Generalizing and expanding the comprehensive action determination model : the case of recycling at home and at work

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2018

Leung, Y. W. (2018). Generalizing and expanding the comprehensive action determination model : the case of recycling at home and at work. Master's thesis, Nanyang Technological University, Singapore.

<http://hdl.handle.net/10356/74233>

<https://doi.org/10.32657/10356/74233>

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**GENERALIZING AND EXPANDING THE
COMPREHENSIVE ACTION DETERMINATION
MODEL: THE CASE OF RECYCLING AT HOME AND
AT WORK**

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WEE KIM WEE SCHOOL OF COMMUNICATION AND INFORMATION

2018

**Generalizing and Expanding the Comprehensive Action Determination Model:
The Case of Recycling at Home and at Work**

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A thesis submitted to Nanyang Technological University
in fulfillment of the requirement for the degree of
Master of Communication Studies

2018

ACKNOWLEDGEMENTS

There is nobody more important than Dr. Sonny Rosenthal in helping me complete my dissertation. Thank you for your tireless support and patient supervision. Most importantly, thank you for inspiring me to strive to be a better researcher.

I would like to extend my gratitude to Dr. Benjamin Detenber and Dr. Christopher Cummings for their invaluable insights along the way. Their suggestions helped to refine this thesis substantially.

There are people to whom I will be eternally indebted. My parents, who have always been a reliable source of food and comfort throughout my life. My friends and classmates, who have made this journey much more enjoyable as we shared triumphs and faced setbacks together. I will like to specially thank my office mates for their friendship and comradery.

I am grateful to the Wee Kim Wee School of Communication and Information for providing me the opportunity to learn from brilliant faculty and peers. The financial support from the school has allowed me to focus on my learning and to conduct this study.

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Abstract

This study aimed to understand the factors influencing proenvironmental behavior in two contexts—at home and at work—by applying the comprehensive action determination model (CADM), a framework that uses rational, irrational, and situational factors to explain proenvironmental behaviors in private contexts. Through generalizing the CADM such that it is applicable to both contexts, the study was able to examine and compare recycling behavior at home and at work. While doing so, this study developed a scale to measure perceived sustainability-related climate, a situational factor proposed to influence proenvironmental behaviors. Next, using the CADM, this study examined if certain factors exert more influence on recycling intention and behavior at home or at work. Lastly, this study expanded the CADM by introducing self-identity to explain how proenvironmental behavior in one context may explain the same behavior in a different context. I administered an online questionnaire to gather responses from 465 working adults, where respondents answered questions pertaining to their recycling behavior at home and at work. Results revealed that the same variables influenced recycling intention in both contexts. However, there were discrepancies in the variables that influenced recycling behavior at home and at work. Specifically, perceived sustainability-related climate had a significant relationship with recycling behavior at work, but not at home. In addition, contrary to previous studies, this study found that self-identity had a direct negative relationship with recycling at work, but had a moderating effect on recycling at home. The results of this study offer an explanation as to why some individuals perform proenvironmental behaviors consistently, while others do not. It also highlights the importance of promoting proenvironmental behaviors in the workplace.

INTRODUCTION

Globally, waste generation rates are rising and are expected to continue rising (The World Bank, 2017a). Recycling is one of the most effective and efficient solutions for managing household and industrial waste (Ma, Yang, & Truong, 2014), motivating many governments to introduce recycling initiatives and legislations in their countries (The World Bank, 2017a). Despite the usefulness of recycling in managing household and industrial waste, the success of recycling also depends on whether individuals actively recycle. Both the home and work contexts present opportunities to recycle, making it possible for individuals to perform recycling at home and at work frequently. Given the benefits of recycling and opportunities to recycle at home and at work, this study seeks to understand recycling behavior in both contexts. It is also useful to examine how practitioners can promote recycling intention and recycling behaviors using different strategies, including communication strategies.

Unfortunately, studies typically focus on understanding recycling behavior only in the home context. Many researchers neglect studying voluntary recycling behaviors at the workplace, as they assume that recycling behavior at the workplace is similar to recycling behavior at home (Lo, Peters, & Kok, 2012; Manika, Gregory-Smith, Wells, & Graham, 2015). Yet, studies repeatedly demonstrate that individuals may perform a behavior in one context, but fail to perform the behavior in another context. For example, while some studies found a relationship between the proenvironmental behaviors (PEBs) performed at work and the PEBs performed at home (Lee, De Young, & Marans, 1995; Tudor, Barr, & Gilg, 2007), there are also studies that failed to detect a relationship between PEBs in different contexts (Littleford, Ryley, & Firth, 2014). Across multiple studies, it seems that individuals

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tend to recycle more at home than they do at work (Blok, Wesselink, Studynka, & Kemp, 2015; Jain, Agrawal, Ghai, Truong, & Seetharam, 2013). In fact, this discrepancy in behavior is notable enough that scholars have called for studies to specify the context in which they are trying to predict recycling intention and behavior (Staats, 2003).

This discrepancy in behavior may suggest that beyond psychological factors, contextual factors are also important in influencing recycling behavior (Klößner & Blöbaum, 2010; Lülfs & Hahn, 2014). Alternatively, some psychological factors that hinder or motivate recycling may be more salient in one context than they are in another. It may also relate to the concept of spillover, in which performing a behavior in one context positively or negatively influences the performance of the same behavior in a different context (Muster, 2011; Thøgersen & Ölander, 2003). Still, scholars acknowledge that there are insufficient studies conducted to understand individual employees' voluntary PEBs at work (Ones & Dilchert, 2012). This study is propelled by the objectives of understanding motivations for performing recycling in the home and work contexts, and why individuals may act similarly or differently between contexts.

To do so, this study first introduces a model of PEB. This study uses the comprehensive action determination model (Klößner & Blöbaum, 2010), which explains behavior as a function of behavioral intention, habits, and situational factors. The model serves as a theoretical guide to examine recycling behavior in the home context; an adapted version of the model (Lülfs & Hahn, 2014) serves to examine voluntary recycling behavior at the workplace. The theoretical models combine theories and concepts of PEB, such as the theory of planned behavior, norm activation model, habits, and situational factors. This study attempts to generalize the model for

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it to be applicable to different contexts. Next, the study examines if certain factors influence behavioral intention differently between the two contexts. Lastly, the study examines the link between recycling behaviors between two contexts by introducing self-identity as a moderating variable. By doing this, I attempt to expand the comprehensive action determination model to offer an explanation to why some individuals perform behaviors consistently and why others do not.

This study contributes to the literature by (1) reviewing the situational variable introduced in the adapted comprehensive action determination model, (2) attempting to generalize a contextualized model of PEB, (3) testing if certain antecedents are more influential in particular contexts and, (4) linking PEBs between two contexts by introducing self-identity as a moderating variable.

LITERATURE REVIEW

In recent decades, a host of environmental concerns such as climate change, pollution, and unsustainable consumerism has perturbed the planet. Such concerns can lead to resource scarcity, health problems, national conflict and instability, and other macro problems. With such extensive consequences at stake, the United Nations listed addressing environmental issues as one of the global key concerns, urging everyone to immediately take “drastic action” (United Nations, n.d.).

Heeding the United Nations’ call to action, many studies have attempted to predict individuals’ PEB intention in hopes of designing successful interventions to promote PEBs—behaviors that individuals consciously perform to reduce their impact on the environment (Kollmuss & Agyeman, 2002). While attempting to encourage such behaviors, scholars have increasingly observed that PEBs in one context do not simply cross over to another context (Littleford et al., 2014; Manika, Gregory-Smith, et al., 2015). That is, PEBs are context dependent (Peattie, 2010), and designing interventions in one context may not be sufficient to encourage the same behavior elsewhere. Thus, this study seeks to understand the common predictors of recycling intention and behavior in different contexts.

Theoretical Approach: Comprehensive Action Determination Model

Traditionally, there are three behavioral theories that scholars adopt to predict PEB intentions. They are the theory of planned behavior (TPB), norm activation model (NAM), and values-beliefs-norms theory (VBN; Cordano, Welcomer, Scherer, Pradenas, & Parada, 2011). To provide a holistic theory to predict behavior, Klöckner and Blöbaum (2010) integrated the TPB and NAM to develop the comprehensive action determination model (CADM). Klöckner and Blöbaum also recognized that

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behaviors are rarely a manifestation of solely our internal attributes. Indeed, scholars alluded to the intention-behavior gap (Webb & Sheeran, 2006). Studies argued that individuals often perform behaviors due to a combination of internal attributes and situational factors (Thomas & Sharp, 2013). Furthermore, individuals do not always perform behaviors based on rational decisions. There are behaviors that individuals unconsciously perform, termed habits. Hence, the CADM further integrated habits and contextual factors as antecedents of behavior to develop a holistic model of PEBs (Klöckner & Blöbaum, 2010). Using these theories and concepts, the CADM includes rational motivations, altruism, automatic behaviors, and situational factors to predict PEBs.

The model has been useful in predicting PEBs such as choosing environmentally friendly transportation options, general recycling, and material-specific recycling in the home context (Klöckner and Blöbaum, 2010; Klöckner & Oppedal, 2011). The studies underscore the importance of a recycling system (situational factors) and personal characteristics in influencing recycling behavior.

Figure 2.1. Representation of CADM (Klöckner and Blöbaum, 2010)

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The CADM comprises four processes: intentional processes, habitual processes, normative processes, and situational processes. According to the CADM, habits, intentional processes, and situational processes directly predict PEBs. On the other hand, normative processes indirectly influence environmental behaviors via intentional processes and habits. The following paragraphs discuss these processes.

Intentional processes

Some scholars regard most behaviors to be goal-oriented and based on rational decisions (Bard, 1992). When a behavior is intentional, it means that individuals have to put in cognitive effort to consider different aspects of the behavior and to assess the goal of performing the behavior (Ohtomo & Hirose, 2007). The CADM groups behavioral intention and attitudes toward a behavior under intentional processes. The model proposes intentional processes as a direct antecedent of PEBs.

Recycling intention. To study behavior, scholars frequently try to predict behavioral intention. For rational actions, individuals often first make a decision to adopt a certain behavior before they perform the behavior (Ajzen, 1996). The TPB assumes that intention encapsulates the motivational indicators that can trigger a behavior (Ajzen, 1991). Therefore, in rational behavior theories such as the TPB, intention to act is assumed to be an immediate antecedent of behavior (Ajzen, 2002).

Behavioral intention signals individuals' progression from the contemplation of action to the willingness to exert effort to perform the action (Ajzen, 1991). The strength of behavioral intention is also an indication of how much effort individuals are willing to exert when attempting to perform a behavior (Ajzen, 1991, 2011). Put simply, behavioral intention is a decision to perform a behavior, and signals how motivated individuals are to perform the behavior (Ajzen, 1991). Recycling intention

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thus reflects how willing and motivated individuals are to exert effort to recycle. By understanding the strength of individuals' recycling intentions, scholars can predict actual recycling behavior.

Attitude toward recycling. Many studies have identified attitude toward recycling as a strong predictor of recycling intention (Lee & Paik, 2011; Robertson & Barling, 2013; Tudor et al., 2007). Attitudes are learned predispositions that guide consistent behavior and judgment toward a particular object (Eagly & Chaiken, 1993; Fishbein & Ajzen, 1977). Attitudes are predicated on individuals' belief system, which results in a positive or negative evaluation of the behavior (Ajzen, 1991). The set of beliefs that attitudes are based on need to be easily accessible to individuals (Ajzen, 2011) and will eventually be used to guide thought and action (Perloff, 2003). In other words, beliefs can serve as heuristics that guide attitudes.

According to the expectancy-value theory (Fishbein, 1963; Fishbein & Ajzen, 1977), attitudes are comprised of cognitive and affective components. Attitude toward a behavior partially forms when individuals consider the potential outcomes of performing the behavior. When individuals believe that a behavior can help them achieve a desired goal, they evaluate the behavior more positively than if a behavior does not help them achieve the goal. Attitude toward a behavior also partially forms when individuals evaluate how they feel about the goal they are trying to achieve and how they feel about attributes of the behavior (Palmgreen, 1984). Attitude is also shaped by the expected emotional experience individuals think they will feel when performing the behavior (Kraft, Rise, Sutton, & Røysamb, 2005). If individuals expect that performing a behavior will lead to positive affect, they are more likely to form a positive attitude toward it.

Habitual Processes

Not all behaviors are planned and motivated by goals; some behaviors are automatic (Neal, Wood, Labrecque, & Lally, 2012). That is, individuals unconsciously perform these behaviors. Such unconscious performance of behaviors is labeled habits, which refer to behavioral routines that became automatic to individuals (McDonald, 2014). Although habits are triggered automatically, individuals still have control over their behaviors and have agency over their habits, making habits distinct from similar concepts like reflexes, phobias, and compulsions (Pollard, 2006). Frequently performed behavior is more often an outcome of habit, instead of an outcome of deliberation (Aarts et al., 1998), highlighting the value of including habit as an antecedent of behavior. Empirical findings lend support to the importance of habits in predicting PEB (McDonald, 2014), suggesting that theoretical models can benefit from considering habits when examining behaviors.

There are two essential elements in habit formation: the frequency of behavior and context stability. Past behavior can predict future behavior especially when the individuals repeat a behavior so frequently that it becomes a habit. Habits influence behaviors when individuals do not have a goal in mind (Ouellette & Wood, 1998). This is because the repeatedly performing a behavior makes the behavior well-rehearsed, resulting in the automatic initiation of behavior (Ouellette & Wood, 1998). In fact, bad recycling habits may negate positive attitudes toward recycling as a predictor of recycling behavior. A study found that the attitude-behavior gap pertaining to recycling might be due to individuals' habit of treating recyclables as garbage (Knussen & Yule, 2008).

