle (1980) finds that litter in the streets is reduced when a weekly report is published in the local newspaper; this likely influenced community norms around littering behaviour.

Manipulation of Capability and Control Factors

Historically communication campaigns promoting ecologically responsible behaviour have been procedurally-based (McKenzie-Mohr et al., 1999); e.g., a flyer or advertisement is delivered that outlines how, when, and where to perform the behaviour. Many environmental NGOs continue to base their communication campaigns around providing procedural information (Kollmuss et al., 2002). These campaigns have repeatedly failed to be effective in influencing behaviour (McKenzie-Mohr et al., 1999). Jacobs et al. (1984) show success in promoting recycling behaviours with door-to-door brochures but other studies (Pardini et al., 1983/4; Spaccarelli, Zolik and Jason, 1989/90) do not replicate this success and cannot establish long-term behaviour change with information flyers. While procedural knowledge is important for recycling (Oskamp et al., 1991), explaining how to perform a behaviour is simply not enough. The decision around recycling, as with many sustainable behaviours, is complex as the activity requires significant effort: waste must be sorted, prepared, stored, and set out at the appropriate place and time (Boldero, 1995).

Combining Different Types of Interventions

Stern (1999) finds that information and incentives interact and can create a synergistic effect on behaviour. Offering prizes in combination with a informative flyer increases

newspaper recycling more than giving the flyer with a bin, but after the prize was removed, recycling levels returned to the baseline (Luyben et al., 1979). Stern (1999) suggests certain interventions have diminishing returns, for example, once a monetary incentive is large enough to demonstrate clear benefit, increasing the dollar value is less effective than spending those extra dollars on an information component.

Expanding on a Nielsen and Ellington (1983) study that shows that block leaders increase and sustain recycling behaviour (possibly through promotion of community norms) Hopper et al. (1991) test the effect of a variety of interventions on participation in a community recycling program, including prompting and providing information through block leaders. They find that block leaders have the greatest positive impact on recycling behaviour, that prompts are effective but less so than block leaders, and that informational flyers are the least effective behavioural intervention.

Providing individuals with behavioural feedback, a type of knowledge that can also be classified as a control factor, has achieved energy and water consumption savings of 10-15% (Schultz et al., 1995); however, Seligman and Becker (1981) suggest two criteria for feedback to be successful: people must be able to identify effect of own behaviour and people must actually want to change. Feedback can also be considered a type of knowledge.

Many researchers also mention that interventions will not be effective until any barriers to change are removed (McKenzie-Mohr et al., 1999). While manipulating contextual factors such as legislation or extrinsic rewards will influence sustainable behaviours, the cost associated with this intervention, and poor level of continuation after the incentive is extinguished, discount them as viable options. Promoting social norms is a viable option, and has seen some success, but the conflicting data on the influence of social norms raises concerns. While providing certain types of knowledge, such as feedback on individual usage, can influence behaviour for individuals with a desire to change, procedurally-based information alone does not influence behaviour.

2.3 - The Knowledge-Action Gap

People do not recycle as often as they could (Schultz et al., 1995). Though an individual holds the values, skills, and ability required to perform a pro-environmental behaviour, performance is not a forgone conclusion as "people do not always perform in a manner consistent with their beliefs, values, attitudes, or intentions" (Kuhl and Beckmann, 1985, 117) and this discrepancy has become known as the KAG. Why is it that individuals who hold the knowledge and values associated with sustainability often do not behave accordingly? While methodological issues can exaggerate the discrepancy, inherent cognitive biases appear to be the root cause of the gap. The recent development of CLT corroborates the cognitive mechanisms underpinning the KAG and offers insight into possible ways that behaviour change campaigns can bridge the KAG (Appendix 8).

Methodological Inconsistencies Contribute to the KAG

Poor data collection methods can exacerbate the size of the difference between stated intention and reported behaviour (Barr et al., 2001); time lags between the measurements of attitude and behaviour, and antecedent variables that are measured generally while dependent variables are measured specifically both contribute to differences between stated intention and reported behaviour (Kollmus et al, 2002). Respondent bias also contributes to the KAG when investigating social dilemmas because participants will often bias their subjective responses towards pro-social norms (Terry et al., 1999), which is especially a problem when using subjective measurements of behaviour.

Yet even when accounting for methodological inconsistencies, the KAG continues to be identified in research on social dilemmas. In one of the first experiments that identified the KAG within an environmental context, Maloney and Ward (1973) note that their subjects scored substantially higher on reported affect for, and verbal commitment towards, environmental behaviours than subjects scored on the objective performance of those behaviours. Participants' scores on a knowledge of ecology subscale did not correlate to environmental affect, verbal commitment towards behaviour, or actual behavioural performance (Maloney et al., 1973). Similar results are found throughout the literature on sustainable behaviours; undergraduates' stated commitment to recycling compared to objective observations of the students' recycling behaviour, shows that the

students' stated value scores are two times greater than the true rate of their behaviour (Chung et al., 2007).

Cognitive Limitations as the Root Cause of the KAG

The ability of general environmental beliefs (i.e. understanding the impact of human behaviour on the planet) to positively influence behaviour is limited by both cognitive and affective components (Kollmuss et al., 2002). The root cause of the KAG is likely inherent cognitive limitations (Kollmuss et al., 2002). The role of cognitive heuristics, and the associated biases that stem from these mental short-cuts, is well-established. These limitations are based on temporal discrepancy, data quantification, normative influences, and oversimplification of environmental information (Kollmus et al., 2002).

Temporal discrepancy describes the non-immediacy of global sustainability problems. The time lag between consumption behaviours and the environmental consequences of that behaviour -- and the generally glacial pace of environmental destruction -- make the consequences of behaviour hard to grasp on a human-life timeline and scale (Kollmuss et al., 2002). Data quantification highlights how environmental challenges are often communicated using quantified data and graphs that help to illustrate evidence, but simultaneously remove emotional involvement with this information (Preuss, 1991). Normative influences encompass the social-psychological maxim known as the diffusion of responsibility effect: an individual's responsibility and desire to cooperate in favour of the collective interest decreases as group size increases (Kollmuss et al., 2002). Consequently environmental destruction, which is the result of collective action, mitigates the responsibility felt by individuals. An additional normative influence is the susceptibility of most individuals to behave in the fashion of the dominant culture which, in the developed world, is the continued promotion of profligate consumption. Oversimplification acknowledges that simplifying complex environmental systems, and abstract ecological chain reactions, for layperson understanding results in an underestimation of issue severity, reducing the sense of urgency felt by that layperson (Kollmuss et al., 2002). These cognitive limitations in turn compromise emotional engagement, which further reduces involvement. Furthermore, when information about environmental destruction, and education around ways to reduce this destruction, are

interpreted as contradicting quality of life and material desires, psychological defense mechanisms such as denial and apathy occur naturally as a result of cognitive dissonance and also prevent action (Harland et al., 1999).

Internal cognitive dissonance, created when behaviours are associated with both positive instrumental attitudes and negative experiential attitudes (or vice versa), can also prevent performance of behaviour (Ajzen, 1992). This is the case with many health behaviours, such as going to the dentist, where negative experiential attitudes associated with the behaviour (pain and discomfort experienced while in the dentist's chair), conflict with the positive instrumental attitudes (preventative oral hygiene and sparkling white teeth). A similar dissonance may often exist for environmental behaviours.

Moral Decisions Exhibit the KAG

"Altruism is characterized by widespread approval but often limited participation" (Hopper et al., 1991, 196). Social dilemmas are sometimes also called moral dilemmas. When describing moral behaviour, Schwartz (1970) suggests that while most individuals will publicly endorse a given moral norm, not everyone will act in accordance with their endorsement. These descriptions of moral behaviour implicate a KAG. Schwartz notes two defense strategies employed, including denial of consequences and denial of personal responsibility.

Summary of the Literature Pertaining to the KAG

CLT theory corroborates cognitive limitations as the underlying cause of the KAG and offers some potential avenues by which to overcome the KAG. Particularly this thesis is interested in testing if certain types of beliefs, such as efficacy beliefs, are less susceptible to the KAG? To further understand and test the influence of various beliefs on curbside recycling participation, a robust framework modeling the antecedents of behaviour must be established.

2.4 Cognitive Psychology Models that Explain Behavioural Decisions

"More research is required in the development of marketing and communication campaigns underpinned by psychological models" (Tonglet et al., 2004, 196). Heeding their advice and seeing that the root cause of the KAG appears to lay in cognitive

processing, this section examines cognitive psychology behavioural theories. Investigating how various models accommodate the various antecedents of behaviour offers insight into how beliefs about the global, indirect benefits of behaviour may exert influence.

Looking Specifically at Curbside Recycling Schemes

This section reviews studies that specifically examine curbside recycling behaviour through application of social-psychological models. "The most popular model in attitude research on recycling has been the TRA" (Davies et al., 2002, 53) and includes recycling studies by Boldero (1995), Cheung et al. (1999), Davies et al. (2002), Taylor and Todd (1995), and Terry et al. (1999). Schwartz's (1977) altruism model has also been used in a variety of recycling studies (Hopper et al., 1991; Oskamp et al., 1991; Vining et al., 1992; Guagnano et al., 1995; Lee et al., 1995). Shrum, Lowrey and McCarty (1994) note that many recycling studies only examine a few factors, and aside from those that use the TPB or Schwartz's (1977) altruism models, many recycling studies use "single applications of general or ad hoc models" making integration across studies is difficult (Thogersen, 1994, 151).

Behavioural models were generally developed in an ad hoc manner until Icek Ajzen and Martin Fishbein set out to establish a super ordinate model: one that could be tested empirically across all human behaviour and which would allow for comparison among different behaviours (Fishbein et al., 2010). While their TRA (and subsequent TPB and RAA model revisions) are the most widely employed models, and employed in this thesis, others including Schwartz's (1977) altruism model, a modified version of Rosenstocks' (1974) health belief model (Lindsay and Strathman, 1997), and a number of other sub-theories contribute additional variables and inform a robust understanding.

The Evolution of the Reasoned Action Approach

Before Ajzen and Fishbein paired up to develop a generally applicable model of behaviour, Fishbein had already developed a model of attitude formation he called the Expectancy Value Model (EVM): "attitude was assumed to be determined by beliefs about the likely outcomes of performing the behaviour …weighted by the evaluation of these outcomes" (Fishbein et al., 2010, 18). Citing Dulany's (1961) theory of propositional control as inspiration, Fishbein (1967) published a model of behaviour stipulating that behavioral

intention (BI) is the direct antecedent of behaviour (B), and that BI is comprised of both attitudes (constructed using the EVM) and social norms (SN). Ajzen and Fishbein then partnered and published a behavioural model that uses the EVM method to calculate both attitudes (behavioural beliefs x likely outcomes) and social norms (SN) (referent beliefs x motivation to comply). This model was published as the Theory of Reasoned Action (TRA) (Figure 2) (Ajzen and Fishbein, 1980). In a solo 1985 publication Ajzen adds the perceived behavioural control (PBC) construct into the model (which is again constructed based on the EVM using control beliefs x power of control factors) to account for behaviours not completely under volitional control (Figure 3) (Ajzen, 1985). PBC distinguishes the TPB from the TRA because it accounts for self-efficacy expectancies (Kraft et al., 2005).
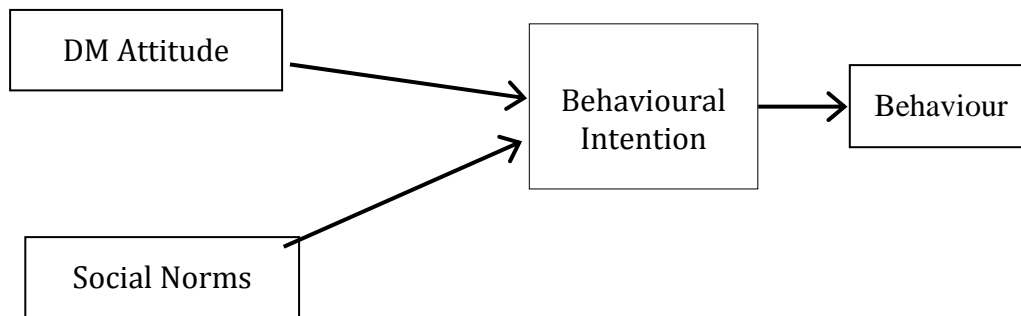
Figure 2. The Theory of Reasoned Action (adapted from Ajzen and Fishbein, 1980)

In 2010, the partners reunited to publish a further revision to the model, renaming it the Reasoned Action Approach (RAA) (Fishbein et al., 2010), and allowing for the incorporation of additional variables moderating intention or behaviour so long as they significantly and independently contribute to predicting behaviour and incorporating the attitude variable as having two separate facets: an affective (experiential) aspect and a cognitive (instrumental) aspect (Figure 4).
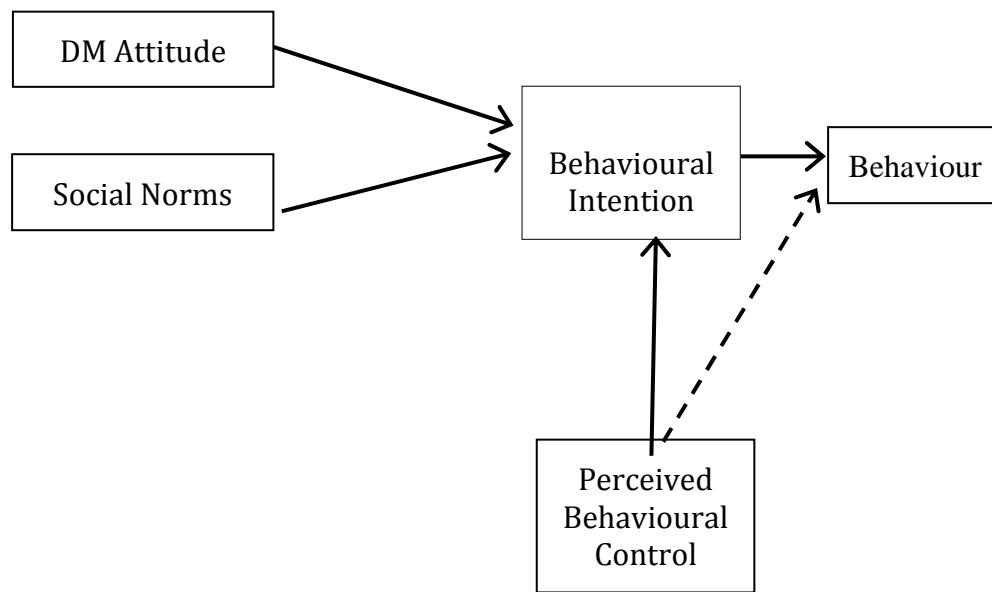
Figure 3. The Theory of Planned Behaviour (adapted from Ajzen, 1985)

The TRA, and subsequent variations, are considered multi-attribute, deliberate processing models: they assume that people are rational in that they "make systematic use of the information available to them " (Kollmuss et al., 2002, 244) and evaluate available information in making behavioural decisions (Connor et al., 1998). These models are based on the knowledge of consequences and East (1993) highlights that TPB is applied to choice behaviour, where an individual can give reasons for their choice. Subjective expected utility logic, "the assumption that action is motivated by desire to maximize private utility" (Thogersen, 1996, 536) is an underlying assumption of the TPB models (Ajzen et al., 1992; Boldero, 1995; East; 1993; Ajzen, 1991). Essentially it presumes that individuals perform a cost/benefit analysis when forming a behavioural intention, and implies that an individual's attitude can be made more positive by increasing personal benefit while holding all other things equal.
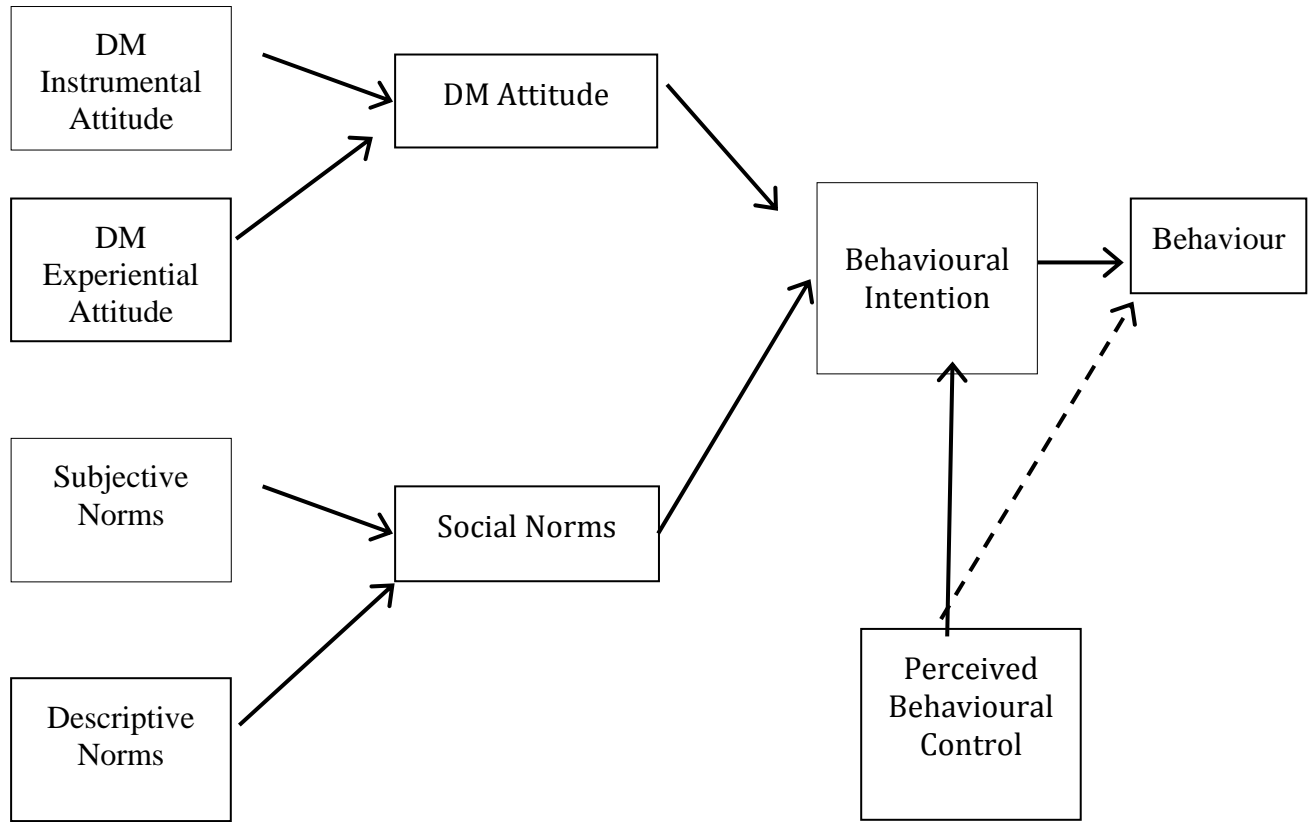
Figure 4. The Reasoned Action Approach (adapted from Fishbein et al., 2010)

The TPB models have been successfully applied to predict such diverse behaviours as leisure choice (Ajzen et al., 1992), driving violations (Parker, Manstead, Stradling, and Reason, 1992), investment decisions (East, 1993), dishonest actions (Beck and Ajzen, 1991), addictions (Godin, Valois, Lepage, and Desharnais, 1992), blood donation (Giles and Cairns, 1995), collective action (Kelly and Breinlinger, 1995), and green consumerism (Sparks and Shepherd, 1992; Sparks, Shepherd, and Frewer, 1995).

RAA Constructs, the EVM, and Associated Equations

One of the reasons why the TPB models are so popular is that the model can be written in terms of equations that allow for ease of variable manipulation. Behaviour is modeled by

$$B \cong w_i BI + w_i PBC \qquad (1)$$

where B is behavioural performance defined in terms of target, action, context, and time elements (which are held constant across all constructs) (Ajzen, 1991); BI is a summation

of the various influence factors attributable to attitudes, social norms, and perceived behavioral control, individual's total level of motivation to perform the behaviour in question (Ajzen, 1991); *PBC* is the individual's perception of control over performance of the behaviour (Ajzen, 1991); and w_i is a weight factor (Staats, 2003). Behavioural intention is modeled by

$$BI \cong w_iA + w_iSN + w_iPBC \qquad (2)$$

where *A* is the individual's favourable or unfavourable evaluation of performing the behaviour in question (Ajzen, 1991) and *SN* is the individual's evaluation of how important others expect him/her to behave.

"An attitude's essential characteristic is its bipolar evaluative dimension" (Fishbein et al., 2010, 76) operationalized using the EVM: a multiplicative sum of a respondent's strength of belief that an object (or behaviour) holds specific attributes, and the respondent's positive or negative evaluation of those attributes.

$$A = \Sigma b_ie_i \qquad (3)$$

where b_i is the individual's strength of belief that the object in question holds attribute *i* and e_i is the individual's positive or negative evaluation of attribute *i*. Subjective Norm (SN) is defined as the individual's perception of social pressure to perform or not perform the behaviour in question (Ajzen, 1991) and can be deconstructed into two subcategories: Social Injunctive Norm is an individual's perceived social pressure from important others, while Descriptive Norm is the individual's perception of behavioral performance by important others. A multiplicative sum of two components, the SN captures the extent to which a person believes a specific referent group wants him/her to perform the behaviour in question and the degree of influence exerted by that referent.

$$SN = \Sigma nb_jmc_j \qquad (4)$$

where nb_j is the normative belief of referent *j* and mc_j is the individual's motivation to comply with referent *j*.

Perceived Behavioural Control (PBC) is a measure of the individual's perception of his/her ability to perform the behaviour in question (Ajzen, 1991). PBC should capture the respondent's confidence that s/he is capable of performing the behaviour under investigation, in terms of both personal capability and external controllability factors

(Ajzen, 2006). PBC is calculated using a multiplicative sum of two subcomponents: control beliefs, (subjective measurements of the likelihood that a specific factor will facilitate or impede performance of the behaviour in question) (Staats, 2003) and perceived power (the subjective degree of help or hindrance that each specific control belief presents). PBC displays an influence on behaviour independent of its influence on BI to the extent that PBC reflects objective control over an individual's ability to perform behaviour. Ajzen (2002) suggests that PBC is a higher order construct of self-efficacy (also known as perceived difficulty) and controllability (also known as perceived control).

$$PBC = \Sigma cb_k pf_k \tag{5}$$

where cb_k is control belief k and pf_k is perceived facilitation of belief k.

The EVM was refined by Fishbein (1963) but had already been established in the literature by Peak (1955), Carlson (1956), and Rosenberg (1956). Feather (1959) states that it is the most popular model of attitude formation. Fishbein et al. (2010, 221) define belief as "a subjective probability." During belief formation, an individual assigns attributes (which hold inherent evaluations) to the object in question. Attribute evaluations are summed to produce an overall evaluative response know as the attitude. Each attribute evaluation contributes to the overall attitude in direct proportion to the strength of belief in the subjective probability that the object in question holds that attribute (a more strongly held belief, or a more polarized attribute evaluation contributes more to the overall attitude than a weakly held belief, or a neutrally-evaluated attribute). From then on, the object will automatically elicit the evaluative meaning, "much the same as the denotative meaning of a concept is automatically available to an individual familiar with that concept" (Fishbein et al., 2010, 224). Attribute importance ratings are not necessary as the multiplicative EVM already takes this into account because "outcomes judged to be most important are typically evaluated more positively or negatively" (Fishbein et al., 2010 111) than less important outcomes which are typically evaluated more neutrally. Individuals hold more information around beliefs that are important to them, and consequently hold these beliefs more strongly (Fishbein et al., 2010). An important note about the TPB's EVM formation of the various constructs is that only the salient beliefs pertaining to the behaviour in question are to be factored in. Conceptualized as

accessibility in memory, this is rooted in the finding that an individual can only hold seven to nine separate cognitions at any time (Miller, 1956).

Meta-analysis by Armitage et al. (2001) report mean correlations of 0.53 and 0.50 respectively between the EVM index and direct measures of attitude. While the EVM is not necessarily how the brain itself functions, the EVM does serve as a reliable model of cognition that can be experimentally tested (Fishbein et al., 2010). The EVM accounts for irrational beliefs in that subjective probability does not necessarily reflect objective probability; attitudes are rationally formed but can be based on irrational beliefs.