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The presence of the same contextual cues also trigger habits (Lally et al., 2010). A study revealed that decisions about recycling behavior often take place in the household context where recycling is seen as a routinized domestic task (Oates & McDonald, 2006). Therefore, recycling or not recycling in the household often becomes a habit (Klößner & Oppedal, 2011; Thomas & Sharp, 2013). However, due to the need for context stability in habit initiation, forming a recycling habit at home frequently does not translate to having a recycling habit at the workplace (McDonald, 2011). The need for context stability, even in automatic behaviors, supports the proposition put forward by Staats (2003) to examine context specific behaviors, instead of general behaviors.

To initiate the formation of a habit, individuals need first to have an intention to perform the behavior to achieve a desired goal (Ouellette & Wood, 1998). Successfully achieving the goal encourages individuals to perform the behavior every time they wish to achieve this goal (Louro, Pieters, & Zeelenberg, 2007). That is, individuals form a mental script where they believe that a particular behavior helps them attain the goal. During this process, individuals learn how to perform the behavior more efficiently by forming routines such that the performance of one action cues the next (Graybiel, 1998). Individuals then perform this set of actions (the routine) frequently such that it becomes automatic to them, forming habits. This paper discusses more on routines below, where I introduce routines alongside the adapted CADM.

Normative Processes

Normative processes include social norms and personal norms. Norms motivate behavior because individuals believe that others expect them or individuals

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expect themselves to perform the behavior. The CADM postulates normative processes to influence PEBs indirectly via habits and intentional processes.

Social Norms. Social norms are rules that individuals in a group understand and use to guide behaviors without the force of law (Cialdini & Trost, 1998). Group members negotiate these rules through social interaction and social sanctions or approvals by other members (Cialdini & Trost, 1998), and different groups may obey different norms. Collective norms are commonplace behaviors that can be studied through objective measures such as media coverage, social networks, and actual behavior frequency (Lapinski & Rimal, 2005). However, collective norms have limited impact on behaviors if individuals do not perceive the collective norm accurately. For example, a study in Japan revealed that men overestimated other men's negative attitudes toward taking paternity leave, which led to low willingness to apply for paternity leave (Miyajima & Yamaguchi, 2017). Such a finding indicates that perceived norms shape behaviors more than collective norms do.

Subjective norms refer to the individual's *perception* of what is popular in a group (Lapinski & Rimal, 2005). Subjective norms exist at the individual level as subjective norms refer to what an individual perceives a group to endorse (Lapinski & Rimal, 2005). These perceptions act as a guide on what the socially accepted behaviors are in different situations and use these perceived norms as information on how to behave in a social situation (Jones & Gerard, 1967). Individuals perceive different groups to have different behaviors and expectations of behavior; individuals tend to adapt to follow the perceived norm of the group they are with (Perloff, 2003). This makes it crucial to consider the specific context in which subjective norms are salient. Once again, stressing the importance of context specificity when predicting behavior.

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This study examines two distinct types of subjective norms—descriptive norms and injunctive norms. Descriptive norms refer to beliefs regarding behaviors performed by the majority of the group. Injunctive norms, on the other hand, are perceptions of having to endure social sanctions for not performing a behavior (Lapinski & Rimal, 2005). Both types of subjective norms influence behaviors to different extents and in different situations (Reno, Cialdini, & Kallgren, 1993), typically depending on how salient the norm is (Cialdini, Kallgren, & Reno, 1991; Jonas et al., 2008). When individuals violate a norm that is salient in their group, they tend to experience negative affect such as worry and guilt (Costarelli, 2005). To avoid experiencing negative affect, individuals tend to follow the descriptive norms and cooperate by adhering to the norm (Balliet, 2010; Doherty & Webler, 2016).

Personal Norms. While subjective norms assume individuals are concerned about social sanctions, personal norm posit individuals also perform prosocial behaviors because they feel morally obligated and see a legitimate reason to do so (Thøgersen, 2008). Personal norms refer to the expectations that individuals hold themselves up to, causing individuals to feel morally obligated to act in accordance with their personal norms (Schwartz, 1973; Schwartz & Howard, 1981). When individuals have a strong personal norm toward an issue, they feel personally responsible for the problem or solution (De Groot & Steg, 2009).

Personal norms can also influence people's affective response to issues (Matthies, Selge, & Klöckner, 2012). Individuals are likely to form stronger personal norms that are more internalized and aligned with their other beliefs when they engage in more elaborate reasoning of an issue (Deci & Ryan, 1985). The more internalized personal norms are the more stable they become across time and contexts (Schwartz, 1977). Individuals experience stronger emotional arousal when stronger personal

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norms are violated (Schwartz, 1977). When personal norms are activated, individuals anticipate feeling guilty for failing to perform the behavior, and therefore choose to perform it to avoid anticipated guilt (Han, 2014; Onwezen, Antonides, & Bartels, 2013). Individuals who act counter to their personal norms could eventually experience guilt and worry, which are emotional states that individuals typically wish to avoid (Schwartz, 1977).

Individuals adhere to both subjective norm and personal norm to avoid negative affect (Doherty & Webler, 2016; Schwartz, 1977). However, the negative affect stems from different sources—individuals adhere to personal norms due to anticipated internalized sanctions; however, they adhere to subjective norms due to anticipated external sanctions (Schwartz & Howard, 1984). Studies suggest that personal norm had a stronger effect than subjective norm on intention to reduce car use and purchase organic food (Abrahamse, Steg, Gifford, & Vlek, 2009; Dean, Raats, & Shephard, 2008). The findings support the notion that PEBs are moral behaviors, and personal norm is an antecedent of PEBs.

Situational Processes

While the previously discussed concepts were individual-level variables, Klöckner and Blöbaum (2010) identified external factors to play a complementary role in influencing behavior. The CADM posits situational processes as a direct antecedent of PEB. Situational processes comprise subjective and objective factors that may hinder or facilitate behavior. The ability and opportunity to perform a behavior affects whether individuals can act on their behavioral intention (Ajzen, 1991). While many people are intrinsically motivated to perform various PEBs, they may not act on these motivations when it is difficult to perform the behavior in a given context (Steg,

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2016). As mentioned earlier, previous studies documented that the same individual may behave differently given different contexts, especially if the contexts are dissimilar (Furr & Funder, 2004). Therefore, for a more holistic understanding of recycling behavior, studies need to pay attention to situational processes that may influence behavioral intention and actual behavior (Norton, Parker, Zacher, & Ashkanasy, 2015).

Subjective Factors. Subjective factors refer to whether individuals perceive their intended behavior to be hindered by their surroundings. The CADM conceptualizes subjective factors as perceived behavioral control, which refers to individuals' confidence in performing a desired behavior (Ajzen, 1991). Greater perceived behavioral control signals individuals' belief that they are likely to perform the behavior successfully and are more likely to persist in their attempts to adopt a behavior (Ajzen, 2002). It is affected by internal and external components. Internally, individuals need to feel confident to acquire resources required to overcome potential barriers to perform the behavior in a given context (Ajzen, 2002). In addition, perceived behavioral control may be influenced by external factors such as individuals' actual access to opportunities, resources, and skills in a given context (Madden, Ellen, & Ajzen, 1992). Due to differences in access to resources, individuals may be confident about performing a behavior in one context but feel incapable of performing the behavior in another context. According to the TPB, attitudes, subjective norms, and perceived behavioral control lead to the formation of behavioral intention, while perceived behavioral control and behavioral intention account for actual behavior (Ajzen, 2002).

Objective Factors. Different objective factors can hinder or facilitate different behaviors. Specific to recycling, objective factors that studies have identified as crucial

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to influencing behavior includes the presence of recycling infrastructure, incentives, and recycling-related communication in the community.

Recycling infrastructure. The presence of recycling infrastructure resulting in convenience and accessibility to recycling services helps to promote recycling (Bolaane, 2006). By making recycling convenient and accessible, individuals perceive recycling to be easier; when recycling is inconvenient and inaccessible, individuals perceive that they have to put in more effort to recycle (Johnston, 2013). Interventions have successfully increased recycling rates solely by increasing the convenience of recycling (Johnston, 2013). For example, greater accessibility to recycling bins through the introduction of curbside recycling or having recycling bins closer to homes increased recycling behaviors (Chen & Tung, 2010; Derksen & Gartrell, 1993; Oke, 2015; Osbaldiston & Schott, 2012). In fact, studies have identified convenience as the single strongest predictor in influencing recycling (Miafodzyeva & Brandt, 2013; Saphores & Nixon, 2014). In a separate study, almost 80% of respondents stated that they occasionally recycle paper, but do not recycle more frequently as recycling services were inconvenient (Martin, Williams, & Clark, 2006).

Incentives. Scholars also acknowledged the use of incentives in promoting recycling. In some studies and initiatives, scholars have attempted to encourage communities to recycle by providing monetary incentives to recycle. Such initiatives often require residents to hand over their recyclables in exchange for monetary compensation. However, incentives often make recyclers and potential recyclers very sensitive to the external rewards they get for their behavior (Schultz, Oskamp, & Mainieri, 1995). These initiatives are often useful in encouraging residents to start recycling, but effects often disappear after removing the incentive (Yau, 2010). Still,

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the findings point to the role external objective factors play in influencing recycling intention and behavior.

Communication efforts. Another objective factor is the extent of communication efforts to encourage recycling. Some neighborhoods appoint block leaders or community leaders to interact with residents to persuade and encourage residents to recycle (Burn, 1991). Other neighborhoods may distribute communication collateral or use interpersonal communication to educate residents on why they should recycle and how they can recycle, and these communication efforts are typically reported to be successful (Cotterill, John, Liu, & Nomura, 2009; Mee, Clewes, Phillips, & Read, 2004). For example, door-to-door distribution of recycling information encouraged 50% of residents to convert to larger volume recycling carts within four weeks (Willman, 2015). These communication efforts helped to raise recycling intention and recycling behavior.

These studies point at the importance of subjective and objective factors in influencing recycling behavior, making it sensible to include situational processes as a predictor of behavior. However, an issue with the concept of situational processes is that it is overly general, and differs between contexts (which is what makes it situational). On an abstract level, it may be useful to say that situational variables influence behaviors. However, recognizing the role of situational processes does little in guiding practitioners on what their initiatives should be. The adapted CADM offers insight to how business literature defines their situational variable.

Adapting the CADM to the Workplace

Despite the comprehensiveness of the CADM, scholars argue that it only predicts private-sphere PEBs (Lülfes & Hahn, 2014). According to Stern (2000),

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private-sphere PEBs refer to direct actions taken by individuals to reduce their own impact on the environment in their private space, typically in their own homes.

Examples of such behaviors include recycling at home, green purchasing, and resource-conservation behaviors at home.

Voluntary PEBs in the Workplace

While studying environmental behaviors in the private sphere has its merits, scholars argue that the literature tends to neglect voluntary PEBs performed in the workplace, which is a more public space (Börner, Kalz, Ternier, & Specht, 2013). Even though individuals tend to produce less waste at work than at home, it is meaningful to study voluntary PEBs in the workplace as working adults spend approximately one-third of their day in the office (Blok et al., 2015). This potentially makes their waste generated in the office substantial.

Studying recycling at work also provides insight into defining characteristics of a context that motivates recycling. Notably, Littleford et al. (2014) found that the home and work contexts were defining features of whether individuals performed PEBs. Recycling at home and recycling at work are distinct behaviors, and scholars have called for more understanding about voluntary PEBs at the workplace (Daily, Bishop, & Govindarajulu, 2008; Ones & Dilchert, 2012; Paillé & Boiral, 2013).

Voluntary PEBs in the workplace are PEBs that the organization did not mandate, and which employees may choose to perform (Lülfes & Hahn, 2013). It requires employees to proactively perform the behavior (Norton, Zacher, & Ashkanasy, 2014). Voluntary PEBs in the workplace are distinct from task-related PEBs, where the latter refers to PEBs performed with the aim of completing an assigned work task (Norton et al., 2014). Measuring employees' voluntary PEB in the

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workplace provides a more accurate reflection of the organization's sustainability culture, as opposed to simply evaluating reports, incentive systems, codes of conduct, and structures (Lülfes & Hahn, 2014).

Lülfes and Hahn (2014) argued that the CADM does not adequately predict voluntary PEB in the workplace because it does not take into consideration concepts that have been established to predict workplace behavior. Therefore, in an effort to study voluntary PEBs in the workplace, they adapted the CADM by introducing the concept of perceived sustainability-related climate to replace situational influences and proposed organizational routines as an antecedent of workplace habit. I introduce these concepts below.

Figure 2.2. Adapted CADM to predict voluntary PEBs in the workplace (Lülfes & Hahn, 2014)

Habit and Organizational Routines

In a workplace, employees' habits are formed by organizational routines, which essentially refer to patterns and regularities (Becker, 2004). By frequently engaging in organizational routines, individuals remember their routines, and this eventually shapes their habits (Cohen & Bacdayan, 1994).

The essence of organizational routines is repetitive patterns involving multiple actors engaging in interdependent actions (Becker, 2004; Feldman & Pentland, 2003). Organizational routines are a product of organizational learning, which helps to diminish variability and promote standardization of operations, and reduce chances of failure (March, 1991). In a sense, organizational routines are scripts or task hierarchies that employees adhere to in order to accomplish a goal (Polites & Karahanna, 2013). Organizational routines are also context-dependent, as routines require external support to execute (Suchman, 1987). The importance of external support indicates that established organizational routines may allow employees to form related habits in the workplace, but these behaviors may be incompatible in another context (Madhok, 1997). Organizational routines sometimes reflect a response to managerial goals (Cohen et al., 1996), which in turn, shapes the actions taken by employees.

Perceived Sustainability-related Climate

Another contribution of the adapted CADM is the introduction of a specific situational process, instead of using perceived behavioral control as a measure of situational processes. Despite the addition of perceived sustainability-related climate to the model, scholars still comment that there is a lack of studies examining proenvironmental organizational climate (Norton, Zacher, & Ashkanasy, 2015). Therefore, this thesis aims to understand what constitutes perceived sustainability-

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related climate. Through literature search, this study explicates perceived sustainability-related climate to be influenced mainly by two factors: Perceptions of sustainability policies and perceptions of sustainability-related communication.

Although people are often motivated to perform proenvironmental behaviors, their desired behaviors may be constrained if external support is lacking (Steg, 2016). Lülfs & Hahn (2014) introduced perceived sustainability-related climate as a workplace-specific situational variable, which refers to whether employees *perceive* the organization to be active in fostering sustainability. Whereas objective situational factors are helpful in shaping behavior, the *perception* of these factors is essential for motivating behavior (Lülfs & Hahn, 2013; Norton et al., 2014). Having sustainability policies does not mean employees will perceive a positive sustainability-related climate as they may view such policies as a mere façade (Kish-Gephart, Harrison, & Treviño, 2010) or an attempt at promoting self-interest instead of promoting PEBs (De Roeck & Delobbe, 2012).

Scholars echo the potential importance of studying perceived sustainability-related climate (Norton et al., 2014; McDonald, 2014). Lülfs and Hahn (2014) even posited that perceived sustainability-related climate is the reason why some policy changes fail to promote PEBs effectively. Supporting this claim, a study found that employees' perceptions of sustainability policies have a positive relationship with employees' voluntary PEBs at work (Norton et al., 2014). Despite the seeming usefulness of perceived sustainability-related climate, there is little guidance on what this concept entails. This may be the reason why despite the introduction of a situational variable, McDonald (2014) still commented that the contextualized model neglected the organizational context. The importance of studying perceived

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sustainability-related climate, coupled with the lack of understanding of what the concept entails, calls for a much-needed explication of the term.

Sustainability Policies. Business commentators frequently lament that many organizations do not practice the values they promote, and identify the problem to be a lack of commitment among employees to practice these values (Lavoie, 2017). Codes of conduct, regulation, incentives, and infrastructure are all means by which an employer can signal how much organizations value certain practices and make these values personally relevant to employees (Chou, 2014). An organization that truly valued a behavior and wanted to promote the behavior should make it easy and rewarding for the employee to perform the behavior (Nelson & Quick, 2013).

To make it easy and rewarding to recycle at work, scholars found that management could introduce sustainability-related trainings and key performance indexes (Manika, Wells, Gregory-Smith, & Gentry, 2015). Some examples of recycling policies in the workplace include providing rewards to employees who recycle frequently (Nelson & Quick, 2013; Young et al., 2015), evaluating recycling practices as part of the hiring and promotion process (Renwick, Redman, & Maguire, 2013; Sepah, 2017), and encouraging recycling in formal work trainings (Jones, Jackson, Tudor, & Bates, 2012).

Haugh and Talwar (2010) found that employees learn most effectively by being active participants in their own learning, such as when employees learn from practical experience. Compared to formal trainings, active learning is argued to be a more effective tool for employee learning, as employees are more likely to encourage others to perform similar behaviors after learning the behavior themselves (Armstrong & Sadler-Smith, 2009). Therefore, a system that rewards and encourages employees to

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recycle can serve as an effective tool for employees to learn from their own recycling experiences.

Sustainability-related Communication. Another key dimension of perceived sustainability-related climate is recycling-related communication. When there are no rules to mandate PEBs, communication becomes vital in solving environmental issues and encouraging cooperation (Balliet, 2010; Xu, Maki, Chen, Dong, & Day, 2017). Sustainability-related communication in the workplace plays a vital role in influencing employee behavior because employees are captive audiences to whom members of the organization can easily reach out via e-mail or newsletters (Carrico & Riemer, 2011).

Sustainability-related communication refers to the transmission of messages that aim to inform, explain to, or persuade others about PEBs. Such communication can come in the form of mediated communication or interpersonal communication, ranging from simple signage and prompts, to leaders personally requesting employees to perform PEBs. The content and purpose of each communication may vary. Prompts may be used simply to remind employees to recycle, while interpersonal communication may be used to persuade and motivate employees to practice PEBs. As this study focuses on encouraging recycling, it will only focus on messages pertaining to recycling.

Many experimental studies have examined the effects of using communication tools to encourage recycling in the workplace (Oke, 2015; Young et al., 2015). Communication by organizational leaders often results in the most behavioral change among employees, especially when leaders articulate the importance of PEBs (Graves, Sarkis, & Zhu, 2013; Robertson & Barling, 2013; Smith & O'Sullivan, 2012; Young et al., 2015). In fact, according to Blok, Wesselink, Studynka, and Kemp (2015),

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performing PEBs at the workplace is influenced mainly by support provided by organizational leaders. When leaders communicate a clear environmental vision and discuss the communicate sustainability to be a priority, employees tend to be more motivated to perform PEBs; these motivations eventually translate to actual PEB (Graves et al., 2013; Robertson & Barling, 2013). Furthermore, being surrounded by supervisors or management who are passionate about environmental issues and PEBs enables employees to clarify doubts and learn skills that may otherwise hinder the successful performance of behavior (Jones et al., 2012).

Frequently providing feedback on employees' behaviors also helps to promote PEBs (Carrico & Riemer, 2011; Lo et al., 2012; Young et al., 2015). Feedback is provided to employees after the behavior is performed (Abrahamse, Steg, Vlek, & Rothengatter, 2007), with the aim of informing employees on the effectiveness of their behaviors (Steg & Vlek, 2009). Feedback about energy consumption at the workplace successfully decreased actual energy consumption (Carrico & Riemer, 2011), illustrating the role of feedback in encouraging PEBs at work. Specific to recycling, employees can receive feedback about how much they have recycled, or how their recycling behaviors have affected the organization.

Other communication tools that can be used in the office include prompts to remind employees when and where to recycle (Osbaldiston & Schott, 2012), and educational collateral to inform employees how, when, where, and why to recycle (Kaplowitz, Yeboah, Thorp, & Wilson, 2009). In order to be effective, collateral have to be noticeable, simple, and close to the site where individuals perform the behavior (McKenzie-Mohr, 2011). A meta-analysis found that across several studies, a single prompt was sufficient for increasing recycling rates, even though prompts are the least

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intrusive and least expensive communication strategy used to promote recycling (Schultz et al., 1995).

Even when communication efforts did not influence attitudes and norms, simple communication interventions such as reminders were sufficient to increase recycling behaviors (Hopper & Nielsen, 1991). Similarly, studies found posters, another intervention that is not highly intrusive, to be effective in encouraging PEBs such as recycling (Jones et al., 2012; McDonald, 2004). Hence, perceptions of sustainability-related communication might greatly increase the frequency of performance of PEBs.

Indirect effect by perceived sustainability-related climate. The adapted CADM suggests that perceived sustainability-related climate influences behavioral intention indirectly via personal norms. With sustainability training, environmental personal norms can become more salient at the workplace and become more predictive of voluntary PEBs at the workplace (Dvorak, Stewart, Hosni, Hawkey, & Nelsen, 2011). Communication with leaders, communication collaterals, and trainings can be designed to activate recycling personal norms in the office by explaining the consequences of not recycling to employees or persuading the employee that the onus to recycle is on the employee (Lülfes & Hahn, 2014). According to the NAM, by increasing awareness of consequences of one's actions and increasing the ascription of responsibility to oneself, personal norms are likely to be activated (Schwartz, 1977). By designing messages to raise awareness of consequences and ascription of responsibility, sustainability policies and sustainability-related communication may activate employees' personal norms to recycle in the workplace.

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There are also instances where sustainability-related communication promotes PEBs via influencing attitudes, a relationship that was not posited by Lülfs and Hahn (2014). There are studies showing that communication about recycling improves attitudes toward recycling (Chen & Tung, 2010; Grodzinska-Jurczak, Tomal, Tarabula-Fiortak, Nieszporek, & Read, 2006). Practitioners often use communication as a persuasive or informational tool to influence attitudes (Burn & Oskamp, 1986). Similarly, workplace interventions often feature communication as a strategy to influence employees' attitudes toward recycling (Carrico & Riemer, 2011; Lo et al., 2012). For instance, informational campaigns and workplace interventions can try to encourage recycling by communicating the benefits of recycling.

Towards a Generalized Model

Through integrating models and theories that are predictive of behavior, the CADM and adapted CADM serve as useful tools to predict PEB and intention. However, it should not be necessary to rely on two highly similar models to predict PEBs in two different contexts. Furthermore, having a model that is only applicable to the workplace and another model that is applicable only to the private sphere makes it difficult to use the model to predict behaviors in other contexts such as school, vacation, etc. The two concepts—organizational routines and perceived sustainability-related climate—introduced in the adapted CADM need not be applicable to just the workplace. In this section, I generalize these concepts to make the model applicable in a wide range of contexts.

Generalizing Organizational Routines

While employees may follow organizational routines at work, individuals also follow their own routines elsewhere. According to the Oxford English Dictionary,

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routines are “a sequence of actions regularly followed.” Through this regularly enacted sequence of actions, individuals identify patterns over time and begin to learn and assume that it is common sense to complete that particular task according to the routine they have learned (Edensor, 2006).

Many scholars used the terms habit and routine interchangeably as individuals perform many actions with a high degree of recurrence (Southerton, 2012). However, Pedwell (2016) suggests that habits are behaviors that individuals compulsively perform, such that the disruption of habits can cause individuals to experience some form of affective arousal to signal that disruption. On the other hand, routines are not as deeply embedded in our lives and the disruption of routines will not trigger emotional responses. Furthermore, a key differentiating point between routine and habit is that routine is not automatically triggered. Instead, following a routine still requires individuals to put in effort to consciously perform a set of actions.

The adapted CADM posits that organizational routine is an antecedent of habit in the workplace. This relationship between routines and habits is not exclusive to the workplace. At home, individuals also follow routines that eventually shape habits. At home, recycling is not just a conscious act, but also a domestic chore where individuals form routines to facilitate frequent recycling (Oates & McDonald, 2006). A recycling routine may include a subset of the following actions: buying recyclable products, sorting recyclables from non-recyclables, washing recyclables, storing recyclables, and taking recyclables to the nearest recycling point. Through performing these actions frequently, the behavior often becomes automatic, suggesting that recycling routines at home also form recycling habits (Georg, 1999; Oates & McDonald, 2002). Therefore, the relationship between routines and habits is not exclusive to the work context. It is also applicable to other contexts such as the home.

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Routines are part of everyday life (Edensor, 2006), and by no means only occur in the workplace or home. Just as organizational routines act as scripts for employees in the workplace, routines outside of the workplace guide individuals on how to complete a task while minimizing chances of failure. Some other routines that scholars have studied include daily routines, classroom routines, bedtime and morning routines, defensive routines, skincare routine, etc. As routines entail regular repetition of a sequence of actions, individuals may practice that sequence of actions frequently enough to make it a habit. This can happen in any context—as long as individuals can form a routine in one setting, that routine can be potentially repeated in that context frequently enough to become a habit in that context. Hence, it is important for scholars to consider the routines in the context they examine.

Generalizing Perceived Sustainability-related Climate

Similarly, perceived sustainability-related climate can be a more general concept that is applicable in most contexts. Individuals can form perceptions of sustainability initiatives and sustainability-related communication in any situation.

Perceptions of sustainability policies. Sustainability policies broadly refers to whether there are initiatives to promote PEBs. Beyond the workplace, relevant authorities can plan campaigns and initiatives to incentivize individuals to perform more recycling. Authorities can also position more recycling bins in convenient locations to facilitate recycling. Such policies can foster a perception that the particular community values recycling and are interested in supporting environmental causes. Specific to the home context, individuals can hold perceptions of whether there is accessible recycling infrastructure to facilitate recycling based on whether their neighbors and town councils implement recycling initiatives to make recycling more

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accessible. However, while communities could attempt to foster perceptions of sustainability policies by introducing actual sustainability initiatives, it is equally crucial to foster positive perceptions of these policies, as it is the perceptions that influence individuals' recycling intention and behavior.

Perceptions of sustainability-related communication. Sustainability-related communication refers to interpersonal and mediated communication to promote PEBs. The presence or absence of such communication allows individuals to perceive whether their community values the performance of PEBs. At home, family members, neighbors, and community leaders can remind individuals to perform PEBs via interpersonal and mediated communication. Therefore, perceptions of sustainability-related communication is also relevant in the home context. In other contexts, representatives of the place can remind and encourage individuals to perform PEBs, fostering a sustainability-related climate.

Given the extensive parallels between the original CADM and the adapted CADM, both models can be used to form a generalized model of PEB. Like the CADM and contextual CADM, this generalized model is comprehensive as it includes internal attributes, habits, and contextual factors as antecedents of PEBs. However, this generalized model is an improvement to the original CADM and the adapted CADM as it allows scholars to refer to one general model of PEBs to understand such behaviors in various contexts.

Context-specific Antecedents

Given that the generalized model is applicable across contexts, it enables scholars to make comparisons that reveal the factors most influential in each context. With the generalized CADM, this study examines if certain antecedents are more

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strongly related to PEBs in the home and work contexts. It is also imperative to test whether routines and perceived sustainability-related climate are significantly related to PEBs in a context other than the workplace. As a means of testing the generalized CADM in the private sphere and a public sphere, this study compares recycling behaviors at work and at home.

Prior research has examined some of the elements from the CADM in the home and workplace, and those studies provide a starting point for hypothesizing about context-specific differences. Some elements from the CADM that were tested in the home and workplace in previous studies include subjective norms, attitudes, and personal norms.

Recycling Subjective Norms

Past studies illustrate a pattern that subjective norms tend to more strongly predict workplace recycling than domestic recycling. This may be due to the presence of organizational leaders at work. A study revealed that leadership plays a crucial role in influencing PEBs at work, especially if organizational leaders have a strong personal commitment to environmental sustainability (Cairns, Newson, & Davis, 2010). The descriptive norms of supervisors and managements' PEBs often have a significant impact on employees' proenvironmental intentions and behaviors (Blok et al., 2015; Robertson & Barling, 2013). In a workplace context, employees draw information about what the organization considers appropriate and expected behavior by observing their leaders' behaviors (Mayer, Nishii, Schneider, & Goldstein, 2007; Robertson & Barling, 2013). Young et al. (2015) found that when superiors perform PEBs, they act as role models thus increasing the chances of employees adopting the behavior as well. Therefore, leaders significantly influence employees' motivations to

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perform voluntary behaviors at work (Derue, Nahrgang, Wellman, & Humphrey, 2011; Ilies, Nahrgang, & Morgeson, 2007).