Criticisms of the TPB Models

A widely applied model such as TPB variants draws wide variety of criticism. Terry et al. (1999) believe that there is an explicit role for self-identity in the TPB. They define self-identity as the "extent to which performing the behaviour is an important component of a person's self-concept" (Terry et al., 1999, 240). Individuals desire to perform behaviours that validate the roles that construct one's self, and an individual is more likely to perform a behaviour if it is in accord with the norms of an important group membership, especially if an individual bases his/her self-definition around that membership (Terry et al., 1999). The personal norm is considered different than the social norm because violating or upholding it is tied to one's self concept (Hopper et al., 1991).

Another criticism of the TPB is that past experience should be a variable that directly influences behavioural intention. In rebuttle, Ajzen (1991) argues that past behaviour contributes indirectly to behavioural intention through attitudes, SN and PBC but not as a separate variable. Fredericks and Dossett (1983) find a direct affect of past behaviour on the behavioural intention variable that is not mediated by PBC. Boldero (1995), Cheung et al. (1999) and Terry et al. (1994) all indicate that past experience is an important variable to measure and include when predicting behaviour.

Some authors also critique the TPB for not specifically accounting for the role of habit in behavioural performance (Thorgersen, 1994). They argue that habitual behaviours do not fall within the TPB framework because the individual components are not considered each time (Staats, 2003).

The Role of Morality in TPB Models

Another criticism of the TPB is that moral norms are not effectively represented (Manstead et al., 1995) and that the TPB "approach is rooted in EVM of attitude decision making... such an approach does not easily embrace beliefs that are not directly related to the immediate costs and benefits of behaviour" (Manstead et al., 1995, 85). Ajzen believes it is synonymous with intention but Harland et al. (1999) conclude that adding a personal norm construct to the TPB improved explanation of intention significantly, further supporting their stance that the standard TPB concepts do not capture the total influence of moral values. Stern (1999) further suggests that the rational utility calculus inherent to subjective expected utility models including the TPB bypasses the intrinsic value of adhering to moral principles; "actions in accordance with attitudes and values lead to an intrinsic utility" (Best and Kneip, 2011, 919) and opposed to cognitive dissonance.

Davies et al. (2002, 98-99) conclude that "internalized moral rules guide behaviour and, in its current formulation, the TPB does not take account of this" and also suggest that "not allowing for the choice between alternatives is a serious omission of the TRA/TPB".

Schwartz's (1977) Altruism Model

While the RAA attempts to serve as a super-ordinate model applicable to all behaviours, other models are designed to explain specific behaviours. Shalom H. Schwartz's (1977) altruism model (also known as the norm activation model) is one such example well established in the social-psychology literature. This theory rests on the assumption that individuals internalize behavioural social norms as personal moral norms anchored in oneself (Harland et al., 1999) (Figure 5). The model proposes that when considering performance of a moral behaviour, an individual must be aware of negative consequences for others (AC) stemming from performance of that behaviour, and ascribe responsibility (AR) to him/herself for preventing those consequences, for one's personal norm to be activated. An activated person norm results in an internal sense of obligation that motivates performance of the moral behaviour. Therefore, for moral behaviour to occur, an individual must be aware of other's well-being depending on the act and feel that s/he is responsible for the act and its consequences. Schwartz (1977) suggests that the ability of personal norms to predict behaviour is better when the individual is more aware of behavioural consequences.
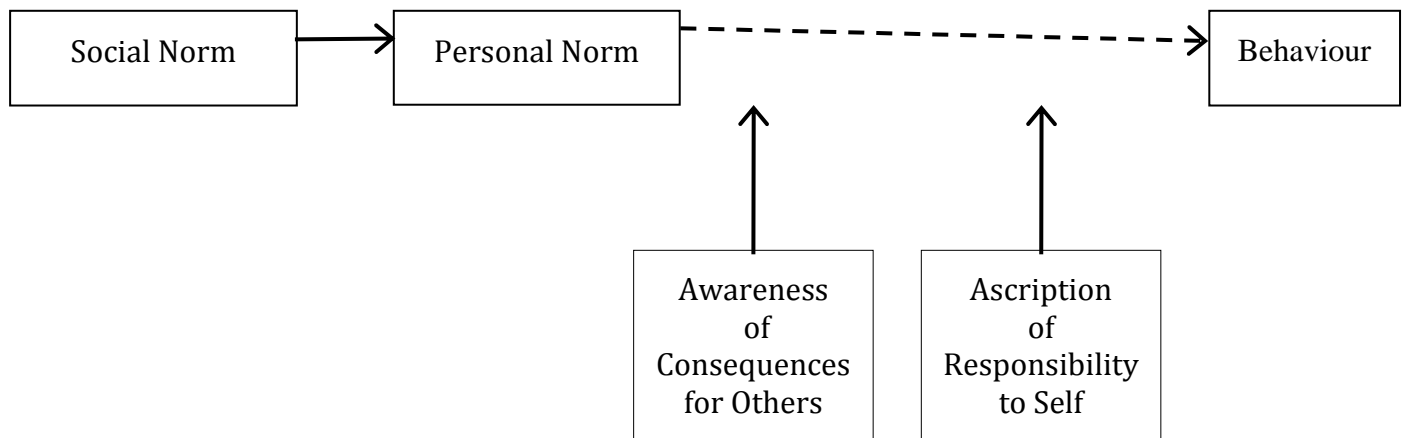
Figure 5. Model of Altruistic Behaviour (adapted from Schwartz, 1977)

Social norm is defined as expectations of moral behaviour generally accepted by the predominant culture or social group (Harland et al., 1999). Personal norm is defined as evaluations of the behaviour in terms of moral worth to self (Harland et al., 1999). Awareness of consequences is defined as an understanding of the impact of behavioural performance on others. Ascription of responsibility is defined as the assignment of responsibility to oneself for the prevention of said consequences. "The consequences that matter in activating personal norms are adverse consequences to whatever the individual values" (Stern, 2000, 414). Behaviour is the moral behaviour in question (Schwartz, 1977).

Schwartz (1970, 128) outlines three distinct attributes that characterize moral decisions: The behaviour leads to "interpersonal actions having consequences for the welfare of others", is "classified as moral only when the decision maker is considered a responsible agent" (i.e. the behaviour is chosen willingly), and the resulting behaviour and agent "are evaluated as good and bad according to the consequences the actions have [on] other's welfare." While household recycling participation may not necessarily fall into this categorization, a variety of studies have applied the altruism to curbside recycling behaviours (Guagnano et al., 1995; Hopper et al., 1991; Lee et al. 1995; Vining and Ebreo, 1992; Oskamp et al., 1991).

A subjective measure of the personal norm has been shown to significantly correlate with a variety of pro-social behaviours, including cannabis use (Connor and McMillian, 1999), dishonest actions (Beck et al., 1991), driving violations (Parker et al., 1992), and shoplifting (Tonglet, 2000; 2002). In terms of environmental behaviours, Schwartz's (1977) model has been applied to yard burning (Van Liere et al., 1978), energy use (Black et al., 1985) and support for environmental protection (Stern, Aronson, Darley, Hill, Hirst, Kempton, and Wilbanks, 1986).

Schwartz' (1977) model states that internalization of norms requires adopting values and learning when to apply them, therefore internalization depends on both social norms and behavioural frequency. Although "following one's moral impulses has value to most people, it usually does not have infinite value" (Thogersen, 1996, 550)

One criticism of the altruism model suggested by Stern (2000) is that both it and the TPB model over emphasize the role of attitudinal variables in environmental behaviours. Another criticism is that it does not allow for the influence of any contextual factors (Davies et al., 2002).

The Modified Health Belief Model

A third cognitive-psychology model of interest due to the similarity among behaviours performed to maintain good health and environmental behaviours, is the modified health belief model based on Rosenstock's (1974) health belief model that purposes for health behaviours to be performed, both a high likelihood of achieving a positive outcome, and a low likelihood of personal barriers will lead to a high probability of action. Both health behaviours and environmental behaviour are under an individual's volitional control to moderate the severity of negative outcomes, which are often far removed in time. Both types of behaviour also often require inconvenient or unpleasant immediate consequences and health behaviours are subject to the KAG (Lindsay et al., 1997). The difficulty in applying this model for environmental behaviours is that, unlike health behaviours, which result in direct personal benefit or consequence, sustainability behaviours are social dilemmas that have only indirect, global consequences (Lindsay et al., 1997). As this thesis examines the affect of beliefs around the global, indirect consequences of recycling, the

MHB model is inappropriate, especially as there are not enough published examples in support the use of this model.

ABC Theory and the Low-Cost Hypothesis

The ABC theory offers insight into the variable influence of attitudes on behaviour: it suggests an interaction effect between attitudes and the associated cost of behavioural performance (Best et al., 2011) and in doing so differs from rational choice theories. It proposes that attitude-based theories should have external boundary parameters for their applicability (Guagnano et al., 1995) and essentially predicts that the more difficult, the more time-consuming, and the more expensive a pro-social behaviour, the less performance will depend on attitudinal factors (Stern, 1999). The influence of behavioural attitudes is strongest when contextual factors are neutral and weakest when contextual factors either strongly facilitate or impede behavioural performance. The critical element is the relative difference between the attitudinal and contextual values; a strongly negative attitudinal or contextual value will result in a rare behaviour whereas strongly positive attitudinal or contextual value will result in a high incident of behaviour.

The low cost hypothesis, put forward by Diekmann and Preisendorfer (2003) specifically applies the ABC Theory to environmental behaviours. It suggests that attitudes influence sustainability behaviour in low-cost situations but that when the associated costs of performance are high these behavioural decisions are based only on tangible utility factors. Derksen et al. (1993) find support for this assertion but Schultz et al. (1996) do not.

Comparison of the Role of Beliefs in the Altruism and RAA Models

While the RAA is a more robust model and the altruism model is specifically applicable to moral behaviour, both models could be used to explain and predict participation in a curbside recycling scheme. While both account for the importance of social norms, the RAA incorporates contextual factors using the PCB, and explicitly includes the influence of attitudes whereas the altruism model emphasizes the importance of a sense of responsibility and knowledge of consequences in activating a personal norm that motivates behaviour. While the TPB models employ rational utility calculus, the altruism model accounts for the intrinsic utility of adherence to one's altruistic values.

As the purpose of this thesis is to investigate the beliefs that influence participation in a curbside recycling scheme, these models need to be examined in terms of how behavioural beliefs are included. In the TPB models, behavioural beliefs are accounted for in the attitude construct, through Ajzen is quite clear that only salient beliefs are involved. Salient beliefs have to be both likely to occur and evaluated as positive or negative to exert influence on overall attitude formation.

In applying the altruism model, beliefs about social norms, behavioural consequences, and personal responsibility all factor into the decision on behavioural performance. In as much, the altruism model is more restrictive in terms of prescribing which types of beliefs will influence behaviour. Furthermore, the TPB models offer clear guidelines on how to test the influences of specific behavioural beliefs, whereas the altruism model does not offer the luxury of quantitative analysis around the influence of particular beliefs. The altruism model has strict requirements for the morality of behaviour and therefore the applicability of the model, while the TPB models appear to be better suited to behaviour that may not necessarily fit into the rigid requirements of the altruism model.

Interestingly, the RAA and altruism models are actually at odds in terms of predicting how to change behaviour: to increase moral behaviour among non-performers, the TPB models would suggest that increasing benefits derived from behaviour would increase behavioural performance, while the altruism model would suggest that increasing personal benefits would actually serve to reduce behaviour.

Model Formation and Hypothesis

Using the RAA as a basis for modeling participation in Toronto's curbside recycling scheme, this thesis examines which specific behavioural beliefs influence curbside recycling participation, by way of investigating the role played by psychological, capability and control factors. In addition to the usual RAA constructs, there is sufficient evidence to justify adding a moral norm construct and a past behaviour construct into the behavioural model of curbside recycling behaviour (Figure 7).

Regression of the behavioural model inherently illustrates how well the included variables account for variance in curbside recycling behaviour. This behavioural model is

regressed using three different formulations of the attitude variable: DMA, BBA3, and BBAALL. The Direct Measure of Attitude (DMA) is the standard method advocated by Fishbein et al. (2010) for measuring latent attitude towards behaviour. BBA3 and BBAALL are constructs that also measure latent attitude towards behaviour but do so by employing the EVM methodology (Equation 3). By testing the behavioural model with three different types of attitude measurement (rather than just a direct measure of attitude), a more nuanced understanding of the influence of attitudes on behaviour can be acquired. Furthermore, use of the EVM methodology allows for a latent attitude measurement that is directly tied to participants' behavioural beliefs; BBA3 is constructed with EVM methodology using salient behavioural beliefs, whereas BBAALL is constructed with EVM methodology using all associated behavioural beliefs. Therefore, use of the EVM methodology to create attitude constructs that are regressed within the behavioural model introduces an opportunity to examine the influence of particular behavioural beliefs on the dependent variable of behaviour. It is this opportunity to examine the influence of particular behavioural beliefs on curbside recycling behaviour that will form the basis of discovery for the remainder of this thesis. As such, the central hypothesis of this work is that salient beliefs around the efficacy of recycling will positively correlate with curbside recycling behaviour.
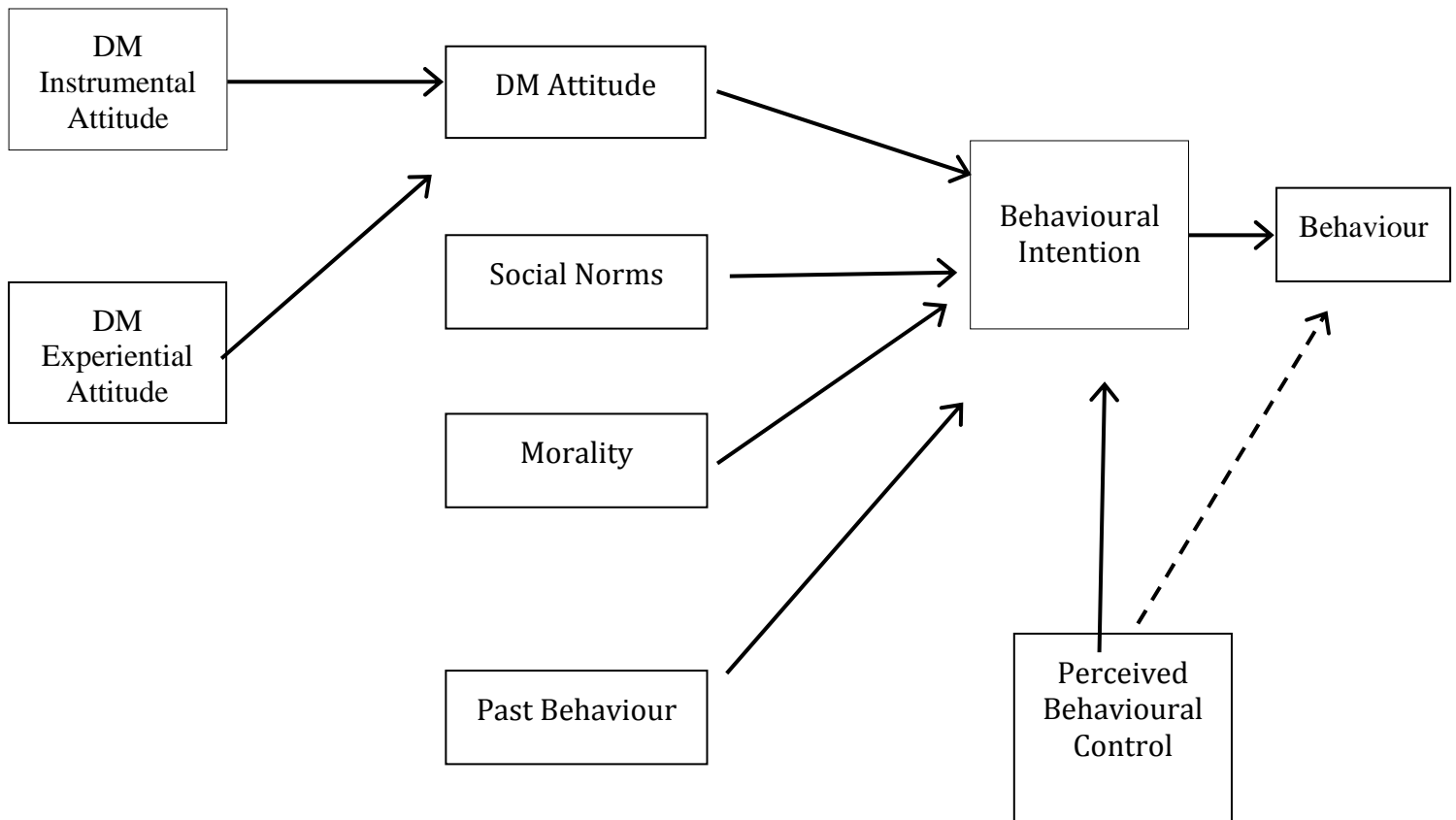
Figure 7. Proposed Model of Participation in Toronto's Blue Bin Curbside Recycling Service (author's own)

CHAPTER THREE: MATERIALS AND METHOD

This thesis investigates if a significant relationship exists between participation rates in the Toronto blue box program recycling scheme and participants' salient beliefs about the consequences of that behaviour. To gather empirical data for this investigation, a model of participation in a curbside recycling program is created based on the literature, followed by developing a survey to test the model, using Fishbein et al. (2010) as a primary guide. Individuals from 304 single-family Toronto households completed an online survey about their household's curbside recycling practices, their beliefs about the advantages, disadvantages and moderating variables around curbside recycling participation, and associated socio-demographic characteristics. A variety of statistical analyses are applied to test the power of the model and to investigate beliefs which beliefs are significant in predicting high levels of recycling participation.

3.1 - The Test Area: City of Toronto

Situated on Lake Ontario, Toronto is a cosmopolitan city home to 2.5 million residents (Statistics Canada, 2007). As Canada's largest city and Ontario's capital, Toronto is a key financial hub, home to the Toronto Stock Exchange. The city's GDP was $144 billion in 2011, contributing 11% of Canada's total GDP (City of Toronto 2012).

Waste Management Services in Toronto

Toronto Solid Waste Management Services operates seven waste transfer stations, one material recycling facility, one organic waste facility and manages 161 closed landfill sites (City of Toronto, 2011). Since January 1, 2011, most city garbage is sent to the city-owned Green Land Landfill Site, located 200km from downtown Toronto in London, Ontario.

Toronto's household curbside collection service operates using three containers: blue bins collect all co-mingled recyclable material, green bins collect organic waste, and black bins collect the remaining non-toxic household waste. Electronic waste is also collected curbside. Organic bins are emptied weekly, while household blue and black bins alternate bi-weekly (City of Toronto, 2011). Residents are permitted to put out extra recyclable materials in clear bags, but additional garbage bags require bag tags, which must be purchased. The provincial *Waste Diversion Act* states that Ontario curbside recycling

programs must accept all paper, steel FBC (food and beverage containers), glass FBC, aluminum FBC, polyethylene terephthalate (PET) plastic FBC, and two additional items from a list of twelve. Toronto's blue bin program additionally accepts cardboard, boxboard, aluminum pans and trays, aerosol cans, metal paint cans with lids removed, foam polystyrene, and plastic retail shopping bags.

Once a year residents receive a collection calendar that includes the curbside collection schedule for their neighbourhood, explicit instructions on which materials are accepted in each bin, and additional procedural information about how to properly participate. A section of the city's website is also dedicated to providing residents with waste management information including participation instructions in a variety of languages, a search tool allowing residents to find disposal locations for materials specifically not accepted in the curbside program, collection schedule information, and an online form for requesting a new bin, an extra bin, or a bin size change. The website also warns against material contamination in the recycling and organic streams, noting that bioplastics are not accepted because end-market buyers will not purchase aggregated plastics contaminated with bioplastic (City of Toronto, 2011).

In 2007 Toronto City Council adopted a 70% waste diversion goal for the city; yet in 2011 only 49% of residential waste (393,438 MT) was diverted from landfill. Single-family homes have a diversion rate of 64% (189,539 MT) compared to 20% for multi-residential buildings (City of Toronto, 2011). According to city officials, if the 70% diversion target is met, the Green Land Landfill will accept waste until 2033; however, at current diversion rates capacity will be exhausted in 2025 (Ontario Waste Managment Association, 2006). City Council has made a few progressive steps towards waste minimization, including banning the sale of water bottles by City facilities, and implementing a bylaw mandating a five cent tax for plastic bags distributed by city retailers. Most recently City Council moved to ban the distribution of plastic bags altogether.

3.2 - Questionnaire Design and Administration

Following instructions laid out by Fishbein et al. (2010), the first step in applying the RAA model to investigate the antecedents of a behaviour is to define the behaviour under

investigation in terms of its target, action, context, and time elements. As such, the behaviour in question was defined as: placing curbside; all household recyclable waste; for municipal recycling collection; over the next six months.

Selection of the Research Population

The second step requires specifying the research population (Fishbein et al., 2010) which was defined as Torontonians, aged 18 and older, who do not live in a multi-residential unit (i.e., condominium or apartment). The waste diversion practices in multi-unit residences vary greatly from household pickup practices (City of Toronto, 2011).

Selection of the Method of Survey Administration

Lightspeed Research, an online data collection firm, was contracted to administer the questionnaire to 300 participants for this project at a cost of $3,470 for data collection Mail-in surveys were deemed impractical and telephone surveys too expensive, so an online survey company by the name of Lightspeed Research was contracted to administer the questionnaire for this investigation. Participants who fit the population criteria were drawn from a pool of willing research participants maintained by Lightspeed Research. To ensure applicability, potential participants were first presented with three questions ensuring that: they did not live in a multi-story building; their household had access to a curbside blue bin recycling program; and they were of 18 years of age or older. Any respondents that did not fit these criteria were thanked for their time and told that they were not eligible to participate. Eligible respondents were told that participation was voluntary, that their input was important and strictly confidential, that answers would not be linked to them, and then asked if they would consent to participate in the study which would take approximately 15 minutes (Appendix 7). If the respondent selected yes, than they were then directed to the official consent agreement (Appendix 7). In exchange for completing the survey, participants were awarded reward points from Lightspeed Research that participants can put towards redemption gifts.

Formulation of Model Constructs

The third step recommended by Fishbein et al. (2010) requires formulating "three to six items formulated to assess each of the major constructs...attitude, perceived norm, perceived behavioural control, and intention. Seven-point bipolar adjective scales are

typically employed" with "items formulated to be exactly compatible with the behavioural criterion and to be self-directed" (Fishbein et al., 2010, 449-450). The standard of compatibility was closely observed throughout construct creation. Fishbein et al. (2010) give direction on the types of instructions to include for participants in the questionnaire.

Creation of the Direct Attitude Measure

A direct measure of attitude (DMA) was assessed using seven-point semantic differential adjective scales as recommended by Fishbein et al. (2010). Both instrumental and experiential adjectives were included as well as the generic good/bad and positive and negative endpoints were calculated (Table 2).

The questions typically used in a pilot to elicit salient beliefs were instead inserted at the beginning of the questionnaire, before any of the questions that assessed theoretical constructs, so as to replicate a pilot study format by preventing respondent prompting. Respondents were asked to consider the possibility of "*Over the next six months, placing all your household recyclable waste at the curbside for municipal recycling collection?*"

Creation of the Subjective Norm Construct

Based on the literature, questions were formulated to encompass both the injunctive norm and subjective perceived norm to give an overall direct measure of subjective norm.

Creation of the Perceived Behavioural Control Construct

A direct measure of PBC was created based on Fishbein et al. (2010).

Creation of the Past Behaviour Construct

Two questions assessing past behaviour construct were developed based on Fishbein et al., (2010).

Creation of the Perceived Difficulty Construct

A measure of perceived difficulty was also included as recommended by (Chen & Tung, 2010).

Creation of the Morality Construct

An index of morality was also calculated based on five questions from the literature.

Creation of the EVM-Based Attitude Construct

To investigate the specific behavioural beliefs that influence curbside recycling participation, in hopes of improving social marketing of sustainable behaviours, a second

type of attitude measurement--based on the Fishbein et al., (2010) EVM model of attitude formation--was also included in the questionnaire design.

Creation of a Test of the Respondent's Salient Behavioural Beliefs

When behavioural beliefs are presented as outcomes to behaviour and selected in terms of importance, salient beliefs are rated as most important (Fishbein et al., 2010). To test which behavioural beliefs were salient for each respondent, a list of behavioural outcomes (17 advantages and 18 disadvantages) were provided and the participant was required to select the three most significant advantages, (and disadvantages respectively) for a total of six salient behavioural beliefs. Individuals can generally hold five to eight items comfortably in their mind at one time (Miller, 1956) and three advantages and three disadvantages was deemed appropriate for testing. The item was worded "*From your perspective, what do you see as the three most significant advantages (disadvantages) if you were to, over the next six months, place all household recyclable waste at the curbside for municipal recycling collection*?" The list of behavioural advantages (disadvantages) were presented to the respondent and three had to be selected by the respondent before s/he could move to the next screen in the survey. The beliefs were randomized.

Selection of Behavioural Beliefs Included

While Fishbein et al. (2010) suggest the next step is to administer a pilot questionnaire eliciting salient behavioural beliefs from the test population this was deemed infeasible due to resource restraints, so instead a wide range of recycling behavioural beliefs were mined from the literature with an additional few based on the researcher's intuition (Table 1), similar to the methodology employed by Chen et al. (2010). Participants selected their three most important.

Formulation of Behavioural Belief Strength and Outcome Evaluation Items

"With respect to each salient behavioural outcome, items are formulated to assess the strength of the behavioural belief and the evaluation of the outcome" (Fishbein et al., 2010, 453). All items were formulated based on examples in Fishbein et al. (2010).

The item formulated to test behavioural belief strength was the preface "*If, over the next six months, I place all my household recyclable waste at the curbside for municipal recycling collection, I will…*" followed by the question *"i) save my city money:"* and the

Likert-type seven-point rating scale *Unlikely/Likely*. The behavioural beliefs were split into two groups and placed as questions 12 and 16.

Table 1. Behavioural beliefs selected to test

Advantages	Disadvantages
Reduce my property taxes	Help eliminate jobs
Save my city money	Need extra space in my house
Save my household energy	Waste my money
Save electrical energy generally	Waste city money
Create a better environment for future generations	Have to put in extra time
Help to protect the environment	Have to put in extra physical effort
Help to preserve natural resources	Have to put in extra mental effort
Reduce the amount of waste that goes into landfill	Create unpleasant odours
Create jobs	Create a mess
Stimulate the economy	Attract pests
Contribute to manufacturing goods made from recycled materials	Increase waste collection costs
Experience satisfaction	Does not give me money for waste materials
Help to solve a global problem	Make me feel overwhelmed
Feel good	Make me feel tired
Feel hopeful	Make me feel confused
Feel reduced guilt	Make me feel stressed
Feel like I'm doing my part	Does not make a difference
	Neighbours see what I put out

The item formulated to test outcome evaluation was: "*My saving my city money is:*" followed by the Likert-type seven-point rating scale "*Bad/Good*". All the outcome evaluations tested were split into two groupings and placed as questions 20 and 23. Each grouping was prefaced with the "*Instructions: Please rate the following general outcomes from your perspective.*"

Development of the Dependent Variable of Behaviour

As a two-stage questionnaire was deemed infeasible, the dependent variable of behaviour was measure historically. Ajzen (2006) suggests using more than one measure of behaviour to create an index. Based on Ferrara and Missios (2005) and Terry et al. (1999),

an index of behaviour was calculated summing the results from ten questions assessing the participant's household subjective diversion rate of ten recyclable materials. An eleventh question assessed the amount of non-recyclable material that was put into the blue bin was reverse scored. A variety of items were included because "when the behavioural criterion is broadly representative of the behavioural domain, rather than a single arbitrarily selected action strong relations between attitudes and behaviour are seen" (Fishbein et al., 2010, 258). These questions were categorical, respondents chose from *0%, 20%, 40%, 60%, 80% and 100%*.   The instructions for this section specified that the respondent was to consider his/her household's use of the curbside recycling collection service (i.e. the blue bin program), over the last six months *"[type of recyclable waste} answer with what percentage of that total x waste actually ends up in the recycling blue bin rather than the amount that ends up in the trash bin*" and not to include items returned to a retailer for recycling. Participants were also reminded to consider all waste in their household, not just that produced in the kitchen area. The instructions clarified that the participant was to (Appendix 7).

Creation of the Behavioural Intention Construct

A direct measure of intention was created by summing the results of three questions based on examples from Fishbein et al. (2010) (Table 2).

Demographic Variables Measured

Socio-demographic questions testing age, education level, house ownership, income level, number of individuals in the household, relationship status were modeled on the waste diversion survey administered by Ferrara and Missios (2005).

The first survey questions assessed the participant's knowledge of his/her curbside collection service (Table 2). These questions served to warm up the respondent and establish recycling as blue bin and trash as black bin, in addition to providing information about the respondent's knowledge of waste management procedures and assessing their responsibility level.

Introduction and Conclusion Text for Survey

Participants were then informed that they had reached the end of the study, were thanked for their participation, provided with contact information should they wish further

information, and a note that their participation "will help in the effort to take better care of the environment." (Appendix 7)

Ethics Approval and Participant Consent

The Ryerson Research Ethics Board initially approved the use of human subjects in this research on December 15, 2010 and renewed approval on December 18, 2011 after an updated methodology was submitted. Risks in administering the survey were considered negligible because there were no special populations surveyed. Risk management was employed in terms of protecting respondent data, which are stored on the investigator's password encrypted computer during use, then transferred onto a USB drive for secure keeping once the project was complete.

Participant consent was acquired through an online process. The REB-approved consent form (Appendix 7) was presented on the screen and the time and date were automatically provided so the participant just had to type in their name and check a box stating that they had read the form. The participant clicked through to the next page as acceptance of the research consent terms.

The official questionnaire then began with a brief introduction highlighting the general purpose of the study as investigating reasoning for participation in the city's blue bin program, that there were not right or wrong answers, and that respondents' honest opinions would generate valuable feedback. This was an attempt to mitigate social desirability bias. Participants were then instructed to read all questions carefully and answer them from a personal perspective.

Micro-Piloting for Clarity

A few colleagues who fit the research population criteria completed the online survey in advance of distribution to make note of any confusion or grammatical errors they experienced. A number of small edits to the survey to remedy areas of confusion that were noted by these individuals.

Data Collection

The survey was released to the Lightspeed Database on March 1, 2012 and the contracted 300 surveys were completed and the survey closed with 304 respondents on March 5, 2012.

Table 2. List of Questionnaire Items and Sources

Construct		Indicators
Behaviour		*Approximately what percentage or your total household…*
	BEH1	recyclable glass bottles and container
	BEH2	recyclable plastic bottles and other plastic container
	BEH3	recyclable metal can and container
	BEH4	recyclable paper, newspaper and magazine
	BEH5	recyclable cardboard
	BEH6	recyclable styrofoam/polystyrene
	BEH7	recyclable plastic bag
	BEH8	recyclable milk/juice carton (also known as boxboard)
	BEH9	recyclable rigid aluminium trays/pans
	BEH10	recyclable aerosol cans
	BEH11	waste that's not supposed to go into the blue bin (ie. trash)
		…do you place at the curbside for municipal recycling collection?
Behavioural Intention		*Over the next six months…*
	BI1	I intend to place all my household recyclable waste
	BI2	I plan to place
	BI3	I will try to place
	BI4	I will place
	BI5	I want to place
		…all my household recyclable waste at the curbside for municipal recycling collection.
Subjective Norm		*With regards to placing all my household recyclable waste at the curbside for municipal recycling collection, over the next 6 months:*
	SN1	most people who are important to me think that I should do so.
	SN2	most people whose opinions I value would approve of me doing so.
		With regards to others placing all their household recyclable waste at the curbside for municipal recycling collection, over the next 6 months:
	SN3	most people I respect and admire will do so.
	SN4	most people who are like me will do so.
Moral Norms		*Over the next six months…*
	MOR1	it would be wrong of me not to place all my household recyclable waste at the curbside for municipal recycling collection.
	MOR2	I would feel guilty if I did not place all my household recyclable waste at the curbside for municipal recycling collection.
	MOR3	not placing all my household recyclable waste at the curbside for municipal recycling collection goes against my principles.

	MOR4	…I do not need to place all my household recyclable waste at the curbside for municipal recycling collection as enough is being down by others to clean up the environment.
	MOR5	…everybody should share the responsibility of placing all household recyclable waste at the curbside for municipal recycling collection.
Perceived Behavioural Control		*Over the next six months…*
	PBC1	…I am confident that I am able to place…
	PBC2	…if I really wanted to, I could place…
	PBC3	…it is under my control to place…
		…all my household recyclable waste at the curbside for municipal recycling collection.
Perceived Difficulty	PD1	*Over the next six months, placing all my household recyclable waste at the curbside for municipal recycling collection is…* Easy/Difficult
	PD2	*Over the next six month, placing all my household recyclable waste at the curbside for municipal recycling collection is…* Complicated/Simple
	PD3	*If I want to, I can easily place all my household recyclable waste at the curbside for municipal recycling collection over the next six months…* Disagree/Agree
Direct Measure of Attitude		*My placing all my household recyclable waste at the curbside for municipal recycling collection over the next six months is…*
	DMA1	Enjoyable/Not enjoyable
	DMA2	Harmful/Helpful
	DMA3	Pleasant/Unpleasant
	DMA4	Wise/Foolish
	DMA5	Immoral/Moral
	DMA6	Good/Bad
	DMA7	Messy/Clean
	DMA8	Quick/Time-consuming
	DMA9	Smelly/Odourless
	DMA10	Complicated/Straightforward
	DMA11	Useful/Useless
	DMA12	Sensible/Sensless
	DMA13	Confusing/Clear
	DMA14	Efficient/Inefficient
	DMA15	Rewarding/Not rewarding
	DMA16	Responsible/Not responsible
	DMA17	Hygienic/Not hygienic
	DMA18	Difficult/Easy

Past Behaviour	PB1	*How often have I placed all my household recyclable waste at the curbside for municipal recycling collection over the last six months?*
		Rarely/Often
	PB2	*Over the last six month I have placed all my household recyclable waste at the curbside for municipal recycling collection.*
		False/True
Behavioural Belief Strength		*If, over the next six months, I place all my household recyclable waste at the curbside for municipal recycling collection, I will...*
	BB1	.save my city money
	BB2	...save electrical energy generally
	BB3	...help create a better environment for future generations
	BB4	...preserve natural resources
	BB5	...reduce the amount of waste that goes into landfill
	BB6	...help stimulate the economy
	BB7	...contribute to manufacturing goods made from recycled materials
	BB8	...help protect the environment.
	BB9	...help create jobs.
	BB10	...help solve a global problem.
	BB11	...help reduce my property taxes
	BB12	...experience satisfaction
	BB13	...feel good
	BB14	...feel hopeful
	BB15	...feel reduced guilt
	BB16	...feel like I'm doing my part
	BB17	...waste my money
	BB18	...waste city money
	BB19	...create unpleasant odours
	BB20	...create a mess
	BB21	...attract pests
	BB22	...increase waste collection costs
	BB23	...not make a difference
	BB24	...need extra space in my house
	BB25	...have to put in extra time
	BB26	...have to put in extra physical effort
	BB27	...have to put in extra mental effort
	BB28	...help to eliminate jobs
	BB29	...not be given money for waste materials
	BB30	...feel overwhelmed
	BB31	...feel tired

	BB32	…feel confused
	BB33	…feel stressed
Outcomes	OUT1	My saving my city money is…
	OUT2	My saving electrical energy generally is…
	OUT3	My helping create a better environment for future generations is…
	OUT4	My preserving natural resources is…
	OUT5	My reducing the amount of waste that goes into landfill is…
	OUT6	My helping stimulate the economy is…
	OUT7	My contributing to manufacturing goods made from recycled materials is…
	OUT8	My helping protect the environment is…
	OUT9	My wasting my money is…
	OUT10	My having to put in extra mental effort is…
	OUT11	My helping eliminate jobs is…
	OUT12	My not being given money for waste materials is…
	OUT13	My feeling overwhelmed is…
	OUT14	My feeling tired is…
	OUT15	My feeling confused is…
	OUT16	My feeling stressed is…
	OUT17	My wasting city money…
	OUT18	My creating unpleasant odours is…
	OUT19	My creating a mess is…
	OUT20	My attracting pests is…
	OUT21	My increasing waste collection costs…
	OUT22	My not making a difference is…
	OUT23	My needing extra space in my house…
	OUT24	My having to put in extra time is…
	OUT25	My having to put in extra physical energy is…
	OUT26	My helping create jobs is…
	OUT27	My helping solve a global problem is…
	OUT28	My helping reduce my property taxes is…
	OUT29	My experiencing satisfaction is…
	OUT30	My feeling good is…
	OUT31	My feeling helpful is…
	OUT32	My feeling reduced guilt is…
	OUT33	My feeling like I'm doing my part is…
	OUT34	Bad/Good

Note: (R) denotes items requiring reverse scoring.

3.3 – Data Analysis Methodology

A variety of methodology was employed to analysis the data collected, including the creation of certain constructs, model regressions, and an examination of belief-based results.

Formulation of the EVM Attitude Constructs and Advantage/Disadvantage Scores

Two belief-based attitude (BBA) constructs were created using the EVM formula. BBA3 employed the EVM calculation method and was based on only the respondent's salient beliefs using the behavioural belief strength and outcomes measures of the top three advantages and top three disadvantages the respondent selected as most important in question eight. This method adheres to the requirement that only salient beliefs be used in the TPB models (Fishbein et al., 2010). A second attitude construct, BBAALL, was calculated, summing the EVM calculation of the behavioural belief strength and outcomes measures of all the advantages and disadvantages tested. This was done to test if belief salience is important in modeling curbside recycling behaviour.

An advantage score (AS) was calculated by summing the EVM calculations for each advantage and, in the same fashion, a disadvantage score (DS) was calculated using the EVM calculation for all disadvantage beliefs.

Feel hopeful", "save my household energy" were two advantages, and "neighbours see what I put out" was one disadvantage, that could not be used in the belief-based attitude calculation because of human error in survey design: respondents were not asked to rate their behavioural belief strengths or evaluate outcomes for these beliefs. These beliefs, however, were still included in the examination of variance in belief selection between high recyclers and low recyclers.

Analysis of Model Constructs

Using SPSS version 17, direct measure constructs were tested for reliability and validity by ensuring constructs had a high degree of internal consistency and questions measuring different constructs exhibit discriminant validity "Each set of items designed to directly assess a given construct should have a high degree of internal consistency (e.g. a high alpha coefficient), and the measures of the different constructs should exhibit discriminant validity… confirmatory factory analysis is one means of evaluating the quality of the scales

to be included." (Fishbein et al., 2010, 452). A Cronbach's coefficient alpha of 0.75 or higher is considered sufficient (Fishbein et al., 2010).

Construct Descriptive Statistics

Descriptive statistics including the mean, range, standard deviation, median, and Cronbach's alpha were calculated for all constructs. Likert's (1932) method of summated ratings adjective scales require an internal consistency criterion to prove that all adjective pairings measure the same underlying continuum.

Model Regressions

The theoretical constructs of the RAA are latent variables not directly observable and therefore are inferred by performing multiple regression analysis from observable responses (Ajzen, 2006). Regression analysis was performed to test the ability of constructs at each level of the model to predict constructs at subsequent levels, using both the continuous variables of behaviour and behavioural intention as dependent variables. Model regressions were tested using the three different attitude constructions (DMA, BBA3, and BBAALL) to assess which is most effective at predicting behavioural intention and to ensure the belief-based attitude constructs correlated with the direct measure method of attitude measurement.

Examination of Differences in Salient Belief Selection Between Good Recyclers and Bad Recyclers

To investigate the difference in salient beliefs between individuals who demonstrate a high level of curbside recycling participation and those who demonstrate a low level of curbside recycling participation chi-square tests were performed comparing the top 10% (labeled Good Recyclers) against the bottom 10% of respondents (labeled Bad Recyclers) using the dependent variable behaviour construct.

Evaluation of the DMA for Instrumental and Experiential Components

Direct measures of instrumental attitudes (DMIA) and experiential attitudes (DMEA) were established based on the confirmatory factor analysis of DMA to test if one of other was more predictive of recycling behaviour.

Analysis of Introductory Questions and Demographic Data

Participants that indicated that they were not at all responsible for household waste management were removed from the data pool, because degree of involvement moderates the correlation between attitudes and behaviour (Ajzen et al., 1992).

Household income was not included in further analysis or the model regressions because 13.2% of respondents selected "not sure" as their answer; these forty respondents would have had to have been removed from the sample altogether – resulting in reduced statistical power – if household income were to be included.

The socio-demographic variable of the number of individuals in the household was also removed from analysis and model regressions due to human error in survey design (i.e. the question measuring this variable was not clearly worded in the survey).

Comparison of the Respondent Population to the General Toronto Population

Chi-square tests were performed between the Toronto census data and respondent population on the socio-demographics of gender, marital status, and home ownership. Income, age, and education level could not be statistically analyzed because the survey questions gave the answer options in the form of ranges.

Comparison of High Advantage/Disadvantage Scores to Advantage/Disadvantage Scores

Independent sample T-tests were conducted measuring the difference between participants with advantage scores (AS) above the median against participants with an AS below the median. The same was done for participant Disadvantage Scores (DS). This test was carried out to examine if participants with overall stronger belief-based attitudes towards curbside recycling participation display greater levels of behaviour than participants with less strong belief-based attitudes towards curbside recycling participation (and vice versa).

CHAPTER FOUR: DATA ANALYSIS AND RESULTS

In this chapter results from the analysis of various data are presented and discussed, based on the methodology outlined in chapter 3. Included is an analysis of the respondent population's demographic characteristics, an examination of descriptive statistics for all constructs, regression of the behavioural model and significance tests on the influence of behavioural beliefs and attitudes on participation in a curbside recycling scheme.

4.1 – Analysis of Data from Introductory and Demographic Questions

Analysis of Participant Responses to Introductory Questions

As laid out in Table 3, a majority of the sample (61.2%) correctly stated that household trash is collected bi-weekly in the city of Toronto; however, only 38.2% correctly stated that household recycling is collected bi-weekly. A majority (59.5%) of respondents thought recycling is collected weekly, which is not the case. While this finding could indicate a lack of procedural knowledge, it is also possible that the wording of the question was unclear or that certain respondents live above commercial storefronts, in which case their household recycling would be collected on a weekly basis.

Table 3. Data collected pertaining to curbside waste management knowledge

Variable	Values	Percentage of Respondents (n = 304)
Curbside recycling collection frequency	Twice a week	2.00
	Once a week	59.50
	Every two weeks	38.20
	Not sure	0.30
	Recycling is not collected	0.00
Curbside trash collection frequency	Twice a week	2.00
	Once a week	32.60
	Every two weeks	61.20
	Not sure	4.30
Responsible for dealing with trash and recycling in household	Yes, completely	36.50
	Yes, in part	59.90
	No	3.60
Curbside recycling mandatory or voluntary?	Mandatory	50.70
	Voluntary	25.70
	Not Sure	23.70

In terms of household waste management responsibility, 59.9% of respondents indicated they are partially responsible for dealing with household trash and recycling, while 36.5% indicated that they are totally responsible for coordinating household waste management. The results from the 11 respondents who indicated that s/he was not at all responsible for household waste management were removed from further data analysis, bringing the group size down to 293 from 304.

While 50.7% correctly identify household recycling in Toronto to be mandatory, 25.7% believe it to be voluntary and another 23.7% of respondents are not sure.

Analysis of Demographic Data

The test population's demographics were compared against Toronto 2006 Census data, although it must be noted that this Census data – unlike the experimental population -- includes adults living in multi-residential buildings.

The Toronto 2006 Census data shows a gender balance of 48% males and 52% females (Statistics Canada, 2007). The population sample is significantly skewed towards females, who comprise 60.6% of respondents χ^2 (1) = 8.69, p = .003.

Toronto 2006 Census data recorded that 46.8% of residents were married, 36.7% were single, and 16.5% were separated, divorced or widowed (Statistics Canada, 2007). The test population included a significantly higher than average rate of married persons (58.0%), compared to the census data χ^2 (2) = 14.84, p = .001.

The test population owned their homes at a significantly higher rate than the general Toronto population χ^2 (1) = 127.68, p = .000.

The city of Toronto median household income is $52,833 and median age is 38.4. The median income in the test population was higher than the Toronto average, with the median landing in the $80,000 - $100,000 range. The median test population age is located in the 48-57 age band, demonstrating a population skewed towards older individuals.

4.2 Analysis of Model Construct Data

Assessment of the Reliability and Validity of Model Constructs

Calculations of Cronbach's alpha and confirmatory factor analysis (CFA) was applied to assess the reliability and validity of the model's constructs (Table 2). The Cronbach's alpha

for all constructs was greater than the 0.75 threshold except the perceived difficulty

construct, which was not included in further analysis.

Table 4. Results from demographic questions

Variable	Values	Percentage of Respondents (n = 304)	Significance of Difference from Census Data
Gender	Male	39.54	.003
	Female	60.60	
Marital Status	Married	58.09	.001
	Divorced, Widowed or Separated	13.30	
	Unmarried	28.70	
Education	High school graduate or less	11.20	n/a
	Some university/college	18.10	
	College diploma	24.70	
	University degree	31.60	
	Post-graduate degree	14.50	
Age	18 – 27	15.10	n/a
	28 – 37	17.80	
	38 - 47	13.80	
	48 – 57	18.80	
	58 – 67	23.40	
	68+	11.20	
Household Ownership	Rent	12.60	.000
	Own	87.40	
Household Income	< $39, 000	14.80	n/a
	$40,000 – $59,000	15.10	
	$60,000 – $79, 000	18.10	
	$80, 000 – $100,000	12.80	
	> $100,000	26.00	
	Not Sure	13.20	

CFA conducted on DMA without restriction on loading number (Table 6) clearly confirms

two underlying factors; factor one (α = 0.87) is comprised of experiential adjective scales

such as enjoyable/not enjoyable, messy/clean, and complicated/straightforward, while

factor two (α = 0.86) is comprised of instrumental adjective scales (e.g. harmful/helpful,

wise/foolish) (Table 7). The DMIA mean (5.87) is slightly higher than the DMEA mean (5.14).

Table 5. Descriptive statistics for model constructs

	Behaviour	Behaviour Intention	Past Behaviour	Subjective norms	Perceived behavioral control	Moral Norm	DMA	Belief based attitude based on salient beliefs (BBA3)	Belief based attitude based on all beliefs (BBAALL)	Advantage Score	Disadvantage Score
N Valid	293	293	293	293	293	293	293	251	293	280	262
Missing	0	0	0	0	0	0	0	42	0	13	31
Mean	4.9	6.4	6.4	6.1	6.3	6.0	5.5	157	682	118	40
Median	5.1	7.0	7.0	6.3	7.0	6.4	5.5	158	679	126	40
Std. Deviation	1.1	.94	.99	1.1	1.1	1.1	1.0	32.	159	29	23
Range	4.5	5.2	6.0	6.0	6.0	5.4	5.2	253	1345	135	144
Minimum	1.6	1.8	1.0	1.0	1.0	1.6	1.8	41	223	12	3
Maximum	6.0	7.0	7.0	7.0	7.0	7.0	7.0	294	1568	147	147

Table 6. Factor analysis of the Direct Measure of Attitude (DMA)

Semantic Adjective Scale	Factor 1 (Experiential)	Factor 2 (Instrumental)
Enjoyable/ Not enjoyable	0.46	
Harmful/ Helpful		0.78
Pleasant/ Unpleasant		0.48
Wise/ Foolish		0.86
Immoral/ Moral		0.72
Good/ Bad		0.86
Messy/ Clean	0.70	
Quick/ Time-consuming	0.67	
Smelly/ Odourless	0.60	
Complicated/ Straightforward	0.77	
Useful/ Useless		0.65
Sensible/ Senseless		0.60
Confusing/ Clear	0.76	
Efficient/ Inefficient	0.60	
Rewarding/ Not Rewarding	0.46	
Responsible/ Not Responsible		0.47
Hygienic/ Not Hygienic	0.59	
Difficult/Easy	0.79	
TOTAL	0.87	0.86

Examination of EVM Calculation for Advantage and Disadvantage Beliefs

The EVM (equation 3) was utilized to create a score for each belief tested; the respondent's rating of belief strength (an integer value between one and seven), and outcome evaluation for each belief (an integer value between one and seven), were multiplied to form the respondent's EVM score for that particular belief.