In the home context, family members and friends can influence subjective norms. Many surveys that use subjective norms as an antecedent of household recycling intention typically refer to important others (Chu & Chiu, 2003; Mannetti, Pierro, & Livi, 2004; Park & Ha, 2014; Taylor & Todd, 1995) or significant others (Jones, 1989) when measuring subjective norms. These studies did not specify exactly who are the people influencing behavioral intention. Some studies indicated a significant relationship between subjective norms on behavioral intention, but the relationship is relatively weak compared to attitudes and perceived behavioral control (Armitage & Conner, 2001).

The influence of subjective norms on recycling intention might differ across context. These differences may be due to differences in motivation to comply with the subjective norms of each group. Subjective norms of different groups may exert a different amount of influence on behavior depending on how motivated individuals are to comply with the norm (Ajzen, 1985). Motivation to comply interacts with subjective norms to influence behavioral intention (Ajzen, 1985). Only when individuals are motivated to adhere to the rules of their referent groups, will subjective norms become a predictor of behavioral intentions.

Empirical studies postulated motivation to comply as an indicator of whether subjective norms will be an effective motivator of recycling behaviors. A study measured the subjective norms of up to eight potential referent groups, including family, close friends, romantic partner, co-workers, roommates, community members, government officials, and environmentalists (Park, Levine, & Sharkey, 1998). That

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study found that individuals were more motivated to comply with the recycling subjective norms of co-workers than with family members or any other referent groups. This signals that individuals have stronger motivations to fit in and gain acceptance when they are at work than when they are at home. Another effort to identify which group of people have more influence over individuals measured subjective norms of family and friends separately. After explicitly identifying friends and family to be the referent groups, subjective norms were not significantly related to recycling intention (Knussen et al., 2004). This suggests that for household recycling, subjective norms of family and friends may be limited. Taking into account the studies by Park et al. (1998) and Knussen et al. (2004), this study posits that:

H1: Subjective norms are more strongly associated with recycling intention at work than at home.

Attitudes toward Recycling

While some studies found that generic attitude toward a behavior is a significant predictor of voluntary PEBs at the workplace (Greaves, Zibarras, & Stride, 2013; Wells, Taheri, Gregory-Smith, & Manika, 2016), other studies did not find this relationship to be significant (Andersson et al., 2005; Manika, Gregory-Smith, et al., 2015; Parker, 2011).

The difference in findings may be due to the presence of competing or non-complementary goals in different contexts, where goals refer to outcomes that individuals deem desirable (Klein, Austin, & Cooper, 2008). These goals influence attitudes toward relevant behaviors (Unsworth et al., 2013) by making certain attitudes more salient (Lindenberg & Steg, 2007). Some of these goals are compatible, while others are in conflict with the goal of addressing environmental issues (Lindenberg &

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Steg, 2007). In fact, one of the most notable conflicting goals with addressing environmental issues is the goal of advancing one's career and standard of living (Gifford, 2011). Research has found that employees' personal goals tend to take a backseat in the workplace, as they channel their attention to achieve their work goals (Shah, Friedman, & Kruglanski, 2002; Vogt, De Houwer, & Crombez, 2011). While individuals may perceive recycling to be good and useful in reducing their waste production, they may also evaluate recycling to be useless in helping them achieve their work goals. The difference in priorities is evident by the finding that there are times when employees choose to spend more time working on a report than walking to a recycling bin (Unsworth et al., 2013).

Attitude toward recycling motivates recycling more when there are fewer conflicting goals and more benefits to recycling. As individuals tend to face more competing goals at work, they are less likely to act on their attitude toward recycling at work than at home.

H2: Attitude toward recycling is more strongly associated with recycling intention at home than at work.

Personal Norms

Personal norms are considered stable as they are deeply rooted in individuals' value systems (Thøgersen, 1999). For this reason, Lülfs and Hahn (2014) argued that organizations have limited influence on employees' personal norms. Instead, they proposed that hiring employees who already have environmental personal norms is the central element of green human resource management and creating a sustainable organization. Indeed, a study by Chou (2014) found that when organizations did not have a clear stance on sustainability, employees' personal norms highly predicted

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PEBs. These studies imply that once activated, personal norm influences behaviors all the time.

Yet, Dolnicar and Grün (2008) found that a majority of their respondents felt morally obligated to perform PEBs at home, but much fewer respondents felt the same way during vacation. This indicates that individuals may choose not to perform behaviors in line with their personal norms in certain contexts. Furthermore, the relationship between personal norms and PEB at the workplace is often weak (Ruepert et al., 2016). Other studies found that personal norms do not have a significant relationship with voluntary PEBs in the workplace (Blok et al., 2015). A possible reason for this discrepancy may be that environmental personal norms only influence PEBs when they are activated in that context.

To influence PEBs in a context, environmental personal norm has to be activated in that specific context (Schwartz, 1977). Individuals tend to assign the responsibility to perform a behavior to different groups of people. That is, for different behaviors, individuals have different ascriptions of responsibility. For personal norm to be useful in predicting behavioral intentions and behavior, it has to be activated in that context by individuals' self-ascription of the responsibility to perform the behavior. Ascription of responsibility refers to individuals' belief of whether their actions can exacerbate or mitigate an issue (Schwartz, 1977). With regard to recycling, having a low ascription of responsibility means that individuals do not view their recycling to affect anyone in a positive or negative manner. A lack of ascription of responsibility hinders the activation of personal norms (Schwartz, 1977). This perceived responsibility is a key predictor of recycling behavior in the household (Brekke, Kipperberg, & Nyborg, 2010).

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However, an ascription of responsibility to recycle may be lacking at work. This may be because employees feel like they have less control over their recycling behaviors at the workplace than they do at home, since they believe that many operations in the workplace are externally controlled and regulated; they thus shirk personal responsibility to perform PEBs such as recycling at work (Blok et al., 2015). Another study found that employees tend to blame their employers for not making recycling more convenient in the workplace (McDonald, 2011). Interestingly, only 30% of employees surveyed stated that it is the responsibility of employees to perform environmental initiatives, while the other employees attributed the responsibility to senior management, property and facilities team, corporate responsibility team, and human resources team (Zibarras & Ballinger, 2011). Other times, employees may simply not know who should be responsible for the PEB (Manika, Wells, et al., 2015). Collectively, the studies indicate that ascription of responsibility to recycle may be lacking at work as employees do not view it as their responsibility to recycle. Therefore, recycling personal norm is less likely to be activated at work.

H3a: Ascription of responsibility is positively associated with recycling personal norm.

H3b: (i) Individuals have lower ascription of responsibility to recycle at work than at home, and therefore (ii) have weaker recycling personal norms at work than at home.

Perceived Sustainability-related Climate

Studies have applied perceived sustainability-related climate exclusively to the work context. This may be because to a larger extent, individuals can plan facilities and layouts in their homes based on their own intentions to perform certain behaviors.

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This autonomy to design their own homes means that the effect of perceived sustainability-related climate at home might be negated by attitudes, habits, and behavioral intention. When individuals have positive attitudes toward recycling or intend to recycle frequently, they might design their homes in a way to facilitate recycling. Therefore, situational processes will play a greater role in facilitating or hindering recycling behaviors in impersonal spaces that individuals have less control over, such as the workplace.

H4: Perceived sustainability-related climate is more strongly associated with recycling behavior at work than at home.

Habit and Intention

Lastly, this study is interested in the idea of whether recycling is more a function of habit or intention. This is because studies found that behavioral intention often does not lead to behavior (Sheeran, 2002). Some scholars argue that previous habits inhibit this relationship, as individuals continue to act upon their old habits instead of their new intentions (Knussen & Yule, 2008). With sparse empirical and theoretical basis to compare the relationship between recycling intention and recycling habit between different between contexts, I posit the following research questions:

RQ1a: Does recycling habit or recycling intention influence recycling behavior more at home?

RQ1b: Does recycling habit or recycling intention influence recycling behavior more at work?

Linking Behaviors in Different Contexts: A Mechanism of Spillover

Earlier, this paper argued that PEBs, specifically recycling, are context dependent. However, contextual *spillover* suggests that this may not always be the case. Despite the differing motivations and constraints contexts may have on behavior, scholars noticed that there is a level of behavioral consistency between contexts (Funder & Colvin, 1991, Maki & Rothman, 2017). This behavioral consistency is termed positive spillover (Thøgersen, 1999), where the performance of behavior in one context spreads into another context. For example, a study found that engaging in source separation at the workplace spills over to source separation in the household (Andersson, Eriksson, & von Borgstede, 2012), indicating a level of consistency in behaviors across contexts. This is because through performing a behavior, individuals may mentally justify their reasons for performing the behavior and thus make certain values, attitudes, and personal norms more salient than before (Nik Ramli & Naja, 2012). Thus, performing a PEB may make environmental concerns, attitudes, norms, and values more salient, motivating individuals to perform the environmental behavior elsewhere.

There is also the possibility of negative spillovers, where performing the behavior in one context deters individuals from performing the behavior in another context. This may occur when individuals perceive that performing the behavior in a particular context is sufficient for helping them achieve the goal the behavior aims to achieve. When an employee perceives to have achieved their green goal at work, they might not perform the same behavior at home or may practice counterproductive behaviors at home (Unsworth et al., 2013). For example, individuals who recycle paper in one context may feel justified to use more paper in another context (Catlin & Wang, 2012). Thus, to understand individuals' behaviors beyond the context specified

by the study, scholars ought to consider the mechanisms that influence the direction of behavioral spillover.

A positive or negative spillover depends on whether the individual has a relevant self-identity (Nilsson et al., 2017; Whitmarsh & O'Neill, 2010). Self-identity refers to how individuals conceptualize themselves, and is predicated on individuals' beliefs and values (Moshman, 2004). Individuals' can use their self-identity to guide their rationalization of whether they should perform certain behaviors (Moshman, 2004). Self-identity is based on the assumption that individuals are motivated to retain and affirm beliefs they hold of themselves. As a result, they tend to act consistently with how they identify themselves and the meanings associated with that identity (Stets & Burke, 2000). Once self-identity is constructed, individuals are more likely to change their behaviors to be in line with their self-identity than they are to change their self-identity to be in line with their behavior (Moshman, 2004). That is, once formed, self-identity guides consistent behaviors.

Applying the concept of self-identity to recycling, individuals who identify themselves to be recyclers are more likely to recycle consistently between contexts (Barr, Shaw, Coles, & Prillwitz, 2010). Specifically, having a recycling self-identity tends to promote positive spillover of recycling behavior from one context to another, while the absence of a recycling self-identity tends to promote a negative spillover of recycling behavior from one context to another. In this sense, a recycling self-identity moderates the relationship between voluntary recycling at work and recycling at home.

H5: A stronger recycling self-identity strengthens the relationship between recycling behavior across contexts.

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After generalizing the CADM and attempting to link PEBs between different contexts, I propose an extended CADM (illustrated in Figure 2.3). The boxes highlighted in blue represent extensions to the CADM.

Figure 2.3. Proposed extended CADM.

METHOD

In order to test the hypotheses and research question, this study used web-based questionnaires to collect cross-sectional data from full-time employees in Singapore. I used Qualtrics to design and host the survey and used a research panel to collect responses.

Sample and Data

To increase representativeness of the sample, I imposed demographic quotas based on gender, age, education level, race, and monthly income. Respondents received compensation in the form of cash-equivalent points that they can exchange for gift vouchers or products upon completion of the questionnaire. Qualtrics sent out 2,500 survey invitations to a pool of Singapore panelists from 3 October 2017 to 18 October 2017. The survey screened out 154 respondents who were either: (1) not Singaporeans or Singapore permanent residents, (2) under 21 years old, (3) not employed full-time at a company, or (4) identified to have spent less than one-third the median time to complete the survey or were identified as straight liners. Another 65 respondents initiated the survey but were not willing to participate after reading the consent form. Eventually, the study collected 465 valid completed responses from full-time working adults. According to AAPOR response rate formula three, the survey response rate is 24.5%¹.

Participants

Respondents were 87.3% Singaporeans and 12.7% Singapore Permanent Residents. Males were slightly oversampled, with 57.0% respondents being males and

¹ Please refer to the Appendix A for the calculation of the response rate

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42.2% females, which could be because males have a higher labor force participation rate than females (Singstat, 2017), resulting in more males being eligible to participate in the survey. There were 4 respondents who did not identify their gender. Of the 465 respondents, 78.1% were Chinese, 10.3% were Malay, 5.2% were Indian, and 6.5% were from other races. The average age of respondents was 35.9 years and the median age was 35 years. The median age of the sample is slightly below the median age of the Singapore population, which is 40.5 years in 2017 (Department of Statistics Singapore, 2017). The median level of educational attainment was a Bachelor's degree and the median personal monthly income bracket was SGD 5,000 to SGD 5,999. The median income of the sample is slightly above the national median of SGD 4,056. The median number of years worked in their current company is 5.0, and respondents were split across industries.

Measurements

When designing the questionnaire for this study, I referred to previous studies that employed the CADM as a theoretical model. In addition, I incorporated measures from other studies that studied some relevant concepts. I adapted these questions to make them context-specific and relevant to recycling behavior, especially in the Singapore context. Using previously tested questions and scales allowed this study to make direct comparisons with previous studies. I pretested the questionnaire with five Singaporean graduate research students to ensure that the questions are readable and easily understandable. Some minor edits were made to the grammar, but the questionnaire remained largely unchanged².

² For the exact wordings, means, standard deviations, and number of responses for each item, please refer to Appendix B.