Table 7. Descriptive statistics for EVM calculation scores of each advantage belief

	Reduce my property taxes	Save my city money	Save electrical energy generally	Create a better environment for future generations	Help to protect the environment	Help to preserve natural resources	Reduce the amount of waste that goes to landfill	Create jobs	Stimulate the economy	Contribute to manufacturing goods from recycled material	Experience satisfaction	Help to solve a global problem	Feel good	Feel reduced guilt	Feel that I'm doing my part
N Valid	293	293	293	293	293	293	293	293	293	293	293	293	293	293	293
Missing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mean	21	27	28	39	38	37	41	29	29	35	34	34	36	29	37
Std. Deviation	13	13	13	11	11	11	11	12	12	12	12	13	12	13	12
Minimum	1	1	1	4	4	2	4	3	4	4	1	1	3	1	4
Maximum	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49

Salient Belief Selection Results

As a measure of belief salience, participants selected the three advantages (and disadvantages respectively) from the full list that s/he deemed most (personally) significant if s/he were to place all household recyclable waste at the curbside for municipal recycling collection. Advantage beliefs (Table 9) and disadvantage beliefs (Table 10) were selected as most (personally) significant at a variety of rates, the highest incidence being 73% for "reduce the amount of waste that goes to landfill" and the lowest being "make me feel overwhelmed" at 1%.

Table 8. Descriptive statistics for EVM calculation scores of each disadvantage belief

	Need extra space in my house	Waste my money	Waste city money	Have to put in extra time	Have to put in extra physical effort	Requires extra mental effort	Create unpleasant odours	Create a mess	Attract pests	Increase waste collection costs	Does not give me money for waste materials	Feel overwhelmed	Feel tired	Feel confused	Feel stressed	Does not make a difference
N Valid	293	293	293	293	293	293	293	293	293	293	293	293	293	293	293	293
Missing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mean	13	7.4	8.8	15	15	13	10	8.7	10	12	17	9.6	9.4	9.1	8.7	9.4
Std. Deviation	9.5	8.3	7.5	9.5	9.2	9.4	7.8	8.0	8.7	8.4	11	9.5	8.7	8.9	8.6	8.7
Minimum	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Maximum	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49

Table 9. Percentage of respondents who selected each advantage belief as one of his/her top three most (personally) significant

Advantage Belief	Percentage of respondents (n = 293) Who Selected Belief as Top Three Most (Personally) Significant Advantage
Reduce the amount of waste that goes into landfill	.73
Help to protect the environment	.51
Create a better environment for future	.38
Feel like I'm doing my part	.27
Contribute to manufacturing goods made from recycled materials	.27
Help to preserve natural resources	.22
Help to solve a global problem	.18
Create jobs	.10
Save my city money	.09
Reduce my property taxes	.04
Experience satisfaction	.04
Stimulate the economy	.04
Feel good	.04

	.03
Feel reduced guilt	.03
Feel hopeful	.02
Save electrical energy generally	.02
Save my household energy	.02

Table 10. Percentage of respondents who selected each disadvantage belief as one of his/her top three most (personally) significant

Disadvantage Belief	Percentage of respondents (n = 293) Who Selected Belief as Top Three Most (Personally) Significant Disadvantage
Attract pests	.43
Increase waste collection costs	.38
Create unpleasant odours	.33
Have to put in extra time	.24
Does not make a difference	.24
Need extra space in my house	.22
Create a mess	.22
Have to put in extra physical effort	.18
Does not give me money for waste materials	.17
Neighbours see what I put out	.11
Have to put in extra mental effort	.11
Make me feel confused	.11
Waste city money	.10
Help eliminate jobs	.06
Make me feel tired	.05
Waste my money	.03
Make me feel stressed	.03
Make me feel overwhelmed	.01

Correlation Coefficients for Model Constructs

Person product correlation coefficients were computed for all model constructs. All correlations were significant at $p > 0.01$.

Table 11. Model construct correlation coefficients

		Behaviour Intention	Past Behaviour	Subjective norms	Perceived behavioral control	Moral Norm	Behaviour	DMA	DMIA	DMEA	BBA3	BBAALL
Behaviour Intention	Pearson Correlation	1	.52**	.56**	.54**	.57**	.25**	.44**	.45**	.34**	.44**	.45**
	Sig. (2-tailed)		.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
	N	293	293	293	293	293	293	293	293	293	251	293
Past Behaviour	Pearson Correlation	.52**	1	.36**	.40**	.45**	.27**	.43**	.40**	.38**	.35**	.42**
	Sig. (2-tailed)	.00		.00	.00	.00	.00	.00	.00	.00	.00	.00
	N	293	293	293	293	293	293	293	293	293	251	293
Subjective norms	Pearson Correlation	.56**	.36**	1	.41**	.56**	.22**	.41**	.42**	.32**	.49**	.50**
	Sig. (2-tailed)	.00	.00		.00	.00	.00	.00	.00	.00	.00	.00
	N	293	293	293	293	293	293	293	293	293	251	293
Perceived behavioral control	Pearson Correlation	.54**	.40**	.45**	1	.48**	.25**	.35**	.33**	.30**	.38**	.44**
	Sig. (2-tailed)	.00	.00	.00		.00	.00	.00	.00	.00	.00	.00
	N	293	293	293	293	293	293	293	293	293	251	293
Moral Norm	Pearson Correlation	.57**	.45**	.56**	.48**	1	.21**	.61**	.60**	.51**	.54**	.60**
	Sig. (2-tailed)	.00	.00	.00	.00		.00	.00	.00	.00	.00	.00
	N	293	293	293	293	293	293	293	293	293	251	293
Behaviour	Pearson Correlation	.25**	.27**	.22**	.25**	.22**	1	.16**	.13*	.14*	.17**	.21**
	Sig. (2-tailed)	.00	.00	.00	.00	.00		.008	.022	.015	.009	.00
	N	293	293	293	293	293	293	293	293	293	251	293
DM Attitude	Pearson Correlation	.44**	.43**	.41**	.35**	.61**	.16**	1	.86**	.92**	.60**	.67**
	Sig. (2-tailed)	.00	.00	.00	.00	.00	.008		.00	.00	.00	.00
	N	293	293	293	293	293	293	293	293	293	251	293
DM Instrumental Attitude	Pearson Correlation	.45**	.40**	.42**	.33**	.60**	.13*	.86**	1	.59**	.58**	.61**
	Sig. (2-tailed)	.00	.00	.00	.00	.00	.022	.00		.00	.00	.00
	N	293	293	293	293	293	293	293	293	293	251	293
DM Experiential Attitude	Pearson Correlation	.34**	.38**	.32**	.30**	.51**	.14*	.92**	.59**	1	.50**	.59**
	Sig. (2-tailed)	.00	.00	.00	.00	.00	.015	.00	.00		.00	.00
	N	293	293	293	293	293	293	293	293	293	251	293
Belief based attitude based on top 3	Pearson Correlation	.44**	.35**	.49**	.38**	.54**	.17**	.60**	.58**	.50**	1	.88**
	Sig. (2-tailed)	.00	.00	.00	.00	.00	.009	.00	.00	.00		.00
	N	251	251	251	251	251	251	251	251	251	251	251
Belief based attitude based on all	Pearson Correlation	.45**	.41**	.50**	.44**	.60**	.21**	.70**	.61**	.59**	.88**	1
	Sig. (2-tailed)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	
	N	293	293	293	293	293	293	293	293	293	251	293

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

4.3 - A Test of the Power of the Experimental Models to Explain the Behaviour Construct

In Experimental Models One and Two the following structural equation was tested in an attempt to explain variance in the behaviour construct (B):

$$
\begin{aligned}
\textit{Behaviour} = \alpha &+ \beta_1 * \textit{gender} + \beta_2 * \textit{home ownership} + \beta_3 * \textit{age28-37} + \beta_4 * \textit{age38-47} \\
&+ \beta_5 * \textit{age48-57} + \beta_6 * \textit{age58-67} + \beta_7 * \textit{age68plus} + \beta_8 * \textit{some post secondary education} \\
&+ \beta_9 * \textit{college education} + \beta_{10} * \textit{university education} + \beta_{11} * \textit{post graduate education} \quad (6) \\
&+ \beta_{12} * \textit{married} + \beta_{13} * \textit{unmarried} + \beta_{14} * \textit{past behaviour construct} \\
&+ \beta_{15} * \textit{subjective norm construct} + \beta_{16} * \textit{perceived behavioural control construct} \\
&+ \beta_{17} * \textit{moral norm construct} + \beta_{18} * \textit{attitude construct} \\
&+ \beta_{19} * \textit{behavioural intention construct}
\end{aligned}
$$

Regression coding for the demographic variables for all models was such that for gender, male respondents were coded as zero and female respondents were coded as one. For home ownership, respondents who own his/her home were coded as zero and non-homeowners were coded as one. For the remaining demographic variables of age, education and marital status, non-applicability of the category was coded as zero whereas category applicability of the category was coded as one. The reference group for the age variables was 18-27 year olds, for education it was no post-secondary education, and for marital status it was single.

Expectations for β Values in Experimental Models

As discussed in chapter two, the review of literature on recycling behaviour creates the expectation that certain variable β values will be observed.

In terms of demographic variables, there are substantiated findings around the influence of age, education and owning one's home. While there is no reliable finding on the influence of gender, home ownership is expected to have a positive β value as per findings by Oskamp et al. (1999). Vining et al. (1990), Scott (1999), and Knussen et al. (2004) all display an increase in recycling behaviour that correlates with age, so the age variable βs are expected to be both positive and increase in value with each increasing age bracket. Increased education levels also have shown a reliable positive effect on recycling behaviour (Van Liere et al., 1980; Davies et al., 2002), so it is assumed that the education

variable βs will be positive and increase with each subsequent education bracket. In terms of marital status, it is expected that the married β will be positive and the unmarried β will be negative, based on the finding by Davies et al. (2002) that married individuals recycle more than non-married individuals in tandem with the Gamba et al. (1994) studying showing that the number of individuals in a household correlated positively to recycling participation.

In terms of model constructs, there are also expectations for the β values derived from the literature. The β value for PBC is expected to be positive and be one of the largest construct βs because the findings around the importance of control and capability aspects for recycling behaviour is well established (Derksen and Gartrell, 1993; Guagnano et al., 1995). The expected β for Past Behaviour is also expected to be positive and relatively larg value based on findings indicating that past recycling behaviour is a strong predictor of future recycling behaviour (Cheung et al., 1999). The β for SN is expected to be slightly positive, as those who hold a higher level of subjective norm around recycling behaviour often show higher behaviour levels (Barr et al., 2001; Davies et al, 2002). The β for MN is also expected to be positive, as those who hold a higher subjective level of moral norm can be expected to display greater levels of recycling behaviour (Valle et al., 2005; Hopper and Neilsen, 1991). While three different attitude constructs (DMA, BBA3, BBAALL) will be tested in the experimental model, the general expectation for these constructs is such that their β values will be positive but small. This is based on findings that positive attitude towards recycling positively affects recycling behaviour but that this relationship is often confounded by other variables (Stern, 1999; Barr et al., 2001). Finally, it is also expected that the β value for the behavioural intention construct will be positive, based on Fishbein et al. (2010)'s RAA model and findings by Armitage and Conner (2001).

Regression of Experimental Model One (Test of DMA)

Experimental Model One applies equation six using the Direct Measure of Attitude (DMA) as the attitude construct. The first regression of Experimental Model One saw factors as the lowest level entered, including Past Behaviour, Age, Education Level, Gender and Marital Status. These five variables accounted for 14.5% of variance $R^2 = 0.15$, $F_{(14, 277)} = 3.35$, $p < .001$ with Past Behaviour as a significant predictor of Behaviour $b = 0.25$, t

(277) = 4.22, $p<.001$ and the age bracket 58-67 was also significant $b = 0.20$, t (277) = 2.01, $p<.05$ while university education approached significance $b = 0.17$, t (277) = 1.88, $p=.062$.

The second regression of Experimental Model One saw the remaining independent constructs of SN, PB, MN, and DMA added. The addition of these four variables increased explained variance to 17% but this increase only approached significance $R^2 = 0.17$, F (4, 273) = 2.03, $p= .091$. Past Behaviour was significant at this second step as well, at $b = 0.17$, t (273) = 2.47, $p<.05$.

The third regression of Experimental Model One added BI to predict the dependent variable Behaviour. This third step did not change variance explained $R^2 = 0.17$, F (1, 272) = 0.23, $p= .63$. Past Behaviour was still significant $b = 0.16$, t (272) = 2.22, $p<.05$.

Table 12. Experimental Model One regression summary

Model					Change Statistics				
	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	0.38[a]	0.15	0.10	1.0	0.15	3.4	14	277	0.00
2	0.41[b]	0.17	0.12	1.0	0.03	2.0	4	273	0.091
3	0.41[c]	0.17	0.11	1.0	0.001	0.23	1	272	0.63

a. Predictors: (Constant), Past Behaviour, age_38_47, edu_some_college_univ, Do you (or does your family) rent or own your current residence?, age_68plus, What is your gender?, edu_postgrad, q31_married, age_48_57, edu_college, age_28_37, age_58_67, edu_university, q31_unmarried
b. Predictors: (Constant), Past Behaviour, age_38_47, edu_some_college_univ, Do you (or does your family) rent or own your current residence?, age_68plus, What is your gender?, edu_postgrad, q31_married, age_48_57, edu_college, age_28_37, age_58_67, edu_university, q31_unmarried, Subjective norms, DM Attitude, Percieved behavioral control, Moral Norm
c. Predictors: (Constant), Past Behaviour, age_38_47, edu_some_college_univ, Do you (or does your family) rent or own your current residence?, age_68plus, What is your gender?, edu_postgrad, q31_married, age_48_57, edu_college, age_28_37, age_58_67, edu_university, q31_unmarried, Subjective norms, DM Attitude, Percieved behavioral control, Moral Norm, Behaviour Intention

Table 13. Experimental Model One ANOVA results

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	50.18	14	3.58	3.35	0.000[a]
	Residual	296.18	277	1.07		
	Total	346.36	291			
2	Regression	58.72	18	3.26	3.10	0.000[b]
	Residual	287.63	273	1.05		
	Total	346.36	291			
3	Regression	58.97	19	3.10	2.94	0.000[c]
	Residual	287.39	272	1.06		
	Total	346.36	291			

a. Predictors: (Constant), Past Behaviour, age_38_47, edu_some_college_univ, Do you (or does your family) rent or own your current residence?, age_68plus, What is your gender?, edu_postgrad, q31_married, age_48_57, edu_college, age_28_37, age_58_67, edu_university, q31_unmarried
b. Predictors: (Constant), Past Behaviour, age_38_47, edu_some_college_univ, Do you (or does your family) rent or own your current residence?, age_68plus, What is your gender?, edu_postgrad, q31_married, age_48_57, edu_college, age_28_37, age_58_67, edu_university, q31_unmarried, Subjective norms, DM Attitude, Percieved behavioral control, Moral Norm

d. Dependent Variable: Behaviour

Table 14. Experimental Model One regression coefficients

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	2.672	.540		4.951	.000
	What is your gender?	.148	.131	.066	1.134	.258
	Do you (or does your family) rent or own your current residence?	-.187	.189	-.057	-.994	.321
	age_28_37	.043	.237	.015	.181	.856
	age_38_47	.317	.264	.100	1.200	.231
	age_48_57	.084	.248	.030	.338	.736
	age_58_67	.498	.248	.195	2.011	.045
	age_68plus	.455	.292	.134	1.557	.121
	edu_some_college_univ	-.055	.235	-.019	-.233	.816
	edu_college	.010	.220	.004	.043	.966
	edu_university	.403	.215	.172	1.877	.062
	edu_postgrad	-.045	.247	-.014	-.181	.856
	q31_married	.058	.198	.026	.294	.769
	q31_unmarried	.063	.241	.026	.262	.794
	Past Behaviour	.271	.064	.245	4.220	.000
2	(Constant)	1.909	.613		3.116	.002
	What is your gender?	.167	.130	.075	1.282	.201
	Do you (or does your family) rent or own your current residence?	-.168	.187	-.051	-.897	.370
	age_28_37	.040	.236	.014	.170	.865
	age_38_47	.313	.263	.099	1.191	.235
	age_48_57	.131	.247	.048	.531	.596
	age_58_67	.482	.249	.189	1.941	.053
	age_68plus	.395	.293	.116	1.350	.178
	edu_some_college_univ	-.064	.236	-.023	-.271	.787
	edu_college	.001	.220	.000	.003	.997
	edu_university	.398	.214	.170	1.854	.065
	edu_postgrad	-.004	.251	-.001	-.014	.989
	q31_married	.038	.197	.017	.191	.849
	q31_unmarried	.040	.240	.017	.167	.868
	Past Behaviour	.184	.074	.166	2.471	.014
	Subjective norms	.097	.073	.094	1.326	.186
	Percieved behavioral control	.121	.070	.119	1.740	.083
	Moral Norm	-.006	.081	-.007	-.079	.937
	DM Attitude	.005	.078	.005	.062	.950
3	(Constant)	1.839	.631		2.916	.004
	What is your gender?	.164	.131	.073	1.251	.212
	Do you (or does your family) rent or own your current residence?	-.162	.188	-.049	-.859	.391
	age_28_37	.047	.236	.017	.200	.841
	age_38_47	.327	.265	.103	1.233	.219
	age_48_57	.131	.247	.048	.531	.596
	age_58_67	.491	.250	.192	1.967	.050
	age_68plus	.405	.294	.119	1.379	.169
	edu_some_college_univ	-.054	.237	-.019	-.227	.821
	edu_college	.009	.221	.003	.039	.969
	edu_university	.398	.215	.170	1.855	.065
	edu_postgrad	.002	.252	.001	.008	.993
	q31_married	.042	.198	.019	.214	.830

	.047	.241	.020	.195	.846
q31_unmarried	.047	.241	.020	.195	.846
Past Behaviour	.173	.078	.156	2.222	.027
Subjective norms	.087	.076	.085	1.146	.253
Perceived behavioral control	.111	.072	.109	1.539	.125
Moral Norm	-.014	.082	-.014	-.169	.866
DM Attitude	.004	.078	.004	.053	.957
Behaviour Intention	.046	.095	.039	.481	.631

a. Dependent Variable: Behaviour

The regression using Experimental Model One indicates that women display a greater level of recycling behaviour than men and that home ownership correlated with increased recycling behaviour, although neither finding was statistically significant. As a whole, the age bracket β values indicated increased levels of behaviour over the reference group: the age 58-67 bracket displayed the largest β (β = .491) and is the only age bracket that achieved statistical significance (p = .05). The some college/university education bracket showed a negative β, although this finding was not significant. The other three education brackets have positive βs as was expected, but only the university education bracket was considered significant (p = .065). The married and unmarried brackets are both positive but not significant. Past Behaviour shows a significant (p = .027), positive β of .173 as was to be expected. SN, PBC, DMA, and BI displayed a positive β as assumed, though none were significant. Interestingly, against expectations the MN construct has a negative β, although this too is not at a significant level.

Regression of Experimental Model Two (Test of BBA3)

Experimental Model Two applies equation six with the attitude construct BBA3, which is based on the EVM calculation of each respondent's top three salient advantage and disadvantage beliefs. The first regression of Experimental Model Two saw factors at the lowest level entered, including Past Behaviour, Age, Education Level, Gender and Marital Status. These five variables accounted for 14.8% of variance R^2 = 0.15, F (14, 235) = 2.91, p< .001 with only Past Behaviour as a significant predictor of Behaviour b = 0.25, t (235) = 3.92, p<.01 and the university education was also significant b = 0.22, t (235) = 2.19, p<.05.

On the second regression of Experimental Model Two, the remaining independent constructs of SN, PBC, MN, and BBA3 were added. The addition of these four variables increased explained variance to 16.9% but this increase was not significance R^2 = 0.17, F (4,

231) = 1.50, p = .20. Past Behaviour was significant at this second step as well, at b = 0.17, t (234) = 2.02, $p < .05$ as was university education b = 0.20, t (234) = 2.28, $p < .05$.

The third regression of Experimental Model Two added BI to predict the dependent variable Behaviour. This third step did not significantly increase variance explained R^2 = 0.17, F (1, 230) = 0.56, p = .46. At this third model only university education is significant b = 0.20, t (232) = 2.00, p =.046.

Table 15. Experimental Model Two regression summary

Model					Change Statistics				
	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	0.38[a]	0.15	0.097	1.01	.15	2.91	14	235	0.00
2	0.41[b]	0.17	0.11	1.01	.022	1.50	4	231	0.20
3	0.41[c]	0.17	0.10	1.01	.002	0.56	1	230	0.46

a. Predictors: (Constant), Past Behaviour, edu_some_college_univ, age_38_47, Do you (or does your family) rent or own your current residence?, age_68plus, edu_postgrad, What is your gender?, age_28_37, q31_married, edu_college, age_48_57, age_58_67, edu_university, q31_unmarried
b. Predictors: (Constant), Past Behaviour, edu_some_college_univ, age_38_47, Do you (or does your family) rent or own your current residence?, age_68plus, edu_postgrad, What is your gender?, age_28_37, q31_married, edu_college, age_48_57, age_58_67, edu_university, q31_unmarried, Belief based attitude based on top 3 (summation), Percieved behavioral control, Moral Norm, Subjective norms
c. Predictors: (Constant), Past Behaviour, edu_some_college_univ, age_38_47, Do you (or does your family) rent or own your current residence?, age_68plus, edu_postgrad, What is your gender?, age_28_37, q31_married, edu_college, age_48_57, age_58_67, edu_university, q31_unmarried, Belief based attitude based on top 3 (summation), Percieved behavioral control, Moral Norm, Subjective norms, Behaviour Intention

Table 16. Experimental Model Two ANOVA results

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	41.98	14	3.00	2.91	0.00[a]
	Residual	242.07	235	1.03		
	Total	284.04	249			
2	Regression	48.11	18	2.67	2.62	0.001[b]
	Residual	235.93	231	1.02		
	Total	284.04	249			
3	Regression	48.68	19	2.56	2.50	0.001[c]
	Residual	235.36	230	1.02		
	Total	284.04	249			

a. Predictors: (Constant), Past Behaviour, edu_some_college_univ, age_38_47, Do you (or does your family) rent or own your current residence?, age_68plus, edu_postgrad, What is your gender?, age_28_37, q31_married, edu_college, age_48_57, age_58_67, edu_university, q31_unmarried
b. Predictors: (Constant), Past Behaviour, edu_some_college_univ, age_38_47, Do you (or does your family) rent or own your current residence?, age_68plus, edu_postgrad, What is your gender?, age_28_37, q31_married, edu_college, age_48_57, age_58_67, edu_university, q31_unmarried, Belief based attitude based on top 3 (summation), Percieved behavioral control, Moral Norm, Subjective norms
c. Predictors: (Constant), Past Behaviour, edu_some_college_univ, age_38_47, Do you (or does your family) rent or own your current residence?, age_68plus, edu_postgrad, What is your gender?, age_28_37, q31_married, edu_college, age_48_57, age_58_67, edu_university, q31_unmarried, Belief based attitude based on top 3 (summation), Percieved behavioral control, Moral Norm, Subjective norms, Behaviour Intention
d. Dependent Variable: Behaviour

Table 17. Experimental Model Two regression coefficients

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	2.631	.571		4.606	.000
	What is your gender?	.122	.141	.056	.859	.391
	Do you (or does your family) rent or own your current residence?	-.172	.192	-.056	-.893	.373
	age_28_37	-.041	.255	-.014	-.162	.871
	age_38_47	.256	.272	.086	.944	.346
	age_48_57	.022	.258	.009	.086	.932
	age_58_67	.463	.262	.186	1.769	.078
	age_68plus	.454	.314	.130	1.445	.150
	edu_some_college_univ	.127	.250	.046	.507	.612
	edu_college	.099	.232	.041	.426	.670
	edu_university	.500	.228	.217	2.191	.029
	edu_postgrad	.186	.264	.059	.704	.482
	q31_married	.025	.208	.012	.119	.905
	q31_unmarried	.032	.255	.014	.124	.901
	Past Behaviour	.274	.070	.248	3.919	.000
2	(Constant)	2.148	.681		3.154	.002
	What is your gender?	.135	.144	.062	.936	.350
	Do you (or does your family) rent or own your current residence?	-.143	.193	-.047	-.744	.458
	age_28_37	-.068	.256	-.022	-.266	.790
	age_38_47	.240	.271	.081	.885	.377
	age_48_57	.048	.258	.019	.188	.851
	age_58_67	.425	.263	.171	1.618	.107
	age_68plus	.378	.315	.108	1.199	.232
	edu_some_college_univ	.097	.253	.035	.382	.703
	edu_college	.068	.233	.028	.290	.772
	edu_university	.462	.229	.201	2.017	.045
	edu_postgrad	.154	.272	.049	.568	.570
	q31_married	-.012	.213	-.005	-.055	.956
	q31_unmarried	.007	.257	.003	.026	.980
	Past Behaviour	.183	.080	.165	2.282	.023
	Subjective norms	.049	.084	.048	.580	.563
	Percieved behavioral control	.133	.072	.135	1.828	.069
	Moral Norm	.043	.081	.044	.538	.591
	Belief based attitude based on top 3 (summation)	-.002	.002	-.050	-.671	.503
3	(Constant)	2.068	.690		2.996	.003
	What is your gender?	.120	.145	.055	.828	.408
	Do you (or does your family) rent or own your current residence?	-.132	.193	-.043	-.685	.494
	age_28_37	-.062	.257	-.020	-.241	.810
	age_38_47	.260	.273	.088	.953	.342
	age_48_57	.043	.258	.016	.166	.868
	age_58_67	.431	.263	.174	1.640	.102
	age_68plus	.397	.317	.114	1.253	.212

edu_some_college_univ	.115	.254	.042	.450	.653
edu_college	.077	.233	.031	.328	.743
edu_university	.460	.229	.200	2.003	.046
edu_postgrad	.156	.272	.050	.575	.566
q31_married	-.007	.214	-.003	-.031	.975
q31_unmarried	.010	.258	.004	.040	.968
Past Behaviour	.159	.087	.144	1.835	.068
Subjective norms	.038	.086	.037	.438	.662
Perceived behavioral control	.119	.075	.121	1.598	.111
Moral Norm	.028	.084	.028	.329	.742
BBA3	-.002	.002	-.058	-.776	.439
Behaviour Intention	.080	.108	.069	.746	.456

a. Dependent Variable: Behaviour

Similar to Experimental Model One, Experimental Model Two indicated a positive β for gender and negative β for home ownership, although neither were at a significant level. Unlike Experimental Model One, the 28-37 age bracket has a negative β, although this finding was not significant. The 58-67 age bracket displays the highest β of the age brackets, and finding approached significance (p = .102). All the education bracket βs in Experimental Model Two were positive, which was different than Experimental Model One; the university education bracket had the biggest β value and was found to be significant (p = .046). Unexpectedly, the married bracket has a small negative β, but the significance of this was very weak (p = .975). Past Behaviour had a β value of .159, which was significant (p = .068). PBC, with a β value of .129, approached significance (p = .111). Similar to Experimental Model One, the SN, MN, and BI constructs all had positive β values, but none of these were at a significant level. Unexpectedly, the BBA3 construct displayed a negative β value, although this finding was also not at a significant level.

4.4 – A Test of the Power of the Experimental Models to Explain the Behavioural Intention Construct

In Experimental Models Three, Four, and Five the following structural equation was tested in an attempt to explain variance in the behavioural intention construct (BI):

Behavioural Intention = α + β_1*gender + β_2*home ownership + β_3*age28-37
+ β_4*age38-47 + β_5*age48-57 + β_6*age58-67 + β_7*age68plus
+ β_8*some post secondary education + β_9*college education
+ β_{10}*university education + β_{11}*post graduate education + β_{12}*married (7)
+ β_{13}*unmarried + β_{14}*past behaviour construct + β_{15}*subjective norm construct
+ β_{16}*perceived behavioural control construct + β_{17}*moral norm construct
+ β_{18}*attitude construct

Experimental Model Three applies equation seven using the BBAALL attitude construct, which is based on the EVM calculation for all a respondent's advantage and disadvantage beliefs, while Experimental Model Four applies equation seven using the BBA3 attitude construct based on EVM calculation of a respondent's top three salient advantage and disadvantage beliefs. Experimental Model Five employs the Direct Measure of Attitude (DMA) as the attitude construct in regressing equation seven.

Regression of Experimental Model Three (Test of BBAALL)

The first regression in Experimental Model Three saw factors at the lowest level entered, including Past Behaviour, Age, Education Level, Gender and Marital Status. Variance in BI explained on this first step was 31% R^2 = 0.310, F (14, 277) = 8.879, p<.001. Past Behaviour was the only significant variable on this step b = 0.523, t (277) = 10.026, p<.001.

The second regression of Experimental Model Three entered the remaining variables including BBAALL. Variance in BI explained by this second step was 53.7% R^2 = 0.537, F (4, 273) = 33.499, p<.001. Significant at the p<.001 level on this second step were Past Behaviour b = 0.258, t (273) = 5.190, p<.001, Subjective Norm b = 0.252, t (273) = 4.658, p<.001, Perceived Behavioural Control b = 0.245, t (273) = 4.760, p<.001 and Moral Norm b = 0.217, t (273) = 3.660, p<.001. The age bracket of 38-47 was negative and approached significance b = -0.110, t (273) = -1.767, p=.078.

BBAALL was not significant but was negative b = -0.031, t (273) = -0.559, p=.577.

Table 18. Experimental Model Three regression summary

Model					Change Statistics				
	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	0.56[a]	0.31	0.28	0.79	0.31	8.88	14	277	0.00
2	0.73[b]	0.54	0.51	0.65	0.23	33.50	4	273	0.00

a. Predictors: (Constant), Past Behaviour, age_38_47, edu_some_college_univ, Do you (or does your family) rent or own your current residence?, age_68plus, What is your gender?, edu_postgrad, q31_married, age_48_57, edu_college, age_28_37, age_58_67, edu_university, q31_unmarried
b. Predictors: (Constant), Past Behaviour, age_38_47, edu_some_college_univ, Do you (or does your family) rent or own your current residence?, age_68plus, What is your gender?, edu_postgrad, q31_married, age_48_57, edu_college, age_28_37, age_58_67, edu_university, q31_unmarried, Subjective norms, Percieved behavioral control, belief_based_attitude_new, Moral Norm

Table 19. Experimental Model Three ANOVA summary

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	78.11	14	5.58	8.88	0.00[a]
	Residual	174.07	277	0.63		
	Total	252.18	291			
2	Regression	135.42	18	7.52	17.59	0.00[b]
	Residual	116.76	273	0.43		
	Total	252.18	291			

a. Predictors: (Constant), Past Behaviour, age_38_47, edu_some_college_univ, Do you (or does your family) rent or own your current residence?, age_68plus, What is your gender?, edu_postgrad, q31_married, age_48_57, edu_college, age_28_37, age_58_67, edu_university, q31_unmarried
b. Predictors: (Constant), Past Behaviour, age_38_47, edu_some_college_univ, Do you (or does your family) rent or own your current residence?, age_68plus, What is your gender?, edu_postgrad, q31_married, age_48_57, edu_college, age_28_37, age_58_67, edu_university, q31_unmarried, Subjective norms, Percieved behavioral control, BBALL, Moral Norm
c. Dependent Variable: Behaviour Intention

Regression of Experimental Model Three indicated a positive β value for gender and a negative β value for home ownership, although neither are significant. All the age bracket β values were negative, with the 38-47 age bracket significantly so ($p = .078$), which showed that the reference group of 18-27 year olds displayed the highest level of recycling intention. All the education brackets had negative β values, which indicated that the reference group of no post-secondary education exhibited the highest levels of BI. Both marital status β values were negative, a result that showed that singletons intend to recycle more than those who are coupled, or used to be coupled, though this finding was not at a significant level. The PB, SN, PBC, and MN constructs were all positive and strongly significant ($p = .000$), which showed that these constructs correlated closely with the variance in BI. The BBAALL β value was neutral, although not significant, which means that this attitude construct did not contribute to explaining variance in BI.

Table 20. Experimental Model Three regression coefficients

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	3.565	.414		8.615	.000
	What is your gender?	.012	.100	.006	.117	.907
	Do you (or does your family) rent or own your current residence?	-.204	.145	-.073	-1.412	.159
	age_28_37	-.125	.182	-.051	-.687	.493
	age_38_47	-.267	.203	-.099	-1.318	.188
	age_48_57	-.088	.190	-.038	-.464	.643
	age_58_67	-.077	.190	-.035	-.406	.685
	age_68plus	-.041	.224	-.014	-.182	.856
	edu_some_college_univ	-.278	.180	-.115	-1.542	.124
	edu_college	-.200	.169	-.093	-1.185	.237
	edu_university	-.026	.165	-.013	-.157	.875
	edu_postgrad	-.295	.190	-.110	-1.554	.121
	q31_married	-.063	.152	-.033	-.414	.679
	q31_unmarried	-.080	.185	-.039	-.430	.667
	Past Behaviour	.494	.049	.523	10.026	.000
2	(Constant)	1.479	.410		3.610	.000
	What is your gender?	.079	.083	.042	.951	.342
	Do you (or does your family) rent or own your current residence?	-.140	.120	-.050	-1.168	.244
	age_28_37	-.168	.150	-.069	-1.119	.264
	age_38_47	-.296	.168	-.110	-1.767	.078
	age_48_57	-.005	.157	-.002	-.030	.976
	age_58_67	-.197	.159	-.090	-1.239	.216
	age_68plus	-.227	.186	-.078	-1.215	.225
	edu_some_college_univ	-.226	.150	-.094	-1.504	.134
	edu_college	-.171	.140	-.080	-1.222	.223
	edu_university	-.024	.136	-.012	-.174	.862
	edu_postgrad	-.134	.159	-.050	-.840	.402
	q31_married	-.109	.125	-.058	-.870	.385
	q31_unmarried	-.159	.153	-.078	-1.041	.299
	Past Behaviour	.243	.047	.258	5.190	.000
	Subjective norms	.220	.047	.252	4.658	.000
	Perceived behavioral control	.213	.045	.245	4.760	.000
	Moral Norm	.182	.050	.217	3.660	.000
	BBAALL	.000	.000	-.031	-.559	.577

a. Dependent Variable: Behaviour Intention

Regression of Experimental Model Four (Test of BBA3)

The first regression of Experimental Model Four saw factors at the lowest level entered,

including Past Behaviour, Age, Education Level, Gender and Marital Status. Variance in BI

explained by this first model was 36.7% R^2 = 0.367, F (14, 235) = 9.73, p<.01. Past

Behaviour was the only significant variable on this step b = 0.57, t (235) = 10.44, p<.01.

The second regression of Experimental Model Four entered the remaining variables

including BBA3. Variance in BI explained by this second step was 57.8% R^2 = 0.58, F (4,

231) = 28.84, p<.001. Significant at the p<.001 level on this second step were Past

Behaviour b = 0.317, t (231) = 6.14, p<.001, Subjective Norm b = 0.162, t (231) = 2.74,

p<.01, Perceived Behavioural Control b = 0.19, t (231) = 3.69, p<.01, Moral Norm b = 0.24, t

(231) = 4.01, p<.001 and BBA3 b = 0.12, t (231) = 2.33, p>.05.

Table 21. Experimental Model Four regression summary

Model					Change Statistics				
	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	0.61[a]	0.37	0.33	0.75	0.37	9.73	14	235	0.00
2	0.76[b]	0.58	0.55	0.62	0.21	28.84	4	231	0.00

a. Predictors: (Constant), Past Behaviour, edu_some_college_univ, age_38_47, Do you (or does your family) rent or own your current residence?, age_68plus, edu_postgrad, What is your gender?, age_28_37, q31_married, edu_college, age_48_57, age_58_67, edu_university, q31_unmarried
b. Predictors: (Constant), Past Behaviour, edu_some_college_univ, age_38_47, Do you (or does your family) rent or own your current residence?, age_68plus, edu_postgrad, What is your gender?, age_28_37, q31_married, edu_college, age_48_57, age_58_67, edu_university, q31_unmarried, Belief based attitude based on top 3 (summation), Percieved behavioral control, Moral Norm, Subjective norms

Table 22. Experimental Model Four ANOVA results

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	76.39	14	5.46	9.73	0.00[a]
	Residual	131.75	235	0.56		
	Total	208.14	249			
2	Regression	120.28	18	6.68	17.57	0.00[b]
	Residual	87.87	231	0.38		
	Total	208.14	249			

a. Predictors: (Constant), Past Behaviour, edu_some_college_univ, age_38_47, Do you (or does your family) rent or own your current residence?, age_68plus, edu_postgrad, What is your gender?, age_28_37, q31_married, edu_college, age_48_57, age_58_67, edu_university, q31_unmarried
b. Predictors: (Constant), Past Behaviour, edu_some_college_univ, age_38_47, Do you (or does your family) rent or own your current residence?, age_68plus, edu_postgrad, What is your gender?, age_28_37, q31_married, edu_college, age_48_57, age_58_67, edu_university, q31_unmarried, BBA3, Percieved behavioral control, Moral Norm, Subjective norms
c. Dependent Variable: Behaviour Intention

Table 23. Experimental Model Four regression results

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	3.171	.421		7.526	.000
	What is your gender?	.058	.104	.031	.557	.578
	Do you (or does your family) rent or own your current residence?	-.231	.142	-.088	-1.631	.104
	age_28_37	-.039	.188	-.015	-.205	.838
	age_38_47	-.243	.200	-.095	-1.211	.227
	age_48_57	.024	.190	.011	.125	.900
	age_58_67	.029	.193	.014	.150	.881
	age_68plus	-.029	.232	-.010	-.126	.900
	edu_some_college_univ	-.313	.184	-.133	-1.701	.090
	edu_college	-.140	.171	-.067	-.818	.414
	edu_university	.037	.168	.019	.219	.827
	edu_postgrad	-.183	.195	-.068	-.940	.348
	q31_married	-.104	.154	-.057	-.679	.498
	q31_unmarried	-.079	.188	-.039	-.419	.676
	Past Behaviour	.538	.052	.568	10.442	.000
2	(Constant)	.998	.416		2.402	.017
	What is your gender?	.178	.088	.095	2.026	.044
	Do you (or does your family) rent or own your current residence?	-.135	.118	-.051	-1.147	.253
	age_28_37	-.080	.157	-.031	-.514	.608
	age_38_47	-.249	.165	-.098	-1.505	.134
	age_48_57	.067	.157	.030	.428	.669
	age_58_67	-.082	.160	-.039	-.512	.609
	age_68plus	-.229	.192	-.077	-1.188	.236
	edu_some_college_univ	-.222	.154	-.094	-1.435	.153
	edu_college	-.111	.142	-.053	-.781	.435
	edu_university	.031	.140	.016	.224	.823
	edu_postgrad	-.024	.166	-.009	-.144	.886
	q31_married	-.063	.130	-.034	-.480	.632
	q31_unmarried	-.048	.157	-.024	-.303	.762
	Past Behaviour	.300	.049	.317	6.137	.000
	Subjective norms	.141	.051	.162	2.738	.007
	Percieved behavioral control	.163	.044	.194	3.694	.000
	Moral Norm	.198	.049	.235	4.009	.000
	BBA3	.003	.001	.123	2.327	.021

a. Dependent Variable: Behaviour Intention

Regression of Experimental Model Four indicated that females displayed a higher level of recycling behaviour with a positive β value for gender, which was observed at a significant level ($p = .044$). The β value for home -ownership indicated that those who own

their home recycle more than those who do not own their home, though this finding was not at a significant level. Most of the age bracket β values were negative, although the 48-57 age bracket β had a small positive value, though not at a significant level. The education brackets' β values were all negative, save for the university education bracket which had a small positive β though not at a significant level. The β values for the PB, PBC, and MN constructs were all positive and strongly significant (p = .000). The β value for the SN construct was also positive and found at a significant level (p = .007). The BBA3 attitude construct β was significant (p = .021) at a very slightly positive value.

Regression of Experimental Model Five (Test of DMA)

The first regression of Experimental Model Five saw factors at the lowest level entered, including Past Behaviour, Age, Education Level, Gender and Marital Status. Variance in BI explained on this first step was 31% R^2 = 0.31, F (14, 277) = 8.88, p<.001. Past Behaviour was the only significant variable on this step b = 0.52, t (277) = 10.03, p<.001.

The second regression of Experimental Model Five entered the remaining variables. Variance in BI explained by this second model was 54% R^2 = 0.54, F (4, 273) = 33.54, p<.001. Significant at the p<.001 level on this second step were Past Behaviour b = 0.26, t (272) = 5.20, p<.001, Subjective Norm b = 0.23, t (272) = 4.17, p<.001, Perceived Behavioural Control b = 0.26, t (272) = 5.20, p<.001, and Moral Norm b = 0.20, t (272) = 3.601, p<.001.

Table 24. Experimental Model Five regression summary

Model					Change Statistics				
	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	0.56[a]	0.31	.28	.79	0.31	8.88	14	277	0.00
2	0.73[b]	0.54	.51	.66	0.23	33.42	4	273	0.00

a. Predictors: (Constant), Past Behaviour, age_38_47, edu_some_college_univ, Do you (or does your family) rent or own your current residence?, age_68plus, What is your gender?, edu_postgrad, q31_married, age_48_57, edu_college, age_28_37, age_58_67, edu_university, q31_unmarried
b. Predictors: (Constant), Past Behaviour, age_38_47, edu_some_college_univ, Do you (or does your family) rent or own your current residence?, age_68plus, What is your gender?, edu_postgrad, q31_married, age_48_57, edu_college, age_28_37, age_58_67, edu_university, q31_unmarried, Subjective norms, DM Attitude, Percieved behavioral control, Moral Norm

Table 25. Experimental Model Five ANOVA results

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	78.11	14	5.58	8.88	0.00[a]
	Residual	174.07	277	0.63		
	Total	252.18	291			
2	Regression	135.33	18	7.52	17.56	0.00[b]
	Residual	116.86	273	0.43		
	Total	252.18	291			

a. Predictors: (Constant), Past Behaviour, age_38_47, edu_some_college_univ, Do you (or does your family) rent or own your current residence?, age_68plus, What is your gender?, edu_postgrad, q31_married, age_48_57, edu_college, age_28_37, age_58_67, edu_university, q31_unmarried
b. Predictors: (Constant), Past Behaviour, age_38_47, edu_some_college_univ, Do you (or does your family) rent or own your current residence?, age_68plus, What is your gender?, edu_postgrad, q31_married, age_48_57, edu_college, age_28_37, age_58_67, edu_university, q31_unmarried, Subjective norms, DM Attitude, Percieved behavioral control, Moral Norm
c. Dependent Variable: Behaviour Intention

Table 26. Experimental Model Five regression coefficients

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	3.565	.414		8.615	.000
	What is your gender?	.012	.100	.006	.117	.907
	Do you (or does your family) rent or own your current residence?	-.204	.145	-.073	-1.412	.159
	age_28_37	-.125	.182	-.051	-.687	.493
	age_38_47	-.267	.203	-.099	-1.318	.188
	age_48_57	-.088	.190	-.038	-.464	.643
	age_58_67	-.077	.190	-.035	-.406	.685
	age_68plus	-.041	.224	-.014	-.182	.856
	edu_some_college_univ	-.278	.180	-.115	-1.542	.124
	edu_college	-.200	.169	-.093	-1.185	.237
	edu_university	-.026	.165	-.013	-.157	.875
	edu_postgrad	-.295	.190	-.110	-1.554	.121
	q31_married	-.063	.152	-.033	-.414	.679
	q31_unmarried	-.080	.185	-.039	-.430	.667
	Past Behaviour	.494	.049	.523	10.026	.000
2	(Constant)	1.538	.391		3.938	.000
	What is your gender?	.077	.083	.040	.925	.356
	Do you (or does your family) rent or own your current residence?	-.142	.119	-.051	-1.186	.237
	age_28_37	-.161	.150	-.066	-1.074	.284
	age_38_47	-.287	.168	-.106	-1.713	.088
	age_48_57	-.006	.157	-.002	-.036	.971
	age_58_67	-.183	.158	-.084	-1.155	.249
	age_68plus	-.221	.187	-.076	-1.186	.237
	edu_some_college_univ	-.221	.150	-.092	-1.471	.143
	edu_college	-.171	.140	-.080	-1.220	.223
	edu_university	-.015	.137	-.008	-.110	.913

edu_postgrad	-.124	.160	-.046	-.773	.440
q31_married	-.102	.126	-.054	-.813	.417
q31_unmarried	-.150	.153	-.073	-.981	.327
Past Behaviour	.237	.047	.251	4.998	.000
Subjective norms	.214	.046	.245	4.611	.000
Perceived behavioral control	.209	.044	.240	4.716	.000
Moral Norm	.165	.051	.197	3.206	.002
DM Attitude	.015	.049	.016	.297	.767

a. Dependent Variable: Behaviour Intention

Regression of Experimental Model Five indicated that females displayed a higher level of recycling behaviour with a positive β value for gender, though not at a significant level. The β value for home -ownership indicated that those who own their home recycle more than those who do not own their home, though again this finding was not at a significant level. All of the age bracket β values were negative, with the 38-47 age bracket being significantly so (p = .088). The education brackets' β values were all negative, though none were significant. The β values for the PB, SN, PBC, and MN constructs were all positive and strongly significant (p = .000). The DMA attitude construct β was positive but not significant.

4.5 – A Test of the Power of the Experimental Model to Explain the Behaviour Construct Having Removed the Past Behaviour Construct

Fishbein et al. (2010) indicate that a measure of past behaviour (PB) is an important construct to include when modeling behaviour where there has been a time lapse between the measurements of behavioral intention (BI) and behaviour (B) itself. In this study all the constructs were measured at the same time point, so PB and B both measure past curbside recycling behaviour. The consequence of this overlap in measurement is that in Experimental Models One through Five the PB construct consistently and significantly explains variance in the dependent variable, possibly crowding out the opportunity for other constructs to reach significance. As such, in Experimental Model Six, the PB construct was removed from the behavioural model to test the ability of model's other constructs to explain variance in behaviour (B). The structural equation for Experimental Model Six is shown in equation eight.

$$Behaviour = \alpha + \beta_1*gender + \beta_2*home\ ownership + \beta_3*age28\text{-}37$$
$$+ \beta_4*age38\text{-}47 + \beta_5*age48\text{-}57 + \beta_6*age58\text{-}67 + \beta_7*age68plus$$
$$+ \beta_8*some\ post\ secondary\ education + \beta_9*college\ education \qquad (8)$$
$$+ \beta_{10}*university\ education + \beta_{11}*post\ graduate\ education + \beta_{12}*married$$
$$+ \beta_{13}*unmarried + \beta_{14}*subjective\ norm\ construct$$
$$+ \beta_{15}*perceived\ behavioural\ control\ construct + \beta_{16}*moral\ norm\ construct$$
$$+ \beta_{17}*attitude\ construct$$

Experimental Model Six applies equation eight using the BBA3 attitude construct, which is based on EVM calculation of a respondent's top three salient advantage and disadvantage beliefs.