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Past recycling behavior. For each context, respondents estimated the percentage of waste they recycle (Home: $M = 45.9$, $SD = 27.4$; Work: $M = 45.3$, $SD = 28.2$) and answered one 7-point Likert scale question about how frequently they recycle (Home: $M = 4.61$, $SD = 1.55$; Work: $M = 4.51$, $SD = 1.60$). As the questions used different scales, I extracted factor scores using maximum likelihood estimation. A higher score represents higher reported recycling behavior (Home: Spearman-Brown Coefficient = .81; Work: Spearman-Brown Coefficient = .82).

Recycling intention. For each context, respondents answered three 7-point Likert scale questions adapted from Park and Ha (2014) to measure how much they plan to recycle at home and at work within the next month. A time frame of one month was given as recommended by Ajzen (2002), in order to measure imminent behavioral intention. A higher score represents greater behavioral intention (Home: $M = 5.38$, $SD = 1.26$, Cronbach's $\alpha = .92$; Work: $M = 5.23$, $SD = 1.23$, Cronbach's $\alpha = .92$).

Attitudes toward recycling. For each context, respondents answered five semantic differential scales adapted from Ofstad, Tobolova, Nayum, and Klöckner (2017) to measure attitudes toward recycling. Response options ranged from 1 to 7, with a higher score representing a more positive attitude (Home: $M = 5.93$, $SD = 1.38$, Cronbach's $\alpha = .96$; Work: $M = 5.87$, $SD = 1.34$, Cronbach's $\alpha = .95$).

Subjective norms. For each context, respondents answered two items measuring injunctive norms and two items measuring descriptive norms with respect to people that individuals may frequently encounter (i.e., people they spend time with at home and colleagues). Each context also included two questions measuring motivation to comply. These items are adapted from a guide to constructing TPB questionnaires (Ajzen & Fishbein, 2010). A 7-point Likert scale was used, with a

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higher score representing a stronger subjective norm. For each context, one descriptive norm item was eventually dropped due to poor reliability (Home: $M = 4.87$, $SD = 1.22$, Cronbach's $\alpha = .90$; Work: $M = 4.54$, $SD = 1.21$, Cronbach's $\alpha = .88$).

Personal norms. For each context, respondents answered four 7-point Likert scale questions adapted from Ruepert et al. (2016) measuring their feelings of moral obligation to recycle. A higher score represents a stronger recycling personal norm (Home: $M = 4.98$, $SD = 1.26$, Cronbach's $\alpha = .84$; Work: $M = 4.84$, $SD = 1.21$, Cronbach's $\alpha = .88$).

Ascription of responsibility. For each context, respondents answered three 7-point Likert scale questions adapted from Abrahamse et al. (2009) measuring how aware they are of how their recycling behavior affects others. A higher score indicates stronger awareness of consequences (Home: $M = 5.06$, $SD = 1.23$, Cronbach's $\alpha = .84$; Work: $M = 4.83$, $SD = 1.21$, Cronbach's $\alpha = .84$).

Routines. Most empirical studies that examined routines tend to be experiments (Barr-Anderson et al., 2011) or how routines influence employees' job satisfaction (Chiang & Wu, 2014). Studies that measured routines in a questionnaire are medical studies or family studies (Sytsma, Kelley, & Wymer, 2001). Noting that none of these previous studies used a measure that is appropriate for the current study, I designed three questions for each context to attempt to measure recycling routines. Questions include "I take steps (such as buying recyclable products, sorting recyclables, washing recyclables, etc) to facilitate recycling at home/work," "I have to put in extra effort to recycle at home/work," and "I have a recycling routine at home/work that I follow closely." A higher score indicates a stronger routine (Home:

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$M = 4.95$, $SD = 1.25$, Cronbach's $\alpha = .85$; Work: $M = 4.78$, $SD = 1.22$, Cronbach's $\alpha = .81$).

Habits. For each context, respondents answered four 7-point Likert scale questions adapted from Ofstad et al. (2017) measuring whether recycling is a habit. A higher score represents that recycling is a stronger habit (Home: $M = 4.91$, $SD = 1.42$, Cronbach's $\alpha = .96$; Work: $M = 4.76$, $SD = 1.32$, Cronbach's $\alpha = .95$).

Perceived sustainability-related climate. To gauge perceived sustainability-related climate, respondents answered 10 questions measuring perception of general sustainability-related climate, perception of sustainability policies, and perception of sustainability-related communication.

For the first component measuring general sustainability-related climate, I adapted four 7-point Likert scale questions from Norton et al. (2014) about how much respondents perceive their neighborhood (for the home context) or organization (for the work context) to care about the environment. I chose to examine wider contexts like the neighborhood and organization, instead of more specific contexts such as the home or the department. This is because it is more likely for leaders of the community and organizations to be able to implement recycling policies and engage in recycling-related communication at the neighborhood and organization level.

For the second component measuring perception of sustainability policies, respondents answered four 7-point Likert scale questions per context. Respondents were asked whether they feel supported and rewarded for recycling, and if they were encouraged and reminded to recycle. I kept the questions general because I wanted to ask parallel questions for both contexts to ensure that I measured the same variable in both contexts.

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For the third component measuring perception of sustainability-related communication, respondents answered two 7-point Likert scale questions for each context. Respondents were asked whether they were informed about the environmental impact of their recycling at home/work and whether they are informed about recycling initiatives happening at home/work.

The latter two dimensions (perceptions of sustainability policies and sustainability-related communication) mostly lack prior operationalization; thus, I crafted four of the questions anew. All 10 items were retained after an exploratory factor analysis revealed that the 10 items loaded well on one scale (Home: $M = 4.38$, $SD = 1.29$, Cronbach's $\alpha = .95$; Work: $M = 4.44$, $SD = 1.40$, Cronbach's $\alpha = .96$).

Self-identity. Respondents answered three 7-point Likert scale questions adapted from Ruepert et al. (2016) to measure recycling self-identity. A higher score represents stronger recycling self-identity ($M = 5.05$, $SD = 1.21$, Cronbach's $\alpha = .92$).

Control variables. The following variables were included in the questionnaire and eventually used as control variables to reduce the number of possible confounding factors.

Social desirability bias. Respondents answered five 7-point Likert scale questions from the Marlow-Crowne social desirability scale. A higher score represents higher social desirability bias. This variable was included as a control variable when examining the relationships between predictor variables and recycling intention and recycling behavior ($M = 5.31$, $SD = .91$, Cronbach's $\alpha = .81$).

Demographic variables. The questionnaire asked for standard demographic information including age, sex, marital status, job sector, years of employment

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education level, ethnicity, and income bracket. Table 3.1 presents the demographic breakdown of the sample.

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Table 3.1: Demographics of sample

Items	N	%
Gender		
Male	265	57.8
Female	196	42.2
Refused or missing	4	.9
Age		
Mean	35.9	NA
Median	35	NA
Mode	17	NA
Minimum	21	NA
Maximum	69	NA
Years at current company		
Mean	6.1	NA
Median	5.0	NA
Mode	3.0	NA
Minimum	.10	NA
Maximum	20	NA
Ethnicity		
Chinese	363	78.1
Malay	48	10.3
Indian	24	5.2
Others	30	6.5
Marital status		
Single	175	37.6
Married	277	59.6
Divorced	13	2.8
Widowed	0	0
Sector of employment		
Community, social, and personal services	31	6.7
Wholesale and retail trade	29	6.2
Business services	85	18.3
Manufacturing	66	14.2
Financial and insurance activities	39	8.4
Transportation and storage	24	5.2
Accommodation and food services activities	12	2.6
Construction	24	5.2
Information and communications	54	11.6
Others	101	21.7
Highest Education		
Primary School	2	.4
Secondary School	40	8.6
Junior College	13	2.8
Diploma	115	24.7
Professional degree	20	4.3
Bachelors degree	207	44.5
Master degree	57	12.3
Doctorate/Ph.D	11	2.4
Monthly income		

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< S\$1,000	1	.2
\$1,000 - \$1,999	18	3.9
\$2,000 - \$2,999	55	11.8
\$3,000 - \$3,999	68	14.6
\$4,000 - \$4,999	78	16.8
\$5,000 - \$5,999	54	11.6
\$6,000 - \$6,999	37	8.0
\$7,000 - \$7,999	30	6.5
\$8,000 - \$8,999	23	4.9
\$9,000 - \$9,999	14	3.0
More than \$10,000	41	8.8
Refused	46	9.9

Analytical Approach

To run my analysis, I used Statistical Package for Social Sciences (SPSS) version 24. Before running any analyses, I omitted missing responses from the analysis using listwise deletion. As all items had more than 98.5% response, it is unlikely these responses will significantly change the current results.

As perceived sustainability-related climate was measured using items from different scales and items that have not been previously tested, there was a need to scrutinize the reliability of the items. I ran an exploratory factor analysis on perceived sustainability-related climate in SPSS using principle axis factoring method with Promax rotation. There were no items with a standardized factor loading of less than 0.40. After ensuring good reliability of items by estimating the Cronbach's alpha, I created a composite measure and standardized composite measure for each variable.

I conducted hierarchical linear regression analysis to examine direct and moderating relationships, allowing me to answer H1, H2, H4, H5, and RQ1, which are interested in the relative strengths of relationships across contexts and tests for moderation. Before performing the analysis, I first dummy coded marital status, race, and sector of employment. I also created standardized composite variables for variables in the CADM. The standardized composite variables were used in the regression analyses. I put the nine control variables into the first block and entered the predictor variables from CADM in the second block. I entered variables introduced in the extended CADM into the third block, and an interaction term in the fourth block to test for moderation.

H1 and H2 questions the strength of subjective norms and attitude toward recycling on recycling intention in each context. To test H1 and H2, I placed variables

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into two blocks. The first block contains control variables. The second block contains attitude toward recycling, recycling subjective norm, recycling personal norms, and perceived sustainability-related climate.

H4 postulates the effect of perceived sustainability-related climate on recycling behavior between the home and work context. H5 posits that a recycling self-identity strengthens the strength of the relationship between recycling at home and recycling at work. RQ1 examines the effect of habit and intention on recycling behavior in both the work and home contexts. For H4, H5, and RQ1, for which the dependent variables are recycling behavior at home and at work, I placed variables into four blocks. The first block contains control variables. The second block contains recycling intention, recycling habit, and perceived sustainability-related climate. The third block contains self-identity and recycling behavior in the other context. Finally, the fourth block contains a multiplicative term that signified the interaction effect for each context. As the analysis involves comparing the betas from two regression models that used the same sample, I checked if the 84% confidence intervals overlapped (Payton, Greenstone, & Schenker, 2003). The overlapping tails of 84% confidence intervals correspond approximately with a 5% region of rejection. Therefore, if the tails do not overlap, there is less than a 5% chance that the difference between slopes was due to random chance (Payton, Greenstone, & Schenker, 2003).

To test H3a, I conducted two hierarchical linear regression analyses with recycling personal norm at home and at work as the dependent variable. In block 1, I entered the nine control variables. In block 2, I entered attribution of responsibility to recycle. I ran paired-samples *t*-tests to check if concepts differed in strength between contexts. Through this analysis, I was able to test whether the results supported H3b(i) and H3b(ii).

RESULTS

Table 4.1A and Table 4.1B present the correlation between the home and work variables respectively.

Table 4.1. Correlation between variables

A. Correlations coefficients between home variables									
Variables	1	2	3	4	5	6	7	8	9
1 Home recycling	-								
2 Work recycling	.56**	-							
3 Intention	.51**	.27**	-						
4 Attitude	.31**	.18**	.44**	-					
5 Subjective norms	.51**	.33**	.62**	.37**	-				
6 Personal norms	.54**	.35**	.65**	.43**	.67**	-			
7 Habit	.65**	.39**	.65**	.39**	.68**	.71**	-		
8 Perceived sustainability-related climate	.39**	.33**	.41**	.24**	.61**	.51**	.53**	-	
9 Self-identity	.54**	.38**	.62**	.43**	.60**	.68**	.70**	.48**	-

Note. **p < 0.01 level (2-tailed).

B. Correlation coefficients between work variables									
Variables	1	2	3	4	5	6	7	8	9
1 Work recycling	-								
2 Home recycling	.56**	-							
3 Intention	.47**	.33**	-						
4 Attitude	.30**	.25**	.38**	-					
5 Subjective norms	.47**	.27**	.52**	.35**	-				
6 Personal norms	.51**	.43**	.60**	.37**	.59**	-			
7 Habit	.59**	.40**	.64**	.39**	.63**	.72**	-		
8 Perceived sustainability-related climate	.49**	.30**	.46**	.29**	.71**	.58**	.61**	-	
9 Self-identity	.38**	.54**	.54**	.40**	.43**	.63**	.59**	.48**	-

Note. **p < 0.01 level (2-tailed).

Exploratory Factor Analysis

The original 10 items used to measure perceived sustainability-related climate comprised three components that measured general sustainability-related climate, perceived sustainability policies, and perceived sustainability-related communication. The Kaiser-Meyer-Olkin measure of sampling adequacy was .93 for home and .94 for work, both of which are above the recommended minimum value of .60 (Kaiser, 1974). The Bartlett's test of sphericity was significant in both contexts (Home: $\chi^2(45) = 4376.52, p < .001$; Work: $\chi^2(45) = 4891.28, p < .001$), rejecting the null hypothesis that the correlation matrix is an identity matrix. Together, the Kaiser-Meyer-Olkin measure of sampling adequacy and Bartlett's test of sphericity suggest that it is suitable to use an exploratory factor analysis on the 10 items (Williams, Onsman, & Brown, 2010).

For both contexts, all 10 items loaded on one factor. Initial eigenvalues identified one factor that explained 68.2% of variance for the home context and 73.8% of variance for the work context. Table 4.2A and Table 4.2B present item wording and factor loadings of the final 10 items for each context.