Table 27. Experimental Model Six regression summary

Model					Change Statistics				
	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	0.30[a]	0.09	0.04	1.05	.092	1.841	13	236	.038
2	0.39[b]	0.15	0.09	1.02	.059	3.998	4	232	.004
3	0.40[c]	0.16	0.09	1.02	.009	2.364	1	231	.126

a. Predictors: (Constant), Past Behaviour, age_38_47, edu_some_college_univ, Do you (or does your family) rent or own your current residence?, age_68plus, What is your gender?, edu_postgrad, q31_married, age_48_57, edu_college, age_28_37, age_58_67, edu_university, q31_unmarried
b. Predictors: (Constant), Past Behaviour, age_38_47, edu_some_college_univ, Do you (or does your family) rent or own your current residence?, age_68plus, What is your gender?, edu_postgrad, q31_married, age_48_57, edu_college, age_28_37, age_58_67, edu_university, q31_unmarried, Subjective norms, BBA3, Percieved behavioral control, Moral Norm

Table 28. Experimental Model Six ANOVA results

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	26.16	13	2.01	1.84	.038[a]
	Residual	257.89	236	1.09		
	Total	284.04	249			
2	Regression	42.79	17	2.52	2.42	.002[b]
	Residual	241.25	232	1.04		
	Total	284.04	249			
3	Regression	45.23	18	2.51	2.43	.001[c]
	Residual	238.81	231	1.03		
	Total	284.04	249			

a. Predictors: (Constant), q31_unmarried, edu_postgrad, What is your gender?, age_38_47, Do you (or does your family) rent or own your current residence?, age_28_37, edu_college, age_68plus, edu_some_college_univ, age_48_57, q31_married, edu_university, age_58_67
b. Predictors: (Constant), q31_unmarried, edu_postgrad, What is your gender?, age_38_47, Do you (or does your family) rent or own your current residence?, age_28_37, edu_college, age_68plus, edu_some_college_univ, age_48_57, q31_married, edu_university, age_58_67, Subjective norms, Percieved behavioral control, Belief based attitude based on top 3 (summation), Moral Norm
c. Predictors: (Constant), q31_unmarried, edu_postgrad, What is your gender?, age_38_47, Do you (or does your family) rent or own your current residence?, age_28_37, edu_college, age_68plus, edu_some_college_univ, age_48_57, q31_married, edu_university, age_58_67, Subjective norms, Percieved behavioral control, BBA3, Moral Norm, Behaviour Intention
d. Dependent Variable: Behaviour

Table 29. Experimental Model Six regression coefficients

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	4.359	.374		11.654	.000
	What is your gender?	.037	.144	.017	.259	.796
	Do you (or does your family) rent or own your current residence?	-.203	.198	-.066	-1.026	.306
	age_28_37	-.072	.262	-.024	-.273	.785
	age_38_47	.307	.279	.104	1.101	.272
	age_48_57	.096	.265	.037	.364	.716
	age_58_67	.563	.268	.227	2.098	.037
	age_68plus	.592	.322	.169	1.838	.067
	edu_some_college_univ	.156	.257	.057	.606	.545
	edu_college	.139	.239	.057	.581	.561
	edu_university	.502	.235	.218	2.136	.034
	edu_postgrad	.183	.272	.058	.672	.502
	q31_married	.053	.214	.024	.246	.806
	q31_unmarried	-.008	.262	-.003	-.029	.977
2	(Constant)	2.745	.635		4.324	.000
	What is your gender?	.106	.145	.048	.730	.466
	Do you (or does your family) rent or own your current residence?	-.142	.195	-.046	-.732	.465
	age_28_37	-.101	.258	-.033	-.390	.697
	age_38_47	.257	.273	.087	.940	.348
	age_48_57	.093	.260	.036	.357	.722
	age_58_67	.449	.265	.181	1.696	.091
	age_68plus	.408	.318	.117	1.285	.200
	edu_some_college_univ	.111	.255	.040	.434	.665
	edu_college	.083	.235	.034	.352	.725
	edu_university	.451	.231	.196	1.950	.052
	edu_postgrad	.156	.274	.049	.567	.571
	q31_married	-.009	.215	-.004	-.040	.968
	q31_unmarried	-.021	.259	-.009	-.083	.934
	Subjective norms	.071	.084	.070	.839	.402
	Perceived behavioral control	.173	.071	.176	2.446	.015
	Moral Norm	.088	.079	.089	1.108	.269
	BBA3	-.002	.002	-.064	-.857	.392
3	(Constant)	2.439	.663		3.677	.000
	What is your gender?	.085	.145	.039	.590	.556
	Do you (or does your family) rent or own your current residence?	-.122	.194	-.040	-.626	.532
	age_28_37	-.080	.258	-.026	-.310	.756
	age_38_47	.291	.274	.098	1.064	.288
	age_48_57	.071	.259	.027	.274	.784
	age_58_67	.456	.264	.184	1.726	.086
	age_68plus	.436	.318	.125	1.374	.171
	edu_some_college_univ	.141	.255	.051	.554	.580

edu_college	.096	.234	.039	.409	.683
edu_university	.449	.231	.195	1.947	.053
edu_postgrad	.159	.273	.050	.581	.562
q31_married	.000	.215	.000	.002	.999
q31_unmarried	-.007	.259	-.003	-.027	.978
Subjective norms	.043	.086	.043	.505	.614
Perceived behavioral control	.138	.074	.140	1.851	.065
Moral Norm	.046	.083	.047	.550	.583
BBA3	-.003	.002	-.077	-1.024	.307
Behaviour Intention	.155	.101	.132	1.538	.126

a. Dependent Variable: Behaviour

The β values in Experimental Model Six did not differ greatly from those found in Experimental Model Two, which regressed the same variables with the exception of PB; all the Experimental Model Six β values were of the same sign as those from Experimental Model Two. The age bracket of 58-67 was significant (p = .086) and the PBC construct was also found at a significant level (p = .065). The β value for BI was closer to being significant in Experimental Model Six (p = .126) than it was in Experimental Model Two (p = .456). Removing the PB construct strengthened the ability of the BI construct to explain variance in Behaviour and allowed the 58-67 age bracket and PBC construct β values to recorded at a significant level.

Summary of Experimental Model Regression Findings

Across all Experimental Models gender had a positive β, indicating that females participated in curbside recycle behaviour more than males, which supports a similar finding by Kollmuss et al. (2002). Also consistent across all models was the finding that homeowners participate in curbside recycling behaviour at a higher rate than non-homeowners, supporting this same conclusion by Oskamp et al. (1999). Generally there seemed to be a trend whereby the referent age group of 18-27 displayed the highest level of behavioural intention but displayed the lowest level of actual curbside recycling behaviour compared to the other age brackets. University education was the only education bracket that stood out with a significant positive β value in explaining variance in behaviour in the regression of Experimental Model Two. Otherwise the findings around education level were conflicting and inconclusive. Similarly, the findings around marital status displayed no general trend.

Generally the construct models of SN, PBC and MN correlated positively and significantly with variance in behavioural intention but the significance of these construct's positive β values was lost when they were correlated with behaviour for all but PBC. In terms of explaining variance in behaviour, the BBA3 is the attitude construct that comes closest to displaying significance as a negative β value in Experimental Model Six.

Also important to note is that use of the experimental variables to examine variance in the Behavioural Intention construct generates β values that were quite different from those generated in Experimental Models One and Two examining variance in Behaviour, which highlights the fundamental difference between behaviour and behavioural intention.

4.6 – Analysis of Results Based on Belief Selection

Analysis of Differences in Advantage/Disadvantage Selection

Chi-square tests are performed to analyze the difference in advantage beliefs and disadvantage belief selection between the top 10% of participant behaviour (good) (n = 61) and bottom 10% of behaviour (poor) recyclers (n = 61). A number of significant differences are found at the $p>0.05$ level.

In terms of advantages, there is a significant difference in terms of which participants selected the "Create jobs" belief: 21.4% of poor recyclers versus only 3.00% of good recyclers selected this as a significant advantage $\chi^2(1, N = 61) = 5.047$, $p = 0.025$. The advantage belief "Feel like I'm doing my part" also shows a significant different, with 39.3% of poor recyclers selecting this but only 15.2% of good recyclers choosing it as a significant belief. $\chi^2(1, N = 61) = 4.560$, $p = 0.033$.

In terms of disadvantage beliefs, 25% of poor recyclers chose "Need extra space in my house" as significant to them while only 3% of good recyclers selected it $\chi^2 1, N = 61) = 6.416$, $p = 0.011$. As well, only 3.6% of poor recyclers chose "Does not give me money for waste materials" as a disadvantage belief but 21.2% of good recyclers selected it $\chi^2(1, N = 61) = 4.137$, $p = 0.042$.

Table 30. Significant differences in belief selection between good and poor recyclers

Belief	Good Recyclers	Poor Recyclers	Significance of χ^2
Create jobs	3.00%	21.4%	0.025
Feel like I'm doing my part	15.2%	39.3%	0.033
Need extra space in my house	3.00%	25.0%	0.011
Does not give me money for waste materials	21.2%	3.60%	0.042

Behavioural Beliefs Selected as Salient that Significantly Predict Behaviour

The following behavioural beliefs, calculated using the EVM and selected as salient, were statistically significant in predicting behaviour and/or behavioural intention.

"Reduce amount of waste that goes into landfill"

Table 31. Group statistics comparing behaviour and behavioural intention for those who select the belief "reduce amount of waste that goes into landfill" as salient against those who do not

	Reduce the amount of waste that goes into landfill	N	Mean	Std. Deviation	Std. Error Mean
Behaviour	0	80	4.60	1.27	0.142
	Reduce the amount of waste that goes into landfill (From your perspective, what do you see as the three most significant	213	4.94	0.999	0.0684
Behaviour Intention	0	80	6.27	1.047	0.117
	Reduce the amount of waste that goes into landfill (From your perspective, what do you see as the three most significant	213	6.45	0.894	0.061

Table 32. Independent samples test comparing behaviour and behavioural intention for those who select the belief "reduce amount of waste that goes into landfill" as salient against those who do not

		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Behaviour	Equal variances assumed	13.65	0.00	-2.40	291	0.017	-0.34	0.14	-0.62	-0.062
	Equal variances not assumed			-2.15	117.37	0.033	-0.34	0.16	-0.65	-0.028
Behaviour Intention	Equal variances assumed	4.58	0.033	-1.42	291	0.16	-0.17	0.12	-0.42	0.068
	Equal variances not assumed			-1.32	124.77	0.19	-0.17	0.13	-0.44	0.087

"Save my household energy"

Table 33. Group statistics comparing behaviour and behavioural intention for those who select the belief "save my household energy" as salient against those who do not

	Save my household energy	N	Mean	Std. Deviation	Std. Error Mean
Behaviour	0	287	4.878	1.069	0.0631
	Save my household energy (From your perspective, what do you see as the three most significant advantages if you were to	6	3.621	1.421	0.580
Behaviour Intention	0	287	6.4174	0.924	0.0546
	Save my household energy (From your perspective, what do you see as the three most significant advantages if you were to	6	5.5333	1.343	0.548

Table 34. Independent samples test comparing behaviour and behavioural intention for those who select the belief "save my household energy" as salient against those who do not

		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Behaviour	Equal variances assumed	0.84	0.36	2.83	291	0.0050	1.26	.044	0.38	2.13
	Equal variances not assumed			2.15	5.12	0.083	1.26	0.58	-0.23	2.75
Behaviour Intention	Equal variances assumed	3.16	0.076	2.30	291	0.022	0.88	0.38	0.13	1.64
	Equal variances not assumed			1.61	5.10	0.17	0.88	0.55	-0.52	2.29

"Waste my money"

Table 35. Group statistics comparing behaviour and behavioural intention for those who select the belief "waste my money" as salient against those who do not

	Waste my money	N	Mean	Std. Deviation	Std. Error Mean
Behaviour	0	285	4.89	1.064	0.063
	Waste my money (From your perspective, what do you see as the three most significant disadvantages if you were to, over	8	3.35	0.97	0.34
Behaviour Intention	0	285	6.4161	0.93	0.055
	Waste my money (From your perspective, what do you see as the three most significant disadvantages if you were to, over	8	5.8000	1.20	0.43

Table 36. Independent samples test comparing behaviour and behavioural intention for those who select the belief "waste my money" as salient against those who do not

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | 95% Confidence Interval of the Difference | |
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Behaviour	Equal variances assumed	0.036	0.85	4.05	291	0.00	1.54	0.38	0.79	2.29
	Equal variances not assumed			4.41	7.48	0.0030	1.54	0.35	0.73	2.36
Behaviour Intention	Equal variances assumed	1.49	0.22	1.84	291	0.067	0.62	0.336	-0.044	1.28
	Equal variances not assumed			1.44	7.24	0.19	0.62	0.43	-0.39	1.63

"Waste city money"

Table 37. Group statistics comparing behaviour and behavioural intention for those who select the belief "waste city money" as salient against those who do not

Waste city money		N	Mean	Std. Deviation	Std. Error Mean
Behaviour	0	264	4.90	1.05	0.065
	Waste city money (From your perspective, what do you see as the three most significant disadvantages if you were to, ove	29	4.46	1.34	0.249
Behaviour Intention	0	264	6.43	0.92	0.057
	Waste city money (From your perspective, what do you see as the three most significant disadvantages if you were to, ove	29	6.10	1.066	0.20

Table 38. Independent samples test comparing behaviour and behavioural intention for those who select the belief "waste city money" as salient against those who do not

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | 95% Confidence Interval of the Difference | |
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Behaviour	Equal variances assumed	3.73	.055	2.049	291	0.041	0.43	0.21	0.017	0.85
	Equal variances not assumed			1.69	31.91	0.10	0.43	0.26	-0.090	0.96
Behaviour Intention	Equal variances assumed	2.48	0.12	1.84	291	0.068	0.34	0.18	-0.024	0.70
	Equal variances not assumed			1.63	32.76	0.11	0.34	0.21	-0.083	0.76

Behavioural Beliefs Selected as Salient that Significantly Predict Behavioural Intention

"Help to preserve natural resources"

Table 39. Group statistics comparing behaviour and behavioural intention for those who select the belief "help to preserve natural resources" as salient against those who do not

	Help to preserve natural resources	N	Mean	Std. Deviation	Std. Error Mean
Behaviour	0	229	4.82	1.09	0.072
	Help to preserve natural resources (From your perspective, what do you see as the three most significant advantages if y	64	4.95	1.08	0.14
Behaviour Intention	0	229	6.33	1.01	0.066
	Help to preserve natural resources (From your perspective, what do you see as the three most significant advantages if y	64	6.66	0.60	0.074

Table 40. Independent samples test comparing behaviour and behavioural intention for those who select the belief "help to preserve natural resources" as salient against those who do not

		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Behaviour	Equal variances assumed	0.098	0.76	-0.82	291	0.42	-0.13	0.15	-0.43	0.18
	Equal variances not assumed			-0.82	101.71	0.41	-0.13	0.15	-0.43	0.18
Behaviour Intention	Equal variances assumed	12.67	0.00	-2.47	291	0.014	-0.32	0.13	-0.58	-0.065
	Equal variances not assumed			-3.26	172.97	0.0010	-0.32	0.10	-0.52	-0.13

"Save my city money"
Table 41. Group statistics comparing behaviour and behavioural intention for those who select the belief "save my city money" as salient against those who do not

Save my city money		N	Mean	Std. Deviation	Std. Error Mean
Behaviour	0	266	4.88	1.06	0.065
	Save my city money (From your perspective, what do you see as the three most significant advantages if you were to, over	27	4.60	1.31	0.25
Behaviour Intention	0	266	6.4474	0.91	0.056
	Save my city money (From your perspective, what do you see as the three most significant advantages if you were to, over	27	5.9259	1.10	0.21

Table 42. Independent samples test comparing behaviour and behavioural intention for those who select the belief "save my city money" as salient against those who do not

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Behaviour	Equal variances assumed	1.69	0.20	1.27	291	0.21	0.28	0.22	-0.15	0.71
	Equal variances not assumed			1.07	29.62	0.29	0.28	0.26	-0.25	0.81
Behaviour Intention	Equal variances assumed	1.34	0.25	2.78	291	0.0060	0.52	0.19	0.15	0.89
	Equal variances not assumed			2.39	29.74	0.024	0.52	0.22	0.075	0.97

"Save my household energy"

Table 43. Group statistics comparing behaviour and behavioural intention for those who select the belief "save my household energy" as salient against those who do not

	Save my household energy	N	Mean	Std. Deviation	Std. Error Mean
Behaviour	0	287	4.88	1.07	0.063
	Save my household energy (From your perspective, what do you see as the three most significant advantages if you were to	6	3.62	1.42	0.58
Behaviour Intention	0	287	6.42	0.92	0.055
	Save my household energy (From your perspective, what do you see as the three most significant advantages if you were to	6	5.53	1.34	0.55

Table 44. Independent samples test comparing behaviour and behavioural intention for those who select the belief "save my household energy" as salient against those who do not

		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Behaviour	Equal variances assumed	0.84	0.36	2.83	291	0.0050	1.26	0.44	0.38	2.13
	Equal variances not assumed			2.15	5.12	0.0083	1.26	0.58	-0.23	2.75
Behaviour Intention	Equal variances assumed	3.16	0.076	2.30	291	0.022	0.88	0.38	0.13	1.64
	Equal variances not assumed			1.61	5.10	0.17	0.88	0.55	-0.52	2.29

A Comparison of High Advantage Scores Against Low Advantage Scores

The Advantage Scores were divided at the mean into two groups. It was found that the behaviour and behavioural intention of respondents with high Advantage Scores is significantly different than respondents with low Advantage Scores.

Table 45. Group statistics for low and high advantage scorers for behaviour and behavioural intention constructs

Advantage Score (Binned)		N	Mean	Std. Deviation	Std. Error Mean
Behaviour	low (<127)	156	4.74	1.09	0.087
	high (≥127)	124	5.02	1.04	0.094
Behaviour Intention	low (<127)	156	6.13	1.01	0.081
	high (≥127)	124	6.77	0.65	0.058

Table 46. Independent samples test comparing high advantage scorers against low advantages scorers on behaviour and behavioural intention

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
| | | | | | | | | | 95% Confidence Interval of the Difference | |
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Behaviour	Equal variances assumed	1.74	0.19	-2.21	278	0.028	-0.28	0.13	-0.54	-0.030
	Equal variances not assumed			-2.22	269.03	0.027	-0.28	0.13	-0.54	-0.032
Behaviour Intention	Equal variances assumed	26.29	0.00	-6.11	278	0.00	-0.64	0.10	-0.85	-0.43
	Equal variances not assumed			-6.41	266.70	0.00	-0.064	0.10	-0.84	-0.44

A Comparison of High Disadvantage Scores Against Low Disadvantage Scores

The Disadvantage Scores were divided at the mean into two groups. There was no significant difference in behaviour or behavioural intention between these two groups.

Table 47. Group statistics for low and high disadvantage scorers for behaviour and behavioural constructs

Disadvantage Score (Binned)		N	Mean	Std. Deviation	Std. Error Mean
Behaviour	low (<41)	131	4.97	1.10	0.096
	high(≥41)	131	4.75	1.05	0.092
Behaviour Intention	low (<41)	131	6.50	0.86	0.075
	high(≥41)	131	6.29	0.99	0.087

Table 48. Independent samples test comparing high disadvantage scorers against low disadvantages scorers on behaviour and behavioural intention

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	**Sig.**	**t**	**df**	**Sig. (2-tailed)**	**Mean Difference**	**Std. Error Difference**	95% Confidence Interval of the Difference	
									Lower	**Upper**
Behaviour	Equal variances assumed	0.022	0.88	1.63	260	0.10	0.22	0.13	-0.045	0.48
	Equal variances not assumed			1.63	259.49	0.10	0.22	0.13	-0.045	0.478
Behaviour Intention	Equal variances assumed	3.47	0.064	1.85	260	0.065	0.21	0.11	-0.013	0.44
	Equal variances not assumed			1.85	254.66	0.065	0.21	0.11	-0.013	0.44

CHAPTER FIVE: DISCUSSION OF RESULTS

While a variety of significant results were presented in chapter four, here in chapter five these results are elaborated on and discussed within context. This includes an overview of methodological difficulties encountered, possible applications of findings and areas for further investigation.

5.1 – Discussion of Statistical Results

Discussion of Introductory and Demographic Results

Only 38.2% of the sample correctly stated that Toronto's household recycling is collected bi-weekly; that almost two-thirds of the sample did not know this recycling schedule indicates a lack of awareness around recycling practices. Furthermore, almost half the sample population did not know that household recycling in Toronto is mandatory. Clearly there is an opportunity for increased citizen education around recycling practices.

The demographic results indicate the sample population is skewed towards married females, with higher-than-average levels of home ownership and income. This finding may be because of the requirements associated with study participation: individuals in multi-family dwellings were not allowed to participate and the online nature of survey administration inherently required computer-literate individuals with access to an internet connection. These two factors likely reduced the number of low-income individuals in the sample.

Discussion of Model Construct Reliability and Validity

Perceived difficulty was the only construct not to surpass the 0.75 Cronback's alpha threshold for discriminant validity. This is not entirely surprising because the PD construct is not particularly well-established in the literature and only two questions were included to test this variable. This finding does not support the use of this PD methodology in further recycling studies.

Confirmatory factor analysis of DMA clearly indicates two underlying components: one which measures instrumentality and one which measures experientiality. The DMIA has a higher mean value than the DMEA, which is reflective of the social dilemma aspect of the curbside recycling behaviour: participants have a more positive attitude for the

purpose of the behaviour than they do for the actual experience of behavioural performance.

Discussion of Salient Advantage/Disadvantage Selection

The three salient advantages selected at the highest rate are "reduce the amount of waste that goes to landfill" (73%), "help to protect the environment" (51%), and "create a better environment for future generations" (38%). All three of these are instrumental efficacy beliefs, indicating that efficacy beliefs are top-of-mind for recycling behavioural decisions. "Makes me feel like I'm doing my part" was an instrumental advantage that was selected by 33% of the sample population. "Contribute to manufacturing goods made from recycled materials" is an additional efficacy belief that was selected as salient by 27% of the test population.

The statistical distribution of salient disadvantage selection is much flatter than that of advantage selection, indicating less general agreement among participants around the important disadvantages of curbside recycling behaviour. The three salient disadvantages selected at the highest rate are "attract pests" (43%), "increase waste collection costs" (38%), and "create unpleasant odours" (33%); the first and third of these are experiential in nature while the second is an instrumental disadvantage. The selection of generally instrumental advantages and experiential disadvantages further reinforces the social dilemma aspect of curbside recycling participation.

Discussion of Construct Descriptive Statistics

Overall, the level of behaviour recorded is quite high, with a median of 5.09 out of six. Even higher is the level of behavioural intention, with a median of 7.00 out of seven and a mean of 6.40. Past behaviour also exhibits a high level, with a median of 7.00 our of seven and a mean of 6.43. These results are skewed towards unreasonably high levels of recycling behaviour and intention-to-recycle. This was to be expected: the pro-social nature of the behaviour promotes respondent social desirability bias (Terry et al., 1999). Rathje and Murphy (1992) go so far as to say that people are unreliable sources of quantitative information on their own behaviour. Corral-Verdugo et al. (1995) find substantial bias in self-reported versus objectively measured recycling behaviour. Knussen et al. (2004) suggest that response consistency efforts also contribute to this type of finding in that a

89

respondent may assume that s/he intended to do his/her past behaviour, therefore s/he uses past behaviour to guide his/her answers on behavioural intention questions.

PBC also exhibits an exceptionally high level, again displaying a median of 7.00 out of seven with a mean of 6.29. This result indicates that respondents feel almost complete control over the behaviour in question; respondents have the required skills and abilities to perform the behaviour and are not hampered by contextual factors. This is an encouraging finding as it indicates that behavioural non-performance is due to factors other than control or self-efficacy issues, which is a prerequisite for attitude and normative-based behavioural interventions.

Although SN, MN, and DMA are also in the upper range of their possible levels, they display less exceptional levels than the measurements of behaviour and control. MN displays the largest standard deviation of any construct, suggesting that respondents hold varying levels of morality and altruistic inclination.

Comparing BBA3 and BBAALL on descriptive statistics is difficult because of the different associated group sizes. The same situation applies to AS and DS, which also have different group sizes. As is to be expected, AS with a mean of 118.21, reflects a generally positive rating of advantage outcomes, while the DS aggregate score, with a mean of 39.96, reflects a generally negative rating of disadvantage outcomes.

Discussion of Construct Correlation Results

All the model construct correlations are significant at the $p>0.01$ level, which is an encouraging sign for model reliability. A low correlation between behaviour and behavioural intention exemplifies the debate discussed in chapter two around the use of BI as a dependent variable and its ability to predict behaviour.

Interestingly, of the three attitude constructs, BBAALL correlates most closely with behaviour at 0.21, while DMA correlates least closely at 0.16, suggesting that belief-based measures of attitude are more predictive of behaviour than a direct method of attitude measurement.

Discussion of Model Regressions with Behaviour as the Dependent Variable

DMA and BBA3 did not differ very much in the amount of behavioural variance the model is able to explain. The only difference between the model regressions that use these two

constructs is that the regression using DMA indicates past behaviour is the only construct significantly able to explain variance in behaviour, whereas the regression that uses BBA3 indicates only university education is significant. This author is not sure why this difference is observed but regardless, support for neither model is established. What must be noted is that the significance of past behaviour in explaining variance in behaviour should be viewed cautiously as both measure the same variable, albeit in different ways: PB measures behaviour very generally while B measures behaviour more specifically. The ability of PB to predict B could also be due to the temporal stability of behaviour (Fishbein et al., 2010).

Discussion of Model Regressions with Behavioural Intention as the Dependent Variable

All three attitude constructs are applied in model regression to test their ability to explain variance in BI. Model four, using the BBA3 construct, accounts for the greatest amount of variance in BI at 57.8%. In the regression of model four, PB, SN, PBC, MN and BBA3 are all significant, supporting use of the model itself to predict BI. This result further supports the finding that an attitude construct based on a measurement of salient beliefs is most effective when modeling curbside recycling behaviours and that the inclusion of PB and MN are valuable additions to the model.

While the next sections discuss results associated with belief selection, it must first be noted that the applicability of these belief-based results is questionable as neither BBA3 nor BBAALL significantly explain variance in the dependent variable of behaviour. Nonetheless, the belief-based results contribute valuable information and do stand on their own as statistically significant values.

Discussion of Results Based on Salient Belief-Selection that Distinguish Good Recyclers from Bad

The significant result that bad recyclers select "feel like I'm doing my part" as a salient advantage of behavioural participation more than good recyclers is perplexing in that it highlights the intrinsic value stemming from behavioural performance, which one would assume would be stronger in good recyclers.