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Table 4.2: Perceived sustainability-related climate

A. Factor and reliability analysis		Home
Item		Factor loadings
People in my neighbourhood are worried about their environmental impact.		.79
People in my neighbourhood are interested in supporting environmental causes.		.83
People in my neighbourhood believe it is important to protect the environment.		.82
People in my neighbourhood are concerned with becoming more environmentally friendly.		.76
I receive support for my recycling behaviour at home.		.66
My community provides rewards to residents for recycling at home.		.73
People in my neighbourhood inform me about the environmental impact of my recycling at home.		.86
I am informed about recycling initiatives happening in my neighbourhood.		.82
People in my neighbourhood encourage me to recycle at home.		.89
People in my neighbourhood remind me to recycle at home		.87
Cumulative explained variance		68.2%
Cronbach's α		.95

B. Factor and reliability analysis		Work
Item		Factor loadings
My company is worried about its environmental impact.		.85
My company is interested in supporting environmental causes.		.85
My company believes it is important to protect the environment.		.85
My company is concerned with becoming more environmentally friendly.		.81
I receive support for my recycling behaviour at work.		.81
My company provides rewards to employees for recycling at work.		.73
My company informs me about the environmental impact of my recycling at work.		.86

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I am informed about recycling initiatives happening in my workplace.	.87
My company encourages me to recycle at work.	.89
My company reminds me to recycle at work.	.88
Cumulative explained variance	73.8%
Cronbach's α	.96

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From this exploratory factor analysis, the study designed a ten-item scale with high internal consistency to measure perceived sustainability-related climate. This scale is applicable in both the home and work context. However, the exploratory factor analysis is preliminary, and does not use confirmatory factor analysis to validate the dimensionality of the scale.

Hypotheses and Research Questions

To answer H1, H2, H4, H5, and RQ1, I estimated four hierarchical linear regression models with recycling intention at home, recycling intention at work, recycling behavior at home, and recycling behavior at work as the dependent variables.

Recycling Intention

The regression models were able to account for 51.1% variance of recycling intention at home and for 43.1% of recycling intention at work.

For both home and work contexts, attitude toward recycling, subjective norm, and personal norm relate significantly to recycling intention. Social desirability bias was significantly associated with recycling intention in both contexts (Home: $\beta = .08$, $p = .038$; Work: $\beta = .14$, $p < .001$). Perceived sustainability-related climate was not significantly related to recycling intention in either context.

H1 predicted that the effect of subjective norms on intention is stronger at work than at home. Results showed that the effect at home ($\beta = .32$, $p < .001$, 84% CI [.25, .39]) was significantly different from the effect at work ($\beta = .16$, $p = .005$, 84% CI [.08, .23]). However, contrary to H1, results revealed that the effect of subjective norms on intention is stronger at home than at work. Hence, the results do not support H1. H2 predicted that the effect of attitude toward recycling on intention is stronger at

home than at work. Results showed that the effect at home ($\beta = .16, p < .001$, 84% CI [.10, .21]) was not significantly different from the effect at work ($\beta = .15, p < .001$, 84% CI [.09, .20]). This result fails to support H2. Table 4.3³ presents the standardized regression coefficients, standard errors, and 84% confidence intervals for the home and work context.

Personal Norm and Ascription of Responsibility

H3a posits that ascription of responsibility is positively associated with recycling personal norm. The results revealed a strong relationship between ascription of responsibility and recycling personal norm (Home: $\beta = .78, p < .001$; Work: $\beta = .71, p < .001$). Thus, the results support H3a. H3b posits that (i) ascription of responsibility to recycle is higher at home than at work, and (ii) recycling personal norm is higher at home than at work. A two-tailed paired samples t-test revealed that individuals felt a greater attribution of responsibility to recycle at home ($M = 5.06, SD = 1.23$) than at work ($M = 4.83, SD = 1.21$), $t(464) = 4.91, p < 0.001$. Respondents also reported a higher personal norm at home ($M = 4.98, SD = 1.26$) than at work ($M = 4.84, SD = 1.21$), $t(464) = 2.83, p = 0.005$. The results provide support for H3b(i) and H3b(ii).

³ Please refer to the Appendices for all four regression models: Appendix C (recycling intention at home) and Appendix D (recycling intention at work).

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Table 4.3: Regression of recycling intention

Recycling intention at home and at work										
Variable	Home				Work					
	b	SE	84% CI		β	b	SE	84% CI		β
Block 1: Control variables										
Marital status (Married = 0)	-.05	.08	-.16, .06		-.02	-.03	.08	-.15, .09		-.02
Ethnicity										
Chinese	.23	.14	.04, .42		.10	.17	.15	-.04, .38		.07
Indian	.29	.20	.02, .57		.07	.21	.21	-.09, .51		.05
Malay	.23	.18	-.02, .48		.07	.15	.19	-.11, .42		.05
Gender (Female = 0)	-.13	.07	-.24, -.03		-.07	-.01	.08	-.12, .10		-.01
Sector of employment										
Wholesale and retail	.26	.15	-.04, .47		.06	.20	.16	-.03, .43		.05
Business	.14	.11	-.01, .29		.05	.04	.12	-.13, .20		.01
Community	.13	.15	-.08, .34		.03	-.01	.16	-.24, .22		.00
Manufacturing	.19	.12	.03, .36		.07	.09	.12	-.08, .26		.03
Financial and Insurance	.21	.14	.01, .40		.06	.16	.15	-.04, .37		.05
Transportation and Storage	.07	.16	-.16, .30		.02	-.34	.18	-.58, -.09		-.08
Accommodation and food	.41	.22	.10, .71		.07	.18	.23	-.15, .51		.03
Construction	-.09	.16	-.32, .14		-.02	-.34	.18	-.59, -.10		-.08
Information and Communications	.24	.12	.07, .41		.08	.14	.13	-.04, .32		.05
Years in current company	-.01	.01	-.02, .01		-.03	.00	.01	-.02, .01		-.01
Education	-.04	.03	-.08, .00		-.06	-.01	.03	-.05, .03		-.02
Monthly income	.01	.01	.00, .03		.04	.00	.01	-.02, .02		.00
Age	.00	.01	-.01, .00		-.03	-.01	.01	-.01, .00		-.05
Social desirability bias	.08	.04	.02, .13		.08*	.14	.04	.09, .20		.14***
Incremental R ²					.13***					.16***
Block 2: CADM variables										
Attitude	.16	.04	.10, .21		.16***	.15	.04	.09, .20		.15***
Subjective norm	.32	.05	.25, .39		.32***	.16	.05	.08, .23		.16**
Personal norm	.36	.05	.29, .43		.36***	.36	.05	.29, .43		.36***

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Perceived sustainability-related climate	.00	.05	-.07	.06	.00	.08	.06	.00	.16	.08
Incremental R ²					.38***					.27***
Total R ²					.51***					.43***

Note. * $p < .05$, $p < .01$, $p < .001$.

Recycling Behavior

The extended CADM was able to explain 55.9% of variance in recycling behavior at home and 51.5% of variance in recycling behavior at work.

Both at home and at work, recycling intention and recycling habit are significantly related to recycling behavior. H4 tests if perceived sustainability-related climate is more strongly associated with recycling behavior at work than at home. Results reveal that perceived sustainability-related climate is positively associated with recycling behavior at work ($\beta = .22$, $p < .001$, 84% CI [.16, .28]), but not at home ($\beta = .07$, $p = .310$, 84% [.00, .14]), providing support for H4. RQ1 explores if recycling intention or recycling habit is more strongly associated with recycling behavior in each context. Results revealed that the effect of intention at home ($\beta = .13$, $p = .003$, 84% CI [.07, .20]) was significantly lower from the effect of habit at home ($\beta = .38$, $p < .001$, 84% CI [.31, .45]), answering RQ1a. For the work context, results revealed that the effect of intention ($\beta = .16$, $p = .001$, 84% CI [.09, .22]) was just not significantly different from the effect of habit ($\beta = .30$, $p < .001$, 84% CI [.22, .37]). Hence, leaving RQ1b unanswered.

Lastly, H5 posits that a recycling self-identity moderates the relationship between recycling behavior at home and at work. A recycling self-identity was

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significantly negatively related to recycling behavior at work ($\beta = -.20, p < .001$), but not significantly related to recycling behavior at home ($\beta = .07, p = .166$). Recycling at work significantly influenced recycling at home ($\beta = .36, p < .001$), and vice versa ($\beta = .45, p < .001$). However, the predicted moderation effect only occurred when predicting recycling behavior in the home context ($\beta = .08, p = .016$), and not the work context ($\beta = .02, p = .639$). That is, self-identity was directly related to recycling behavior only at work, but only had an interaction effect with recycling behavior at home. Hence, the results lend partial support for H5. Table 4.4⁴ presents the standardized regression coefficients, standard errors, and 84% confidence intervals or both the home and work contexts.

⁴ Please refer to the Appendices for all four regression models: Appendix E (recycling behavior at home) and Appendix F (recycling behavior at work.)

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Table 4.4: Regression of recycling behavior

Recycling behavior at home and at work								
Variable	Home				Work			
	b	SE	84% CI	β	b	SE	84% CI	β
Block 1: Control variables								
Marital status (Married = 0)	-.01	.07	-.12, .09	-.01	-.04	.08	-.15, .07	-.02
Ethnicity								
Chinese	.01	.13	-.18, .19	.00	-.25	.14	-.45, -.06	-.10
Indian	-.18	.19	-.44, .09	-.04	-.23	.20	-.51, .05	-.05
Malay	-.30	.17	-.54, -.06	-.09	-.13	.18	-.38, .12	-.04
Gender (Female = 0)	-.18	.07	-.28, -.08	-.09*	-.02	.07	-.12, .08	-.01
Sector of employment								
Wholesale and retail	-.07	.15	-.36, .22	-.02	-.22	.15	-.44, -.01	-.05
Business	-.03	.10	-.28, .14	-.01	-.17	.11	-.32, .02	-.07
Community	.07	.14	-.18, .12	.02	.04	.15	-.25, .18	-.01
Manufacturing	.01	.11	-.14, .27	.00	-.18	.12	-.34, .02	-.06
Financial and Insurance	.07	.13	-.16, .16	.02	-.19	.14	-.38, .00	-.05
Transportation and Storage	.06	.16	-.17, .28	.01	-.24	.17	-.48, .01	-.05
Accommodation and food	.24	.22	-.06, .55	.04	.15	.23	-.47, .18	-.02
Construction	.40	.16	.17, .62	.09*	.30	.17	-.54, .07	-.07
Information and Communications	.10	.12	-.07, .26	.03	.10	.12	-.27, .07	-.03
Years in current company	.00	.01	-.01, .01	.01	.01	.01	-.01, .02	.02
Education	.00	.02	-.03, .03	.00	-.02	.03	-.05, .02	-.03
Monthly income	.00	.01	-.02, .01	-.01	.00	.01	-.02, .02	-.01
Age	.00	.00	-.01, .00	-.03	.01	.01	.00, .01	.06
Social desirability bias	-.05	.04	-.10, .00	-.05	-.05	.04	-.11, .00	-.05

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Incremental R ² (%)					.10***				.08***
Block 2: CADM variables									
Intention	.13	.04	.07, .20		.13**	.16	.05	.09, .22	.16**
Habit	.38	.05	.31, .45		.38***	.30	.05	.22, .37	.30***
Perceived sustainability-related climate	.04	.04	-.02, .10		.04	.22	.05	.16, .28	.22***
Incremental R ² (%)					.35***				.30***
Block 3: Extension of CADM									
Self-identity	.07	.05	.00, .14		.07	-.20	.05	-.27, -.14	.20***
Behavior in other context	.36	.04	.31, .42		.36***	.45	.04	.39, .51	.45***
Incremental R ² (%)					.10***				.14***
Block 4: Interaction effect									
Self-identity x Behavior in other context	.07	.03	.03, .11		.08*	.01	.03	-.03, .06	.02
Incremental R ² (%)					.01***				.00
Total R ² (%)					.56***				.52***

Note. *p < .05, p < .01, p < .001.

To summarize, the data supported H3a, H3b(i), H3b(ii), and H4. The data also provided partial support for H5. Findings contradicted H1, and failed to support H2. For R1, the data revealed that compared to recycling intention, recycling habit had a significantly stronger relationship with recycling behavior at home. However, recycling intention and habit did not differ in the extent of their influence at home.

DISCUSSION

Based on the results reported in the previous chapter, this chapter now discusses the results by arranging them into five topics. First, I discuss possible reasons why H1 and H2 were not supported. Second, I consider how the findings pertaining to recycling intention support the extended TPB. Third, I discuss the relationship recycling behavior has with (a) recycling habit and recycling intention, (b) perceived sustainability-related climate, and (c) self-identity. Fourth, I revisit the idea of positive spillover. Fifth, I argue that the extended model generalizes beyond the home and work contexts.

Unsupported Hypothesis

H1 and H2 were not supported. The findings revealed that while subjective norm was associated with behavioral intention at home and at work to a different extent, the direction of the relationship ran contrary to what was predicted. Additionally, the findings revealed that attitude toward recycling were not different in their effect on recycling intention at work and at home. These findings might be due to methodological reasons, such as the poor operationalization of the concepts. Another reason could be the unclear indication of the context in the survey. Aside from potential methodological reasons, there may be further theoretical explanations for the null findings.

Subjective norms in the household may influence recycling intention to a greater extent than anticipated due to differences in living arrangements in Singapore. Studies that measured motivation to comply were from Western countries. Those studies found that motivation to comply was lower at home than at work. In such countries, it is common for children to move out of their parents' home when they enter college or the workforce (Monthly Labor Review, 2014). However, in Singapore,

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it is common for citizens to live with their parents until their 30s. The value of filial piety still resonates strongly in the Singapore society (Phua & Loh, 2008), which might strengthen Singapore citizens' motivation to comply with subjective norms at home. Therefore, in Singapore and other Asian countries, subjective norms might influence recycling intentions at home more than at work.

Attitude toward recycling did not have a stronger relationship with recycling intention at home. This may be because non-complementary goals may be a factor of perceived sustainability-related climate instead of attitude toward recycling. For example, an employee may have a positive attitude toward recycling but perceive their workplace not to support recycling. To test this explanation, I conducted a post-hoc hierarchical linear regression with recycling intention at work as the dependent variable. The results illustrate that the strength of relationship between attitude and intention weakened after introducing perceived sustainability-related climate into the model (Block 1: $\beta = .38, p < .001$; Block 2: $\beta = .25, p < .001$). This supports the argument that perceived sustainability-related climate could result in unaligned goals that weakens the relationship between attitude and behavior. Future studies can measure employees' goals in the workplace as a mediator of attitudes toward recycling.

The Extended Theory of Planned Behavior

The findings revealed that attitude toward recycling, recycling subjective norm, and recycling personal norm were significantly associated with recycling intention both at home and at work. Therefore, this study provides support to the notion of including personal norm as an antecedent of behavioral intention, in line with the extended theory of planned behavior. The findings thus lend support the CADM

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proposed by Klöckner & Blöbaum (2010), which integrated the extended TPB into the CADM.

The extended TPB also posits perceived behavioral control, a situational factor, as an antecedent of intention. While this study did not measure perceived behavioral control, it measured perceived sustainability-related climate. Both concepts are distinct from one another, but they both refer to situational affordances and constraints. The results revealed that perceived sustainability-related climate was not significantly associated with recycling intention in either context. Maki and Rothman (2017) examined students' intention to practice four types of PEBs in three settings—home (private setting), friends' homes (a hybrid public/private setting), and school (public setting). The study found that in the home context, perceived behavioral control was not significantly related to intention to perform any of the behaviors. Similarly, in the school context, perceived behavioral control was only significantly related to intention to perform one of the behaviors. The mixed findings from their study and the null finding from this study indicate that having a surrounding that facilitates PEBs is not sufficient to increase individuals' behavioral intention.

Recycling Behavior

Habit and Intention

RQ1a and RQ1b questioned if recycling habit or recycling intention had a greater effect on recycling behavior at home and at work. Consistent with Thomas and Sharp (2013), recycling at home was indeed more a function of habit than intention. Hence, recycling is often an unconscious behavior that individuals incorporate into their lifestyles, rather than a behavior that they consciously perform. However, at work, habit and intention predicted recycling equally.

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The discrepancy in findings between the home and workplace may be related to how individuals behave in private and public spaces. The home is a more private space, and the workplace is a more public space. The defining feature of a public space is accessibility—the more visible and easily reached a place is, the more public it is (Madanipour, 2010). In addition, private spaces are less accessible to the public than public spaces (Mehta, 2014). In a private space such as the home that is less visible and reachable to the public, individuals are less self-conscious and tend to put less thought into their behaviors (Fenigstein, Scheier, & Buss, 1975). However, in a more public space such as at work, individuals tend to experience a heightened sense of self-consciousness as they become aware of reactions from others (Fenigstein et al., 1975). Hence, a certain degree of automaticity in behaviors may become conscious behaviors that individuals actively choose to perform. The weaker relationship between habit and behavior, coupled with the strengthened relationship between intention and behavior, could have negated the difference in strength of effects.

Perceived Sustainability-related Climate

A key objective of this study was to explicate and operationalize the situational processes that influences PEB—the CADM labeled this situational variable as perceived sustainability-related climate.

This study found that perceived sustainability-related climate is significantly related to recycling behavior at work. At the workplace or in less personal spaces, individuals tend to have less control over what behavior can be performed (Littleford, Ryley, & Firth, 2014). Situational processes may dictate whether individuals are able to act according to their self-identity. Individuals who view external factors to limit their ability to perform a behavior experience less cognitive dissonance despite not acting upon their self-identity (Festinger & Carlsmith, 1959), reducing the extent to

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which self-identity motivates the behavior. This misalignment of external factors and internal motivations result in recycling behavior having a positive relationship with perceived sustainability-related climate and a negative relationship with a proenvironmental self-identity.

However, perceived sustainability-related climate is not significantly associated with recycling behavior at home. Yet, Tang et al. (2011) found that situational factors influenced recycling behavior at home. They operationalized situational factors using three items “Recycling takes up too much time,” “Recycling takes up too much room,” and “Recycling is too complicated.” The results revealed that situational factors were positively related to recycling behaviors at home. This may be because the study did not include self-identity as a predictor. In fact, results from this study demonstrate that perceived sustainability-related climate was significantly associated with recycling behavior at home before self-identity was included in the model ($\beta = .11, p = .022$). Individuals with a high proenvironmental self-identity can plan their homes in a manner that facilitates recycling, nullifying the effect of situational variables on recycling behavior.

Another possibility for this null finding might be due to the operationalization of perceived sustainability-related climate in the home context. The items measured perceived sustainability-related climate in the neighborhood, which might not be strongly associated with recycling behavior in a private space such as the home. Future studies can try to measure perceived sustainability climate by directly using the home context (instead of the neighborhood).

Self-identity

Even though this study initially hypothesized only a moderating effect of self-identity on recycling behavior between contexts, the data illustrated a direct relationship that contradicts previous empirical findings and theories. Specifically, a proenvironmental self-identity was negatively associated with recycling behavior at work, while a proenvironmental self-identity was not significantly associated with recycling behavior at home.

Previous studies argued that self-identity is positively associated with related behaviors as people aim to maintain consistency in their behaviors and identity (Whitmarsh & O'Neill, 2010). Yet, this study did not replicate that finding in either of the two contexts. This may be an issue related to self-reported behaviors. With a high proenvironmental self-identity, individuals want to perform recycling more frequently to maintain their self-identity (Stryker & Burke, 2000). As they want to recycle more frequently, these respondents may not perceive themselves to recycle sufficiently at work, a place where recycling is often an outcome of situational variables. On the other hand, with a low proenvironmental self-identity, individuals do not actively recycle. This makes rare occurrences of recycling feel frequent to the individual. Assuming that situational constraints at work result in similar levels of recycling among all employees, then the following outcomes should occur: (1) those with a strong recycling self-identity will think they recycle too little at work and (2) those with a weak recycling self-identity will think they recycle more than sufficiently at work. If the assumption is correct, then such outcomes would explain why recycling self-identity was negatively related to self-reported recycling at work. To test this conjecture, a future study will need to compare the relationship between proenvironmental self-identity with data on individuals' actual recycling and self-

reported recycling behavior. Having actual data allows researchers to have an objective measurement of respondents' recycling behavior, enabling researchers to assert that a recycling self-identity is positively related to actual recycling behavior, but negatively related to self-reported recycling behavior.

Positive Spillover between Contexts

This study originally hypothesized that self-identity will act as a moderator for the relationship between behaviors in two contexts. The findings revealed that the moderating effect only occurred in one direction—work behavior predicting home behavior. In addition, recycling in one context had a modest direct relationship with recycling in the other context.

For the moderating role of self-identity, spillover studies postulate that self-identity influences whether behavior remains consistent between contexts (Barr, Shaw, Coles, & Prillwitz, 2010). The results support this relationship when predicting home recycling behavior. This provides support for the notion that without external pressures or scrutiny, self-identity guides consistent behaviors (Moshman, 2004). Yet, self-identity did not moderate the influence of home recycling behavior on work recycling behavior. This may be related to the observation that recycling behavior at work is more positively related to situational variables than is self-identity.

Furthermore, findings revealed a direct effect on recycling at home by recycling at work, and vice versa. This finding reveals that it may be possible to predict behavior in different contexts if scholars knew the frequency of behavior in one context. However, the fact that it is not a perfect relationship, but a modest relationship, suggests that there may be more mechanisms to explain the effect of

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recycling in one context on recycling in another context. Self-identity is but one possible mechanism to explain this relationship.

Generalizing the CADM

This study aimed to take an initial step in clarifying the phenomenon that behaviors spill over contexts as a function of self-identity. While this study utilized the home and work context to examine the performance of PEBs in two contexts, the extended CADM is can be potentially applied to any context. Scholars can test the extended CADM to examine PEBs at schools, vacations, shopping malls, and any context they wish. They can also test this model beyond examining two contexts. Self-identity may be able to explain and predict PEBs in three or more contexts. With thorough testing and revisions, the CADM has the potential to be a general behavioral model that incorporates three theories that are currently widely used in social science.

CONTRIBUTIONS AND IMPLICATIONS

Through explicating perceived sustainability-related climate, generalizing and extending the CADM, and comparing the influence of antecedents in different contexts, this study informs directions for research and policymakers trying to promote PEBs.

Firstly, despite introducing perceived sustainability-related climate as a new antecedent of voluntary PEBs in the workplace, Lülfs and Hahn (2014) operationalized this concept only as the outcome of objective efforts such as codes of conduct. Through a thorough literature review, this study attempted to provide a holistic overview of what constitutes perceived sustainability-related climate.

Examining perceived sustainability-related climate produces theoretical and practical implications. This study attempted to design a comprehensive and adaptable perceived sustainability-related climate scale that future studies can use as a tool to examine the influence of situational processes on behavior. Still, scholars can do more to test this scale. First, this scale can benefit from a confirmatory factor analysis. Scale development uses two samples—the first for exploratory factor analysis and the second for confirmatory factor analysis (Hinkin, Tracey, & Enz, 1997). Therefore, while this study offers a scale that assesses perceived sustainability-related climate, the lack of a confirmatory factor analysis warrants further testing to test the goodness-of-fit of the resulting factor structure. Additionally, to test for convergent and divergent validity, scholars need to use this scale while measuring potentially conflating variables (Hinkin, Tracey, & Enz, 1997). Some conflating variables include perceived behavioral control and subjective norms. Despite the additional analyses that this study

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was not able to conduct, the scale remains a tool that scholars can adopt, test, and modify.

This study also found that the perception of situational processes is significantly associated with behavior, but not behavioral intentions. It is likely that individuals require different motivations when they are at different stages of adopting the behavior. The transtheoretical model (Prochaska & Diclemente, 1982) theorizes that to modify a behavior, individuals need to progress through six phases: precontemplation, contemplation, preparation, action, maintenance, and relapse. At the contemplation and preparation stage, individuals are forming and firming up their intention to perform a behavior. At the action and maintenance phase, individuals are trying out behaviors and deciding whether they wish to continue performing the behavior. The model further suggests that individuals at different phases require different needs so that they can progress to the next phase. The findings from this study are consistent with the transtheoretical model, revealing that situational factors, incentives, and more direct communication may be useful only when individuals have already formed an intention to perform the behavior. Prior to that, more subtle influences such as information and subjective norms are more effective in molding behavioral intention.

Secondly, this study offers an extension to the CADM to examine behavior in more than one context simultaneously. Acknowledging that individuals may not be motivated to perform a behavior in every situation, this study examined what factors influenced behavioral intention and behavior in two distinct contexts. However, examining behaviors in specific contexts brings about the issue of a study being overly narrow in terms of scope. Therefore, this study proposed and tested a bridging mechanism for predicting behaviors in two contexts simultaneously. While a step in

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the right direction, I urge scholars to apply the extended CADM to different contexts to assess stringently its generalizability.

In addition, this study proposes recycling self-identity as an antecedent of recycling behavior and as a moderator of the relationship between recycling behaviors in different contexts. Specifically, given a high recycling self-identity, recycling behavior in a given context is more strongly associated with recycling behaviors in any other given context. By introducing self-identity as a moderating variable, this study tests how PEBs between contexts may be connected. Still, more studies are needed to test how self-identity moderates actual behavior as self-reported behavior may be conflated with expectation of frequency of behavior. A longitudinal study can administer this questionnaire to participants and track their actual daily recycling behaviors in two contexts.

Noting the one-way moderation effect can inform communication practitioners on the location they should try to modify or promote behaviors. From this study, we learn that recycling at work has a direct and indirect relationship with recycling behavior at home. Therefore, promoting recycling at the workplace may bring about a greater change in overall recycling behavior. Practitioners can dedicate more resources to convince employers to implement more initiatives to promote recycling at work. These initiatives should reduce perceived conflict between work goals and personal environmental goals. Having clear environmental policies or role models at work performing recycling are possible facilitators of recycling and PEBs at the workplace.

LIMITATIONS

This study faced several limitations that I attempted to address and mitigate. The limitations include using a web-based questionnaire, utilizing cross-sectional data, and using self-reported data.

First, this study collected data from an online survey panel using web-based questionnaires. Although this design potentially limits the generalizability of the findings by under-representing non-Internet users, this limitation is mitigated in Singapore, as the city-state has a high Internet penetration rate of 82% (We Are Social, 2017).

Second, utilizing cross-sectional data does not allow this study to make causal inferences. However, the study is grounded in theories that have been tested by previous studies. Therefore, it helps to support logical reasoning for directionality of relationships. Nevertheless, future studies can conduct randomized controlled experiments to ascertain causal relationships among the variables.

Lastly, the study based its analysis and conclusions on self-reported measures. A social desirability bias may occur among respondents, who may want to be perceived as more environmentally friendly than they are. To mitigate this, I included questions from the Marlow-Crowne social desirability scale and controlled for social desirability bias. A previous meta-analysis also demonstrated a good correlation between self-reported behavior and actual behavior (Webb & Sheeran, 2006), thus suggesting that self-reported behavior is still a useful indicator of actual behavior. Future studies with access to organizations' and residential recycling facilities can measure the weight of recyclables collected as an objective measure of recycling behavior.

CONCLUSION

The heightened awareness of environmental issues has brought together scholars across disciplines to attempt to understand the motivations of performing PEBs. Advancements in technology and changes in legislation have played a major role in alleviating environmental degradation. Still, the key to preserving the environment is human behavior, and the key to modifying behavior is still a black box. More research is needed to gain an improved understanding of how to increase frequency of and commitment to PEBs.