This author is unsure why bad recyclers select the instrumental advantage "create jobs" as a salient advantage significantly more often than good recyclers. One possibility is that bad recyclers perhaps do not believe in some of the other instrumental advantages of recycling (i.e. efficacy beliefs) and "create jobs" is an instrumental behavioural belief not related to the efficacy of participation in the recycling scheme.

"Need extra space" is an experiential disadvantage that also distinguishes good from bad recyclers. The high PBC construct value indicates that contextual factors such as this one do not account for behavioural non-performance, so perhaps bad recyclers select this belief as justification for their low level of behaviour.

Most unexpectedly, significantly more good recyclers than bad recyclers select "does not give me money for waste materials" as a salient disadvantage of behaviour. Bad recyclers could be expected to select this instrumental disadvantage as a justification for not recycling, but this selection by good recyclers is peculiar. This finding also contradicts the findings cited in chapter two suggesting that individuals who view sustainable behaviours in terms of personal economic costs versus benefits are less motivated to perform behaviours with indirect, global benefits. Another option is that good recyclers find very few disadvantages to their participation in the curbside recycling scheme and this belief allows them to lament the amount of money they could receive for all the materials they contribute to the curbside recycling scheme?

Discussion of Behavioural-Beliefs Selected as Salient that Significantly Predict Behaviour

"Reduce the amount of waste that goes into landfill" is the only behavioural belief that, when selected as salient, displays a significant, positive correlation with behaviour. The significance of this advantage in predicting behaviour provides strong support for the conclusion that at least certain types of efficacy beliefs influence curbside recycling behaviour.

"Save household electrical energy" is an advantage, while "waste my money" and "waste my city's money" are disadvantages the three behavioural beliefs that exhibit a negative correlation with behaviour. These three behavioural beliefs each encompass an economic angle, supporting the conclusion that individuals who view curbside recycling

92

participation in terms of economic costs versus benefit demonstrate less behaviour than those who do not view the behaviour in economic terms.

Discussion of Behavioural-Beliefs Selected as Salient that Significantly Predict Behavioural Intention

"Help to preserve natural resources" is the only behavioural belief that, when selected as salient, positively correlates with behavioural intention, further supporting the finding that advantage efficacy beliefs influence sustainable behaviour. Again, the economic-related beliefs of "save my city money" and "save my household electrical energy" negatively correlate with the dependent variable of behavioural intention.

Discussion of the Test of High Versus Low Advantage and Disadvantage Scores

The aggregate AS differentiates between high and low levels of recycling behaviour and behavioural intention, whereas DS does not display this same finding. What this means is that individuals with strong beliefs in the combined likelihood and value of the behavioural advantages participate more in curbside recycling schemes than those with weak beliefs in the combined likelihood and value of those advantages. The same discrimination is not observed between those with high and low disadvantage scores. This difference between AS and DS could be because the AS has a larger standard deviation, making it easier to show statistical significance. Another possibility is that beliefs around the advantages of participation in curbside recycling schemes influences behaviour more strongly than disadvantage beliefs. If that were to be the case, such a finding would suggest that persuasive messaging around behaviours with indirect, global consequences should focus on promoting associated advantages rather than downplaying associated disadvantages.

5.2 – Summary of Findings

When viewed in completion, the overarching results of this thesis highlight a number of important issues associated with curbside recycling behaviour, including the importance of certain efficacy beliefs and the generally negative affect of framing curbside recycling behaviour in terms of economic cost versus benefit.

It was hypothesized that selection of the efficacy belief "contribute to manufacturing goods made from recycled materials" as salient would discriminate between good and bad

recyclers. This was not the case: the 27% of individuals who did select this belief as salient did not significantly differ, in terms of behaviour or behavioural intention, from those who did not. The question that remains is why did other similar efficacy beliefs demonstrate a positive correlation with behaviour but this one did not?

This author suggests that the inability of the behavioural efficacy belief "contribute to manufacturing goods made from recycled materials" to positively correlate with behaviour, or discriminate good recyclers from bad, is indicative of the larger, systemic efficacy challenge within Ontario's current recycling scheme.

Ontario Municipal Recycling: A Broken System

In researching this thesis, the most glaringly obvious policy challenge surrounding the promotion of recycling as a sustainable consumption loop is that there is no incentive for manufacturers to innovate and use easily recyclable packaging and product materials in their goods. In fact, producers are effectively discouraged from the promotion of consumer recycling. This is because producers are only required to cover the costs associated with their products that enter the recycling stream; they do not pay for any of their products that are sent to landfill. Furthermore, the Ontario stewardship scheme does not take into account differences in the recyclability of various producer's products: overall costs associated with each industry are calculated and then distributed among all producers based on market share. Extended producer responsibility needs to be implemented on the front end so that producers are made responsible for all the waste they produce, not just the waste that is properly diverted from landfill.

Furthermore, growth in the Canadian recycling industry is currently stymied by volatile commodity markets and a lack of end-markets for recyclable goods (Ontario Waste Managment Association, 2006). Manufacturers of consumer goods need to be encouraged to use recycled content in their products to better establish these end-markets. If more goods were made from recycled materials, and properly advertised as such, perhaps the associated efficacy belief would significantly correlate with recycling behaviour. Valle et al. (2004, 533) suggest something similar: "it might also be of great value to explore the idea of... how packaging residues, through the recycling process, give rise to a new set of useful goods that everyone recognizes." Encouragingly, the city of Toronto has recently begun

94

promotion of recycling in this way, with the introduction of their Recycling is Magic pamphlet (appendix 4).

It is also important that corporations are held accountable for the sustainability claims they make. The plant bottle distributed by Pepsi (appendix 1) is a perfect example of persuasive messaging that promotes a global, indirect advantage: the problem is that bio-plastic is not accepted in recycling streams! The efficacy belief that would moderate the connection between persuasive messaging and behaviour here does not hold up under scrutiny, therefore likely rendering the persuasive message ineffective.

It must also be noted that the concept of waste diversion from landfill and diversion percentages, such as those used as a measures of behaviour in this study and to chart the progress of the city of Toronto, can be misleading and do not alone illustrate the entire waste picture. Diversion percentages use total waste produced as the reciprocal, will increase if both recycling and total waste produced increases, which is not automatically a good thing. Conversely, if total waste produced decreases, but recycling levels hold steady, the diversion percentage would decrease but again this could be a good thing because total waste to landfill has actually decreased. As such, this investigator recommends that waste diversion percentages not be the only metric employed to track and motivate waste diversion behaviours.

Many papers cite the importance of increasing residential recycling (Scott, 1999). This is only one part of the solution: recycling is relatively low on the waste diversion hierarchy. Other diversion activities such as reuse and waste minimization must also be pursued to effectively mitigate society's waste challenge. Scott (1999) argues that emphasizing recycling promotes consumption, instead of conservation. However, as discussed, when integrated properly, recycling is an overarching solution that accommodates consumption as one stage of a sustainable cycle. Instead of viewing consumption as an inherently unsustainable behaviour that must be changed, recycling offers an opportunity to allow consumption of goods made from recycled materials as one step in a larger, sustainable recycling framework.

5.3 - Suggestions for Future Research

One interesting demographic factor absent from this paper is the influence of ethnicity on recycling behaviour and intention. Toronto has a very ethnically diverse population and it would be interesting to test this affect on recycling participation.

Another methodological issue that was not controlled for was different levels of need for affect/cognition in the population. This is an interesting psychological variable that could be a mediating factor in how individuals are influenced by instrumental and experiential attitudes.

No objective observations were made, which mitigates the applicability of these findings, however all constructs are measured subjectively, which helps maintain consistency across the behavioural model.

5.4 – Conclusion

Burroughs et al. (2012, 257) describe the modern incarnation of Hardin's (1968) tragedy of the commons inherent to many of today's sustainable behaviours: "...the short-term payoffs of consumption undermine the longer term personal and societal benefits of moderation and restraint." Indeed, Burroughs and Rindfleish (2012, 258) suggest there are some capacities for escaping the material trap: "aligning individual and collective interests, narrowing the conceptual distance between micro-motives and macro-consequences, framing behaviours to raise saliency of their impact." The results from this thesis can certainly stand as evidence that efficacy beliefs about the global, indirect benefits of behaviour do have a positive impact on consumers' decisions. Hopefully this finding, in addition to similar others, will encourage manufacturers, consumers, and the government to adopt recycling as a sustainable consumption loop and that persuasive messaging around sustainable behaviours will serve to drive society towards a sustainable future.

APPENDIX 1

Advertisement for Pepsi's plant bottle

APPENDIX 2

Sunchip bag promoting compostable packaging

APPENDIX 3

Small changes that make a big difference!

Replace with a roll of 100% recycled bathroom tissue and together we could save

61,000 trees!

Replace with a roll of 100% recycled paper towels: you save 7 litres of water!

*Details on

Simplegreenaction.ca

Cascades, leading the way.
Introducing new Cascades® Enviro 100% recycled paper towels and bathroom tissue. The new packaging, made mostly from recycled plastic, is fully recyclable. Another plus: each package features an environmental fact chart. Refer to it and see how you're helping to protect the environment when you choose a Cascades® product.

Certified products.
Cascades® Enviro 100% recycled products meet the toughest environmental standards. It's your guarantee of authenticity.

Environmental Facts	
Factor	Amount
Recycled content (majority post-consumer fibres)	100%
Virgin fibre	0%
Chlorine bleaching	0%
Water saved vs. paper industry manufacturing average	80%
Hypoallergenic properties	100%
Added fragrances and colours	0%
Environmental certifications	2
Quality	100%

Earth Day CANADA

Printed on Rolland Enviro100, which contains 100% recycled post-consumer fibers, is EcoLogo, Processed Chlorine Free and FSC Recycled certified and manufactured using biogas energy.

Cascades toilet paper packaging

Who Knew Recycling is Magic!

Abracadabra! Ala Kazam! Ta da—presenting the mysterious, magical ways of recycling! Admire these marvelous transformations—they're out of the box and right back at you. Recycling makes useful objects out of waste and adds a little magic to your life.

Recycling fine paper into toilet paper gives new meaning to watching your bottom line! It's all about saving trees. Recycling paper uses 75 per cent less energy and 50 per cent less water than making paper from raw wood fibre.

It may be yesterday's news, but it's true—repulped newspapers can become roof shingles. And that's just one end product. Others include new newsprint, boxboard (cereal and shoeboxes), wallboard, ceiling tiles, egg trays, animal bedding and mulching material. Recycle one tonne of old newspapers and save 19 trees. Typically, Toronto annually recycles 100,000 tonnes of newspapers—that's giving more than two million trees a tomorrow.

Here's a cosy thought to warm up to—recycled glass becomes fibreglass insulation. Old glass can become new glass, glass beads for reflective paint or be mixed with aggregate for a road building type of asphalt called 'glasphalt'. Glass made from recycled crushed glass, called cullet, uses 30 per cent less energy than glass manufactured from new resources.

Another heart-warming thought—PET plastic is recycled into polar fleece jackets and scarves. And that's not all, other end products include fibrefill, strapping, pallets, rope, carpet, automobile bumpers, brush bristles, sign posts, and even the fuzz on tennis balls. Recycled HDPE plastic becomes pipe, flowerpots, plastic lumber and of course, blue boxes. Producing new products from recyclable plastics reduces pollution and uses one-third less energy.

Here's the spin—aluminum drink cans are transformed into CDs. What goes around, comes around. Of course it can pop back into a beverage can too. Recycling aluminum saves raw materials (it takes more than seven tonnes of materials to produce just one tonne of finished aluminum). Cans recycled into aluminum cut energy use by 95 per cent. Throwing away a single aluminum can is like pouring out six ounces of gasoline.

Yes, it's possible for a can to become another can, and it does. But, why stop there? Steel yourself! Thanks to recycling, steel can be transformed into concrete reinforcing bars, chains, pipes, and car parts. This greatly reduces costs, pollution and energy used (reusing steel cans alone reduces energy use by 74 per cent). Every tonne of recycled steel cans saves 1.36 tonnes of iron ore.

Here's the real dirt, organic waste—and there's lots of this stuff—making up 30 per cent of household garbage—becomes compost. Compost is a nutrient-rich soil amendment ideal for use on gardens and lawns. Don't waste these organic resources in landfill. Make the natural choice. Recycle organics into compost. Feed it to your own green spaces and watch the benefits bloom.

Pamphlet promoting efficacy beliefs from the city of Toronto website

White et al., (2011) loss frame paired with feasibility information (low level construal)

White et al., (2011) gain frame paired with desirability information (high level construal)

STUDY QUESTIONNAIRE

Welcome to Opinion Survey #XXXXX!

This survey will take you about 15 minutes. As always, your individual survey responses are protected by our Privacy Policy.

Rewards
If you qualify for and complete this survey, you will earn 5 Lightspeed Points, and earn one entry into the $3,000 Lightspeed Sweepstakes.

After answering the first few questions, some of you will not qualify to complete this survey. Although you will not earn any points, you will earn one entry into the $3,000 Lightspeed Sweepstakes.

Please Keep In Mind...
Please do not use your Back or Forward browser buttons while you are taking this survey. Once you answer a question, you will not be able to go back and change your answer.

Click on the button below to begin this survey.

a) Do you currently live in a multi-story apartment building or condo building?

If Yes > Thank you but you are not eligible for this survey.
If No > Great, proceed to next question.

b) Does your household have access to a curbside blue bin recycling program?

If Yes > Great, proceed to next question.
If No > Sorry, you are not eligible for this study.

c) Are you 18 years of age or older?

If Yes > Great, proceed to next question.
If No > Sorry, you are not eligible for this study.

d) Participation in the study is purely voluntary. Your input IS important and strictly confidential. Your answers cannot be linked to you. Your participation supports the study of sustainability. Would you consent to participate in the study? It will take about 15 minutes to do the study?

If Yes > Thank you. Please read over the following consent form and agree to the terms.
If No > Thank you but you are not eligible for this survey.

Consent Agreement

Evaluating the Effect of Waste Diversion Attitudes on Household Waste Diversion Behaviours
in Canada

You are being asked to participate in a research study. By completing the enclosed survey, you
are giving your consent to use the information provided by you for the purposes of this study.

Investigators: Jocelyn Molyneux, B.B.A, B.Sc. and Paul Missios, B.COM, M.A., Ph.D.

Purpose of the Study: The purpose of this study is to gather information on the waste diversion
habits of Canadians, in order to identify programs and policies that will be effective in reducing
the amount of residential garbage disposed in landfills. We expect that individuals would
respond differently for various recycling items (such as glass and plastics), to differing access to
recycling programs (yard waste, blue box, etc.), and to alternative recycled-content purchasing
opportunities. However, there are costs and benefits to each recycling issue. With the
information collected from your questionnaire and the others we have sent, we can try to
determine which programs and policies serve the interests of the public best. You have been
selected randomly as one of 300 potential participants in this study.

Description of the Study: This study involves only the following questionnaire. None of the
questionnaires used in this study are experimental in nature. The only experimental aspect of this
study is the gathering of information for the purpose of analysis. A graduate student in fulfilment
of her thesis work is carrying out this study.

Benefits of the Study: More effective recycling programs could potentially lead to a cleaner
environment, lower product prices, and lower taxes. There is no guarantee, however, that you
will receive any direct benefits from participating in this study.

Confidentiality: The questionnaires used in this survey are not connected to you in any way.
Personal information not requested on the questionnaire (such as your name or address), should
not be included to ensure that you remain anonymous. Lightspeed secures data through data
encryption and password protection.

Incentives to Participate: Participants will be compensated in line with their standing
agreement with Lightspeed Research.

Voluntary Nature of Participation: Participation in this study is voluntary. Your choice of
whether or not to participate will not influence your future relations with Ryerson University. If
you decide to participate, fill out the following survey. If you do not wish to participate, simply
do not complete the survey.

Questions about the Study: If you have a question about this research, please make an inquiry. You may contact:

> Paul Missios, PhD. or Jocelyn Molyneux (c/o Paul Missios)
> Ryerson University
> 350 Victoria Street
> Toronto, ON M5B 2K3
> 416-979-5000 x 6186

If you have questions regarding your rights as a human subject and participant in this study, you may contact the Ryerson University Research Ethics Board for information.

Research Ethics Board
c/o Office of Research Services
Ryerson University
350 Victoria Street
Toronto, ON M5B 2K3

Agreement:

☐ By clicking this button, you indicate that you have read the information in this agreement. Your button click also indicates that you agree to be in the study and have been told that you can change your mind and withdraw your consent to participate at any time. You have been given an opportunity to print this agreement.

You have been told that by accepting this consent agreement you are not giving up any of your legal rights.

_____   _____
Name of Participant (please type)   Date

Introduction
Household rates of recycling and use of the City of Toronto's Blue Bin program vary widely. The present survey is part of an investigation that tries to discover some of the reasons that individuals do or do not engage in Blue Bin recycling. We are interested in your personal opinions about waste (garbage and recycling) in your home and how you dispose of it through curbside collection, known as the Blue and Black Bin programs. Your honest opinions will generate valuable feedback to help make recycling easier and more efficient. There are no right or wrong answers.

Instructions: Please read each question carefully and answer it to the best of your ability. Please answer all questions from your personal perspective.

1. How frequently is recycling (Blue Bin) collected curbside in your community?

Twice a week
Once a week
Every two weeks
Not sure
Recycling is not collected in my community

2. How frequently is trash (Black Bin) collected curbside in your community?

Twice a week
Once a week
Every two weeks
Not sure

3. Are you, in whole or in part, responsible for dealing with trash and recycling within your household?

Yes, completely
Yes, in part
No

4. Is curbside recycling mandatory or voluntary in your community?

Mandatory
Voluntary
Not sure

Instructions: When answering the next questions, consider your behaviour around use of your community's curbside recycling collection service, (ie. the Blue Bin program), over the last six months. Only answer questions in terms of items recycled through your curbside recycling

*program, **not** items that you returned to a retailer for recycling.*

While the majority of household waste material is often produced in the kitchen area, please consider ALL the waste produced in your household, including waste from the kitchen, living areas, bedrooms and bathrooms.

5. Material Rates
***Instructions:** The following questions ask about how much of each type of material you place in the blue bin for curbside municipal recycling collection. For example, if the question asks about your total household recyclable METAL CAN and CONTAINER waste, please consider the total METAL CAN and CONTAINER waste regularly generated in your household and then answer with what percentage of that total METAL CAN and CONTAINER waste actually ends up in the recycling bin rather than the amount that ends up in the trash bin.*

i) Approximately what percentage of your total household recyclable GLASS BOTTLES and CONTAINER waste do you place at the curbside for municipal recycling collection?

ii). Approximately what percentage of your total household recyclable PLASTIC BOTTLES and OTHER PLASTIC CONTAINER waste do you place at the curbside for municipal recycling collection?

iii). Approximately what percentage of your total household recyclable PAPER, NEWSPAPER and MAGAZINE waste do you place at the curbside for municipal recycling collection?

iv). Approximately what percentage of your total household recyclable METAL CAN and CONTAINER waste do you place at the curbside for municipal recycling collection?

v). Approximately what percentage of your total household recyclable CARDBOARD waste do you place at the curbside for municipal recycling collection?

vi). Approximately what percentage of your total household recyclable STYROFOAM/ POLYSTYRENE waste do you place at the curbside for municipal recycling collection?

vii). Approximately what percentage of your total household recyclable PLASTIC BAG waste do you place at the curbside for municipal recycling collection?

viii). Approximately what percentage of your total household recyclable MILK/JUICE CARTON (also known as boxboard) waste do you place at the curbside for municipal recycling collection?

ix). Approximately what percentage of your total household recyclable RIGID ALUMINUM TRAYS/PANS waste do you place at the curbside for municipal recycling collection?

x). Approximately what percentage of your total household recyclable AEROSOL CAN waste do you place at the curbside for municipal recycling collection?

xi) Approximately what percentage of your total household WASTE THAT'S NOT SUPPOSED TO GO INTO THE BLUE BIN (ie. trash) do you place at the curbside for municipal recycling collection (accidently or otherwise)?

None
20%
40%
60%
80%
100%

*Instructions: Please take a few minutes to tell us what you think about the possibility of, **placing all your household recyclable waste at the curbside for municipal recycling collection over the next six months**. There are no right or wrong responses; we are merely interested in your personal opinions. While the majority of household waste material is often produced in the kitchen area, please consider waste produced in all areas of your household, including kitchens, living areas, bedrooms and bathrooms.*

In response to the three questions that follow, please list the thoughts that come immediately to mind in response to each question. Write each thought on a separate line.

6. i) What do you see as the **advantages** to, over the next six months, placing all your household recyclable waste at the curbside for municipal recycling collection? (**List the first few thoughts that come to mind.**)
1._____
_____
2._____
_____
3._____
_____
4._____
_____
5._____
_____

ii) What do you see as the **disadvantages** to, over the next six months, placing all your household recyclable waste at the curbside for municipal recycling collection? (**List the first few thoughts that come to mind.**)
1._____
_____
2_____
_____
3._____
_____

4._____

_____
5._____

_____

iii) What else comes to mind when you think about placing all your household recyclable waste at the curbside for municipal recycling collection over the next six months? (**List the first few thoughts that come to mind. If nothing comes to mind, type the word "nothing".**)
1._____

_____
2_____

_____
3._____

_____
4._____

_____
5._____

_____

7. Advantage Selection
From your perspective, what do you see as the three most significant **advantages** if you were to, over the next six months, place all your household recyclable waste at the curbside for municipal recycling collection?

i) Reduce my property taxes
ii) Save my city money
iii) Save my household energy
iv) Save electrical energy generally
v) Create a better environment for future generations
vi) Help to protect the environment
vii) Help to preserve natural resources
viii) Reduce the amount of waste that goes into landfill
ix) Create jobs
x) Stimulate the economy
xi) Contribute to manufacturing goods made from recycled materials
xii) Experience satisfaction
xiii) Help to solve a global problem
xiv) Feel good
xv) Feel hopeful
xvi) Feel reduced guilt
xvii) Feel like I'm doing my part

8. Disadvantage Selection

From your perspective, what do you see as the three most significant **disadvantages** if you were to, over the next six months, place all your household recyclable waste at the curbside for municipal recycling collection?

i) Help eliminate jobs
ii) Need extra space in my house
iii) Waste my money
iv) Waste city money
v) Have to put in extra time
vi) Have to put in extra physical effort
vii) Have to put in extra mental effort
viii) Create unpleasant odours
ix) Create a mess
x) Attract pests
xi) Increase waste collection costs
xii) Does not give me money for waste materials
xiii) Make me feel overwhelmed
xiv) Make me feel tired
xv) Make me feel confused
xvi) Make me feel stressed
xvii) Does not make a difference
xviii) Neighbours see what I put out

Instructions: The next questions in this survey make use of rating scales with seven numbers; you are to circle the number that best describes your opinion. For example, if you were asked to rate about "Watching a newscast most days" on such a scale, the seven places should be interpreted as follows:

My watching a newscast most days is:

Unlikely: _1_ : _2_ : _3_ : _4_ : _5_ : _6_ : _7_ : *Likely*
extremely quite slightly neither slightly quite extremely

If you think that your watching a newscast most days is extremely unlikely, then you would select the number 1.
My watching a newscast most days is:
Unlikely _1_:_2__:_3__:_4__:_5__:_6__:_7__:**Likely**

If you think that your watching a newscast most days is quite likely, then you would circle the number 6.
My watching a newscast most days is:
Unlikely _1_:_2__:_3__:_4__:_5__:_6__:_7__:**Likely**

If you think that your watching a newscast most days is slightly unlikely, then you would circle the number 3.
My watching a newscast most days is:
Unlikely _1_:_2_:_3_:_4_:_5_:_6_:_7_:**Likely**

If you think that your watching a newscast most days is neither likely nor unlikely, then you would circle the number 4.
My watching a newscast most days is:
Unlikely _1_:_2_:_3_:_4_:_5_:_6_:_7_:**Likely**

Please answer each of the following questions by circling the number that best describes your opinion. Some of the questions may appear to be similar, but they do address somewhat different issue, so please read each question carefully.

9. Direct Measure of Intention (part 1)

Over the next six months…

i) I intend to place all my household recyclable waste at the curbside for municipal recycling collection.
False ___:___:___:___:___:___:___:True

ii) I plan to place all my household recyclable waste at the curbside for municipal recycling collection.
Not at all ___:___:___:___:___:___:___:Definitely

iii) I will try to place all my household recyclable waste at the curbside for municipal recycling collection.
False ___:___:___:___:___:___:___:True

10. Direct Measure of Norm

With regards to placing all my household recyclable waste at the curbside for municipal recycling collection, over the next 6 months:

i) Most people who are important to me think that I should do so.
Unlikely ___:___:___:___:___:___:___:Likely

ii) Most people whose opinions I value would approve of me doing so.
Unlikely ___:___:___:___:___:___:___:Likely

With regards to others placing all their household recyclable waste at the curbside for municipal recycling collection, over the next 6 months:

iii) Most people I respect and admire will do so.
Unlikely ___:___:___:___:___:___:___:Likely

iv) Most people who are like me will do so.
Unlikely ___:___:___:___:___:___:___:Likely

11. Direct Measure of Morality (part 1)
Over the next six months…

i) It would be wrong of me not to place all my household recyclable waste at the curbside for municipal recycling collection.
Disagree:___:___:___:___:___:___:Agree

ii) I would feel guilty if I did not place all my household recyclable waste at the curbside for municipal recycling collection.
Disagree:___:___:___:___:___:___:Agree

iii) Not placing all my household recyclable waste at the curbside for municipal recycling collection goes against my principles.
Disagree:___:___:___:___:___:___:Agree

12. Behavioral Belief Strength (part 1)
If, over the next six months, I place all my household recyclable waste at the curbside for municipal recycling collection, I will…

i) save my city money:
Unlikely ___:___:___:___:___:___:___:Likely

ii) save electrical energy generally:
Unlikely ___:___:___:___:___:___:___:Likely

iii) help create a better environment for future generations:
Unlikely ___:___:___:___:___:___:___:Likely

iv) preserve natural resources:
Unlikely ___:___:___:___:___:___:___:Likely

v) reduce the amount of waste that goes into landfill:
Unlikely ___:___:___:___:___:___:___:Likely

vi) help stimulate the economy:
Unlikely ___:___:___:___:___:___:___:Likely

vii) contribute to manufacturing goods made from recycled materials:
Unlikely ___:___:___:___:___:___:___:Likely

viii) help protect the environment:
Unlikely ___:___:___:___:___:___:___:Likely

ix) help create jobs:
Unlikely ___:___:___:___:___:___:___:Likely

x) help solve a global problem:
Unlikely ___:___:___:___:___:___:___:Likely

xi) help reduce my property taxes:
Unlikely ___:___:___:___:___:___:___:Likely

xii) experience satisfaction:
Unlikely ___:___:___:___:___:___:___:Likely

xiii) feel good:
Unlikely ___:___:___:___:___:___:___:Likely

xiv) feel hopeful:
Unlikely ___:___:___:___:___:___:___:Likely

xv) feel reduced guilt:
Unlikely ___:___:___:___:___:___:___:Likely

xvi) feel like I'm doing my part:
Unlikely ___:___:___:___:___:___:___:Likely

13. Direct Measure of PBC
Over the next six months…
     i) I am confident that I am able to place all my household recyclable waste at the curbside for municipal recycling collection.
False ___:___:___:___:___:___:___: True

     ii) if I really wanted to, I could place all my household recyclable waste at the curbside for municipal recycling collection.
False ___:___:___:___:___:___:___:True

     iii) It is under my control to place all my household recyclable waste at the curbside for municipal recycling collection.
False___:___:___:___:___:___:___:True

14. Direct Measure of Attitude (part 1)
My placing all my household recyclable waste at the curbside for municipal recycling collection over the next six months is

Enjoyable ___:___:___:___:___:___:___:Not enjoyable
Harmful ___:___:___:___:___:___:___:Helpful
Pleasant ___:___:___:___:___:___:___:Unpleasant
Wise ___:___:___:___:___:___:___:Foolish
Immoral ___:___:___:___:___:___:___:Moral
Good:___:___:___:___:___:___:___: Bad

15. Direct Measure of Perceived Difficulty
Over the next six months…
i) Placing all my household recyclable waste at the curbside for municipal recycling collection is:
Easy ___:___:___:___:___:___:___:Difficult
Complicated ___:___:___:___:___:___:___:Simple

ii) If I want to, I can easily place all my household recyclable waste at the curbside for municipal recycling collection over the next six months.
Disagree ___:___:___:___:___:___:___:Agree

16. Behavioral Belief Strength (part 2)
If, over the next six months, I place all my household recyclable waste at the curbside for municipal recycling collection, I will…

i) waste my money:
Unlikely ___:___:___:___:___:___:___:Likely

ii) waste city money:
Unlikely ___:___:___:___:___:___:___:Likely

iii) create unpleasant odours:
Unlikely ___:___:___:___:___:___:___:Likely

iv) create a mess:
Unlikely ___:___:___:___:___:___:___:Likely

v) attract pests:
Unlikely ___:___:___:___:___:___:___:Likely

vi) increase waste collection costs:
Unlikely ___:___:___:___:___:___:___:Likely

vii) not make a difference:
Unlikely ___:___:___:___:___:___:___:Likely

viii) need extra space in my house:
Unlikely ___:___:___:___:___:___:___:Likely

ix) have to put in extra time:
Unlikely ___:___:___:___:___:___:___:Likely

x) have to put in extra physical effort:
Unlikely ___:___:___:___:___:___:___:Likely

xi) have to put in extra mental effort:
Unlikely ___:___:___:___:___:___:___:Likely

xii) help eliminate jobs:
Unlikely ___:___:___:___:___:___:___:Likely

xiii) not be given money for waste materials:
Unlikely ___:___:___:___:___:___:___:Likely

xiv) feel overwhelmed:
Unlikely ___:___:___:___:___:___:___:Likely

xv) feel tired:
Unlikely ___:___:___:___:___:___:___:Likely

xvi) feel confused:
Unlikely ___:___:___:___:___:___:___:Likely

xvii) feel stressed:
Unlikely ___:___:___:___:___:___:___:Likely

17. Direct Measure of Intention (part 2)
Over the next six months…
i) I will place all my household recyclable waste at the curbside for municipal recycling collection.
Improbable ___:___:___:___:___:___:___:Probable

ii) I want to place all my household recyclable waste at the curbside for municipal recycling collection.
False ___:___:___:___:___:___:___:True

18. Direct Measure of Attitude (part 2)

My placing all my household recyclable waste at the curbside for municipal recycling collection over the next six months is

Messy ___:___:___:___:___:___:___:Clean
Quick ___:___:___:___:___:___:___:Time-consuming
Smelly ___:___:___:___:___:___:___:Odourless
Complicated ___:___:___:___:___:___:___:Straightforward
Useful ___:___:___:___:___:___:___:Useless
Sensible___:___:___:___:___:___:___:Senseless

19. Direct Measure of Morality (part 2)

Over the next six months…

i) I do not need to place all my household recyclable waste at the curbside for municipal recycling collection as enough is being done by others to clean up the environment.
Disagree:___:___:___:___:___:___:Agree

ii) Everybody should share the responsibility of placing all household recyclable waste at the curbside for municipal recycling collection.
Disagree:___:___:___:___:___:___:Agree

20. Outcome Evaluation (part 1)

Instructions: *Please rate the following general outcomes from your perspective.*

i) My saving my city money is:
Bad:___:___:___:___:___:___:___:Good

ii) My saving electrical energy generally is:
Bad:___:___:___:___:___:___:___:Good

iii) My helping create a better environment for future generations is:
Bad:___:___:___:___:___:___:___:Good

iv) My preserving natural resources
Bad:___:___:___:___:___:___:___:Good

v) My reducing the amount of waste that goes into landfill is:
Bad:___:___:___:___:___:___:___:Good

vi) My helping stimulate the economy is:
Bad:___:___:___:___:___:___:___:Good

vii) My contributing to manufacturing goods made from recycled materials is:
Bad:___:___:___:___:___:___:___:Good

viii) My helping protect the environment is:
Bad:___:___:___:___:___:___:___:Good

ix) My wasting my money is:
Bad:___:___:___:___:___:___:___:Good

x) My having to put in extra mental effort is:
Bad:___:___:___:___:___:___:___:Good

xi) My helping eliminate jobs is:
Bad:___:___:___:___:___:___:___:Good

xii) My not being given money for waste materials is:
Bad:___:___:___:___:___:___:___:Good

xiii) My feeling overwhelmed is:
Bad:___:___:___:___:___:___:___:Good

xiv) My feeling tired is:
Bad:___:___:___:___:___:___:___:Good

xv) My feeling confused is:
Bad:___:___:___:___:___:___:___:Good

xvi) My feeling stressed is:
Bad:___:___:___:___:___:___:___:Good

21. Direct Measure of Attitude (part 3)
My placing all my household recyclable waste at the curbside for municipal recycling collection over the next six months is

Confusing ___:___:___:___:___:___:___:Clear
Efficient ___:___:___:___:___:___:___:Inefficient
Rewarding ___:___:___:___:___:___:___:Not Rewarding
Responsible ___:___:___:___:___:___:___:Not Responsible
Hygienic ___:___:___:___:___:___:___:Not Hygienic
Difficult___:___:___:___:___:___:___:Easy

22. Past Behaviour Direct Measure

i) How often have I placed all my household recyclable waste at the curbside for municipal recycling collection over the last six months?

Rarely:___:___:___:___:___:___:___:Often

ii) Over the last six months I have placed all my household recyclable waste at the curbside for municipal recycling collection.

False___:___:___:___:___:___:___:True

23. Outcome Evaluation (part 2)

Instructions: Please rate the following general outcomes from your perspective.

i) My wasting city money is:
Bad:___:___:___:___:___:___:___:Good

ii) My creating unpleasant odours is:
Bad:___:___:___:___:___:___:___:Good

iii) My creating a mess is:
Bad:___:___:___:___:___:___:___:Good

iv) My attracting pests is:
Bad:___:___:___:___:___:___:___:Good

v) My increasing waste collection costs is:
Bad:___:___:___:___:___:___:___:Good

vi) My not making a difference is:
Bad:___:___:___:___:___:___:___:Good

vii) My needing extra space in my house:
Bad:___:___:___:___:___:___:___:Good

viii) My having to put in extra time is:
Bad:___:___:___:___:___:___:___:Good

ix) My having to put in extra physical energy is:
Bad:___:___:___:___:___:___:___:Good

x) My helping create jobs is:
Bad:___:___:___:___:___:___:___:Good

xi) My helping solve a global problem is:
Bad:___:___:___:___:___:___:___:Good

xii) My helping reduce my property taxes is:
Bad:___:___:___:___:___:___:___:Good

xiii) My experiencing satisfaction is:
Bad:___:___:___:___:___:___:___:Good

xiv) My feeling good is:
Bad:___:___:___:___:___:___:___:Good

xv) My feeling helpful is:
Bad:___:___:___:___:___:___:___:Good

xvi) My feeling reduced guilt is:
Bad:___:___:___:___:___:___:___:Good

xvii) My feeling like I'm doing my part is:
Bad:___:___:___:___:___:___:___:Good

DEMOGRAPHICS

In answering the next questions, please remember that these answers are confidential and will not be linked to you or your family.

24. Do you (or does your family) rent or own your current residence?

Rent
Own

25. What is your age?

Under 20 - ___
20-34 - ___
35-49 - ___
50-65 - ___
Over 65- ___

26. How many individuals in your household are in each of the following age groups? *ENTER A NUMBER FOR EACH CATEGORY INCLUDING ZERO WHERE APPLICABLE*

18 – 27 - ___
28 – 37 - ___
38 – 47 - ___
48 – 57 - ___
58 – 67 - ___

68 – 77 - ___
79+ - ___

27. What is the highest level of formal education achieved by someone in your household?

Less than high school
Some high school
High school graduate
Some college/university
College diploma
University undergraduate degree
Post-graduate degree

28. What is your total household income per year?

Less than $20,000
$20,000 to $39,000
$40,000 to $59,000
$60,000 to $79,000
$80,000 to $100,000
Over $100,000
Not sure

29. What are the first three characters of your postal mailbox?
___ ___ ___

30. What is your gender?

Male
Female
Rather not say

31. What is your marital status?

Married
Divorced
Widowed
Separated
Never been married
A member of an unmarried couple

We've reached the end of the study. Thank you for participating in it. Dr. Paul Missios of Ryerson University is the principal investigator for the study. For any questions, please contact him at this email: pmissios@ryerson.ca Once again, thank you for your participation. The information that you and others have provided is important and will be of help in the effort to take better care of the environment.

Appendix 8: Construal Level Theory

The Importance of Construal Level Matching in Persuasive Messaging

Framing persuasive messaging positively (as in a gain promotion frame) or negatively (as in a loss prevention frame) influences persuasion efficacy. Negatively framed messages from personal acquaintances increase actual recycling behaviours, but positively framed messages results in more favourable attitudes towards curbside recycling (Obermiller, 1995). While it is unclear when a positive versus negative frame is more effective, construal level may be moderating factor (White et al., 2011).

White et al. (2011), in a series of studies manipulating the construal level of a persuasive municipal recycling pamphlet, show that pamphlets with congruent messaging (pairing loss prevention framing with feasibility concerns, or gain promotion framing with desirability concerns) are more effective in increasing objective recycling behaviour than messaging mis-matched on construal level (e.g., a loss prevention frame paired with why desirability concerns). The authors demonstrate a significant increase in recycling intention when matching timeframe construal level (proximal is low, distal is high) with message frame construal level. In their third study, White et al. (2011) again test the influence of matched versus mis-matched construal level recycling pamphlets on recycling intention, but also include measurements of processing fluency and perceived efficacy and again find that messaging paired on construal level is more effective at influencing behavioural intention and find greater processing fluency of matched messaging. They suggest that ease of processing the persuasive messaging is interpreted as ease of doing the behaviour, which may increase self-efficacy and motivation to perform the behaviour in question.

The information included in persuasive messaging is dependent on time: persuasive messaging including feasibility information has a greater influence on purchase choice in the near future whereas desirability information has greater influence on distant future purchase intentions (Thomas et al., 2007). Agrawal et al. (2007) find that participants are willing to pay more for a psychologically distant option when the choice is framed by desirability factors rather than feasibility factors. Fujita et al. (2008) demonstrate that a

value-related argument highlighting the greater environmental sensitivity of a product enhances persuasion for distant future purchase decisions, but not for near future purchase decisions.

Lee et al. (2010) find that a match between regulatory focus and construal level leads to more positive attitudes, driven by "processing fluency as a result of perceived engagement" (White et al., 2011, 480). The ability to process information can influence consumer evaluations (Lee and Aaker 2004; Lee and Labroo, 2004), purchase intentions (Lee et al., 2004) and choices (Novemsky, Dhar and Schwarz, 2007).

Global, indirect benefits can be considered high-level construals because they are physically, temporally, and often times socially, remote. Subsequently, the CLT-based findings around frame matching and the temporal effect on the influence of desirability versus feasibility features offers great insight into how and when advertising global, indirect benefits may influence consumer behaviour.

Insights into the KAG Offered by Construal Level Theory

A relatively new theory based on cognitive construal level offers insight into the causes of the KAG and how the cognitive biases involved may be superseded. CLT hinges on evidence that an object can be mentally construed at different levels (Vallacher and Wagner, 1987) and that "as a direct consequences of activating different mental construals, preferences and decisions shift systematically" (Fujita et al., 2008, 563). A low-level construal is a detailed, contextualized representation of the object in mind that includes minor details and a focus on the feasibility aspects of that object (i.e. the how). Conversely, a high-level construal is a de-contextualized representation of the object in mind that conveys generalized gist from available information while omitting specific details and focus on desirability aspects (i.e. the why). CLT suggests that individuals use higher level construals to represent more distant events, as a generalized heuristic, likely because distal events are fluid and generally lack details. "Lack of knowledge forces people to use more abstract, high-level construals to represent distant entities" (Fujita et al., 2008, 67) and requires use of construals like memories, imagination and predictions.

The Influence of Psychological Distance

CLT proposes that psychological distance influences behaviour by changing the mental representations of choice alternatives and that increased psychological distance systematically influences people's evaluations and choices. Psychologically distant objects are construed at a higher level than psychologically close objects. Psychologically close concepts are experienced personally, while stimuli that are temporally removed, socially distant (sensed by others), spatially distant, or are unlikely to occur are considered psychologically distant. Forster (2009) suggests that novelty has a similar affect as psychological distance. Psychological distance from an object increases tendency to construe it in high-level terms.

Psychologically distal events become connected with high-level construals (and vice-versa) and this connection, as with most heuristics, becomes over-generalized and used even when other, additional information is available (Liberman, Trope and Stephan, 2007; Trope and Liberman, 2003). "Even with equivalent information, construals of objects or events are more high-level when they are temporally distant versus near" (Fujita et al., 2008, 563). The relationship between psychological distance and level of construal is bi-directional (Eyal et al., 2010): "as psychological distance increases, construals become more abstract, and as level of abstraction increases, targets seem more psychologically distant" (Eyal et al., 2009, 69).

How Construal Level Influences Object Value

CLT suggests that the attractiveness of an object is based on the value an individual places on both high-end and low-level construals of that object. Psychological distance increases the weight an individual assigns to an object's high-level value (desirability) while decreasing the weight of the low-level (feasibility) value. Psychologically distancing an object shifts the perception of attractiveness towards the object's high-level value. As psychological distance increases, desirability concerns receive greater weight than feasibility concerns (and vice versa) (Liberman et al., 1998; Tudorov et al., 2007). If an object's high level value is more attractive than its low-level value, as would be the case with most environmental behaviours, the object is perceived as more attractive when it is more remote.

Moral Decisions in Light of the CLT

"Personal values, ideologies, and moral principles are abstract, de-contextualized, super ordinate cognitive structures and as such constitute high-level construals" (Eyal et al., 2009, 79). Central values are higher and will have a stronger affect on distant events versus near future events. Wakslak, Nussbaum, Liberman, and Trope (2008) find that people anticipate exhibiting more consistent traits in distant future opposed to near future. Eyal et al. (2009) show that intentions for further in the future better reflect values. They also show that benevolence values better predict committed volunteer hours for distant future while feasibility concerns better predict committed volunteer hours in the near future. Eyal, Sagristano, Trope, Liberman and Chaiken (2009), using Schwartz's altruism model show that "values were more strongly associated with behaviours planned for the distant future than those planned for near future" (Eyal et al., 2009, 79). They also find that general attitudes are better predictors of intentions for the distant future. "One's cherished values are expressed in one's plans, but unless committed to in advance, they are not necessarily expressed in one's daily conduct" (Eyal et al., 2009, 80). Personal values predict potential future behaviour but often those same values fail to be enacted at implementation unless committed to beforehand. Research shows that high-construal level promotes cooperation in moral judgments (Agerstrom and Bjorklund, 2009) and negotiations – where high level construal increases the likelihood of reaching integrative solution (Henderson et al., 2006).

Individuals are more likely to express prosocial behavioural intentions in the distant future (Agerstrom et al., 2009). Eyal et al. (2010) find that moral transgressions far in the future are more likely to be described in moral terms than transgressions in the near future and "moral transgressions were judged more severely when imagined in the distance compared to the near-future" (Eyal et al., 2010, 9). The same is found for social distance (Eyal et al., 2008).

Insights into Persuasive Messaging Offered by CLT

Loss frames highlight negative consequences and negative consequences signal a threat or problem demanding corrective action. Lee et al. (2010) find that priming an individual with a promotional focus led to more abstract thinking while priming with a prevention

focus led to more concrete thoughts. Temporal orientation can activate concrete or abstract mind-sets (Forster et al., 2004; Wakslak et al., 2008)

Personal relevance is "the extent to which an issue has important personal consequences" (Fujita et al., 2008, 562). Petty et al. (1981) show that high-personal relevance leads to more sensitivity to strength of argument while low-personal relevance leads to more sensitivity to source of argument. This is assumed to work with dual-processing model (systematic versus heuristic processing).

Discussion of Construal Level Theory and Areas for Further Research

While CLT has rapidly gained attention and research interest, it is this investigator's belief that the influence of construal level has not yet been viewed in light of the KAG, nor juxtaposed against the TPB model and methods. The importance of aligning construal level with priming and messaging frame, as displayed by White et al., (2010), cannot be overlooked. The following section highlights some preliminary question and interesting avenues for further research.

CLT suggests that people are naturally primed to pay attention to low-level, feasibility actions at the time of behaviour so persuasive messaging close (temporally and physically) to the behaviour need to highlight feasibility concerns. For example, placing procedural information on the recycling bins themselves. Further away from the behaviour, (physically or otherwise), higher-level construals might be more effective. The efficacy belief of "contribute to manufacturing goods made from recycled materials" is a consequences far-removed from the physical act of recycling, therefore it naturally is construed at high level.

Experiential beliefs, by their nature, are experienced by the individual and are psychologically quite close to the individual. As such, they would lend themselves to low-level construals. Instrumental beliefs would, overall, be construed at a higher level because they are not experienced first-hand and they require a cognitive inference. Direct personal benefits are construed at a low level while indirect, global benefits are construed at a higher level.

The survey questions are posed in low-construal terms; most of the questions are framed in terms of the first person, (with the exception of a couple moral norm and social

125

norm questions that refer to others). Intention is also measured in terms of low-level construal (e.g., "I intend", "I plan", "I will") and addresses the "how" questions of recycling. Similarly, the behaviour construct is also low-level construal because it is both recent and personal. Since the dependent measures are low-level construals, it would follow based on CLT that independent variables construed at the low-level would exert more influence than high-level construed independent variables because the respondent has been primed for low-level construals. Do the RAA survey questions prime the respondent to think in low-level, feasibility terms? Does the Schwartz model prime higher-construal thinking? Would it be possible to create a RAA questionnaire that did not emphasize low-level construals?

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GLOSSARY

ABC Theory: Stern's (1999) theory that depicts behavioural performance as a result of the interaction among attitudinal and contextual variables

AS: Advantage score based on EVM calculation using all advantage beliefs

B: Behaviour construct

BBAALL: Attitude construct based on EVM calculation using all advantage and disadvantage beliefs

BBA3: Attitude construct based on EVM calculation using top three salient advantage and disadvantage beliefs

Behavioural Belief: An individual's belief around a particular consequence of behavioural performance

BI: Behavioural intention construct

CLT: Construal level theory

DMA: Direct measure of attitude construct

DMEA: Direct measure of experiential attitudes construct

DMIA: Direct measure of instrumental attitudes construct

DS: Disadvantage score based on EVM calculation using all disadvantage beliefs

Efficacy beliefs: An individual's belief in how effective a particular behaviour is in achieving the end result it aims to accomplish

EVM: Expectancy-value model

Experiential attitudes: Attitudes that relate to the subjective experience of behavioural performance

Instrumental attitudes: Attitudes that relate to the objective value of behavioural performance

FBC: Food and beverage containers

GDP: Gross domestic product

KAG: Knowledge-action gap

MHB Model: Modified health belief model

MN: Moral norm construct

Experimental Model One: Model tested that has the Behaviour (B) construct as the
dependent variable and uses DMA as the attitude construct

Experimental Model Two: Model tested that has the Behaviour (B) construct as the
dependent variable and uses BBA3 as the attitude construct

Experimental Model Three: Model tested that has the Behavioural Intention (BI)
construct as the dependent variable and uses BBAALL as the attitude construct

Experimental Model Four: Model tested that has the Behavioural Intention (BI) construct
as the dependent variable and uses BBA3 as the attitude construct

Experimental Model Five: Model tested that has the Behavioural Intention (BI) construct
as the dependent variable and uses DMA as the attitude construct

Experimental Model Six: Model tested that has the Behaviour construct (B) as the
dependent variable, uses BBA3 as the attitude construct, and excludes the Past
Behaviour (PB) construct

MOE: Ministry of the environment

PB: Past behaviour construct

PBC: Perceived behavioural control construct

Persuasive messaging: The use of marketing communication techniques to persuade
consumers into performing of a particular behaviour

RAA: Reasoned action approach

RCO: Recycling council of Ontario

REB: Research ethics board

Salient Outcomes: Consequences of behavioural performance that influence the actor's
decision to engage in the behaviour in question. Fishbein et al. (2010) suggest that
there are a finite number of outcomes that will be considered and these are the ones
deemed salient

SN: Social norm construct

Social dilemma: A behavioural choice situation where short-term, personal benefits are at
the expense of long-term, community benefits

Sustainable behaviours: Behaviours performed for which the consequences are beneficial
in terms environmental, economic, and social continuity and improvement

TCR: Transformational consumer research

TPB: Theory of planned behaviour

TPB Models: The theory of reasoned action, theory of planned behaviour, and the
reasoned action approach

TRA: Theory of reasoned action

WDO: Waste Diversion Ontario