This study first acknowledged that individuals take up multiple roles in society. With this notion in mind, this study sought to examine how antecedents might influence the performance of PEBs differently across contexts. While doing so, I came across multiple behavioral theories, but few emphasized the importance of context in influencing behavior. The CADM and the adapted CADM offered a solution to this gap in the literature. However, both models faced limitations that this study aimed to address. First, each model only allowed scholars to examine behavior in only one context at a time and was applicable to only the private (CADM) sphere or workplace (adapted CADM). This study strived to expand the CADM and adapted CADM such that scholars can examine behavior in more than one context at a time. Second, the situational variable—perceived sustainability-related climate—lacked sufficient explication, resulting in scholars expressing uncertainty on what the concept entails. This study aimed to provide clarity to the concept and test the usefulness of the concept in different contexts.

To address the first limitation of the CADM and adapted CADM, this study extended the CADM to offer a lens for understanding performance of PEBs in different contexts. I proposed relevant self-identity as a possible bridging mechanism

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between behaviors in two contexts. Despite being grounded in theory, empirical evidence only partially supported the relationship between self-identity and behavior. In the work context, recycling self-identity was even negatively associated with recycling behavior, a finding that contradicts past findings. Such findings call for more in-depth examinations of how proenvironmental self-identity influences behaviors in different contexts. The results of this study remind practitioners to acknowledge that different strategies are required to increase recycling intention and behavior. More resources also need to be channeled into creating an environment that is supportive of PEBs at the workplace.

Addressing the second limitation of the CADM, this study aimed to explicate perceived sustainability-related climate to provide more clarity as to what the concept entails. Scholars have noticed a lack of understanding of how sustainability climate influences PEBs. Hence, this study did a thorough literature review to examine the situational factors that are useful in promoting PEBs. Through this process, the study identified perceptions toward sustainability policies and perceptions toward sustainability-related communication as key aspects influencing perceived sustainability-related climate. Beyond explicating perceived sustainability-related climate, I also operationalized the concept by developing a scale that is easily adaptable to different contexts to suit scholars' differing needs. I emphasized the role of contexts when examining PEBs throughout the thesis. The results iterate the importance the *perception* of situational factors play on performing PEBs in public spaces.

This thesis also attempted to generalize organizational routines and perceived sustainability-related climate such that these two concepts are not just applicable to the workplace. By generalizing these concepts, I was able to apply the same model to both

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the home and work context. Scholars who wish to examine PEBs in other contexts can also adopt this generalized and extended CADM to examine PEBs.

Using the generalized CADM, this study compared the relationship strengths between the model's antecedents and recycling intention and behavior. Contrary to what previous studies found, subjective norms was more strongly associated with recycling intention at home than at work. I propose that the discrepancy in findings between this study and previous studies might be due to different living arrangements in Singapore and Western countries. This finding warrants further examination into the discrepancies in social dynamics between countries that differ in living arrangements and family orientation.

To conclude, I hope that this thesis sheds more light on the factors influencing individuals' motivations to perform PEBs. By further testing of the extended and generalized CADM, and the perceived sustainability-related climate scale, this thesis hopes to be able to play a small role in promoting more PEBs, and have a real impact on society.

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Appendices

Appendix A: Calculation of response rate

Qualtrics sent out 2,500 invitations. The survey screened out 154 respondents who were either: (1) not Singaporeans or Singapore permanent residents, (2) under 21 years old, (3) not employed full-time at a company, or (4) identified to have spent less than one-third the median time to complete the survey or were identified as straight liners.

AAPOR response rate 3 formula: $I / ((I+P) + (R+NC+O) + e(UH+UO))$

Where I = Completed responses; P = Partial responses; R = Refusals; NC = No contact; O = Others; UH = Unknown household; UO = Unknown other; e = estimated proportion of cases of unknown eligibility that are eligible.

$$e = 1 - (154/619) = .751$$

$$I = 465; P = 0; R = 65; NC = 0; O = 0; UH = 1816; UO = 0; e = .751$$

$$\begin{aligned} \text{Response rate} &= 465 / (465+0) + (65+0+0) + .751(1816+0) \\ &= 24.5\% \end{aligned}$$

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Appendix B: Wording and descriptives of questionnaire items

Mean, standard deviation, and number of responses per item						
Items	Home			Work		
	M	SD	N	M	SD	N
Recycling behavior						
How many percent of your waste do you recycle?	45.9	27.40	463	45.3	28.20	460
On a scale from 1 to 7, how frequently do you recycle in the following contexts?	4.61	1.55	465	4.51	1.60	465
Recycling intention						
I intend to recycle at home/work within the next month.	5.36	1.34	465	5.17	1.35	465
I will try to recycle at home/work within the next month.	5.4	1.35	465	5.28	1.30	465
I plan to recycle at home/work within the next month.	5.39	1.37	465	5.24	1.31	465
Attitude toward recycling						
For me, recycling at home/work will be considered...						
Bad - Good	6.12	1.41	464	6.09	1.34	464
Useless- Unpleasant	5.99	1.46	464	5.85	1.48	463
Unpleasant - Pleasant	5.73	1.52	464	5.73	1.49	463
Foolish - Wise	5.95	1.49	464	5.86	1.50	463
Unimportant - Important	5.88	1.53	465	5.81	1.56	464
Subjective norms						
People I spend time with at home/ My colleagues think that I should recycle at home.	5.01	1.40	465	4.63	1.42	465
People I spend time with at home / My colleagues expect me to recycle at home.	4.79	1.49	465	4.56	1.46	465
It is normal for people I spend time with at home/	5.04	1.43	465	4.78	1.42	464

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my colleagues to recycle at home.						
People I spend time with at home/ My colleagues do not recycle when they are at home.[R]*	2.86	1.65	464	4.13	1.58	465
When it comes to recycling at home/work, I want to do what people I spend time with at home /my colleagues think I should do.	4.74	1.49	465	4.31	1.51	465
Generally speaking, I care about what people I spend time with at home/ my colleagues think I should do.	4.77	1.50	465	4.39	1.56	465
Personal norm						
I feel guilty if I do not recycle at home/work.	4.83	1.53	465	4.71	1.51	465
I feel morally obligated to recycle at home/work.	4.94	1.47	465	4.79	1.45	465
I feel proud when I recycle at home/work.	5.35	1.27	465	5.17	1.27	465
It conflicts with my principles if I do not recycle at home/work.	4.78	1.47	465	4.70	1.43	465
Ascription of responsibility						
I feel personally responsible if there is insufficient recycling at my home/work.	4.79	1.47	465	4.47	1.53	465
If I do not recycle at home/work, I contribute to environmental problems.	5.26	1.37	465	5.09	1.30	465
If I do not recycle at home/work, it will constitute a problem to society.	5.15	1.41	465	4.92	1.36	465

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Routine

I take steps (such as buying recyclable products, sorting recyclables, washing recyclables, etc) to facilitate recycling at home/work.	5.04	1.41	465	4.78	1.44	465
I have to put in extra effort to recycle at home/work.	5.07	1.30	465	4.99	1.38	465
I have a recycling routine at home/work that I follow closely.	4.75	1.56	465	4.57	1.50	465

Habit

Recycling at home/work is something I do automatically.	4.97	1.49	465	4.84	1.42	465
Recycling at home/work is something I do without thinking.	4.95	1.48	465	4.78	1.42	465
Recycling at home/work is something I do without having to consciously remember.	4.92	1.51	465	4.75	1.42	465
Recycling at home/work is something that I start doing before I realise I am doing it.	4.78	1.54	465	4.67	1.45	464

Perceived sustainability-related climate

People in my neighbourhood/ My company are/is worried about their environmental impact.	4.38	1.51	465	4.59	1.52	465
People in my neighbourhood/ My company are/is interested in supporting environmental causes.	4.51	1.40	465	4.71	1.51	465
People in my neighbourhood/ My company believe(s) it is important to protect the environment.	4.66	1.43	465	4.85	1.50	465

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People in my neighbourhood /My company are/is concerned with becoming more environmentally friendly.	4.53	1.46	465	4.66	1.57	464
I receive support for my recycling behaviour at home/work.	4.82	1.51	465	4.55	1.55	465
My community/company provides rewards to residents/employees for recycling at home/work.	4.02	1.66	465	3.83	1.76	465
People in my neighbourhood/ My company inform(s) me about the environmental impact of my recycling at home/work.	4.12	1.66	465	4.11	1.75	465
I am informed about recycling initiatives happening in my neighbourhood/ at my workplace.	4.36	1.66	465	4.30	1.76	465
People in my neighbourhood /My company encourage(s) me to recycle at home/work.	4.22	1.65	465	4.49	1.69	465
People in my neighbourhood/ My company remind(s) me to recycle at home/work.	4.20	1.69	464	4.36	1.69	465
Self-identity						
Acting pro-environmentally is an important part of who I am.	5.12	1.28	465			
I am the type of person who acts pro-environmentally.	5.03	1.28	465			
I see myself as a pro-environmental person.	4.97	1.35	465			

Note. * represents items that were removed from the analysis due to poor reliability. [R] represents items that were reverse-coded.

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Appendix C. Hierarchical linear regression predicting recycling intention at home

Regression coefficients								
Variable	Model 1				Model 2			
	b	SE	84% CI	β	B	SE	84% CI	B
Marital status (Married = 0)	-.19	.10	-.34, .05	-.09	-.05	.08	-.16, .06	-.02
Ethnicity								
Chinese	.12	.18	-.13, .37	.05	.23	.14	.04, .42	.10
Indian	.30	.26	-.07, .67	.07	.29	.20	.02, .57	.07
Malay	.01	.23	-.32, .34	.07	.23	.18	-.02, .48	.07
Gender (Female = 0)	-.13	.09	-.26, .00	.07	-.13	.07	-.24, -.03	-.07
Sector of employment								
Wholesale and retail	.22	.20	-.06, .50	.05	.26	.15	.04, .47	.06
Business	.30	.14	.10, .49	.11*	.14	.11	-.01, .29	.05
Community	.17	.20	-.11, .45	.04	.13	.15	-.08, .34	.03
Manufacturing	.44	.15	.23, .66	.16**	.19	.12	.03, .36	.07
Financial and Insurance	.42	.18	.17, .67	.12*	.21	.14	.01, .40	.06
Transportation and Storage	.20	.22	-.10, .51	.05	.07	.16	-.16, .30	.02
Accommodation and food	.19	.29	-.22, .60	.03	.41	.22	.10, .71	.07
Construction	.17	.22	-.14, .48	.04	-.09	.16	-.32, .14	-.02

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Information and Communications	.24	.16	.01, .47	.08		.24	.12	.07, .41	.08
Years in current company	.01	.01	-.01, .02	.04		-.01	.01	-.02, .01	-.03
Education	.02	.03	-.03, .07	.03		-.04	.03	-.08, .00	-.06
Monthly income	.00	.02	-.02, .03	.01		.01	.01	.00, .03	.04
Social desirability bias	.31	.05	.25, .37	.31***		.08	.04	.02, .13	.08*
Age	.00	.01	-.01, .01	-.01		.00	.01	-.01, .00	-.03
Attitude						.16	.04	.10, .21	.16***
Subjective norm						.32	.05	.25, .39	.32***
Personal norm						.36	.05	.29, .43	.36***
Perceived sustainability-related climate						.00	.05	-.07, .06	.00
Incremental R ²				.13***					.38***
Total R ²									.51***

Note. *p < .05, p < .01, p < .001

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Appendix D. Hierarchical linear regression predicting recycling intention at work

Regression coefficients								
Variable	Model 1				Model 2			
	b	SE	84% CI	β	b	SE	84% CI	β
Marital status (Married = 0)	-.07	.10	-.21, .07	-.03	-.03	.08	-.15, .09	-.02
Ethnicity								
Chinese	-.10	.18	-.35, .15	-.04	.17	.15	-.04, .38	.07
Indian	.13	.26	-.24, .49	.03	.21	.21	-.09, .51	.05
Malay	-.12	.23	-.45, .20	-.04	.15	.19	-.11, .42	.05
Gender (Female = 0)	.09	.09	-.04, .22	.05	-.01	.08	-.12, .10	-.01
Sector of employment								
Wholesale and retail	.06	.20	-.21, .34	.02	.20	.16	-.03, .43	.05
Business	.08	.14	-.12, .27	.03	.04	.12	-.13, .20	.01
Community	-.02	.20	-.29, .26	-.01	-.01	.16	-.24, .22	.00
Manufacturing	.12	.15	-.09, .33	.04	.09	.12	-.08, .26	.03
Financial and Insurance	.32	.18	.07, .57	.09	.16	.15	-.04, .37	.05
Transportation and Storage	-.49	.21	-.79, -.19	-.11*	-.34	.18	-.58, -.09	-.08
Accommodation and food	.06	.28	-.34, .46	.01	.18	.23	-.15, .51	.03
Construction	-.33	.21	-.63, -.02	-.07	-.34	.18	-.59, -.10	-.08

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Information and Communications	.09	.16	-.14, .31	.03	.14	.13	-.04, .32	.05
Years in current company	.01	.01	-.01, .02	.04	.00	.01	-.02, .01	-.01
Education	.02	.03	-.03, .06	.02	-.01	.03	-.05, .03	-.02
Monthly income	.01	.02	-.02, .03	.01	.00	.01	-.02, .02	.00
Social desirability bias	.38	.04	.32, .44	.38***	.14	.04	.09, .20	.14***
Age	.00	.01	-.01, .01	-.02	-.01	.01	-.01, .00	-.05
Attitude					.15	.04	.09, .20	.15***
Subjective norm					.16	.05	.08, .23	.16**
Personal norm					.36	.05	.29, .43	.36***
Perceived sustainability-related climate					.08	.06	.00, .16	.08
Incremental R ²				.16***				.27***
Total R ²								.43***

Note. *p < .05, p < .01, p < .001

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Appendix E. Hierarchical linear regression model predicting recycling behavior at home

Regression coefficients										
Variable	Model 1				Model 2					
	b	SE	84% CI		B	b	SE	84% CI		β
Marital status (Married = 0)	-0.13	0.11	-.28, .02		-0.06	-0.03	0.08	-.14, .09		-0.01
Ethnicity										
Chinese	-0.04	0.18	-.30, .22		-0.02	-0.20	0.15	-.41, .00		-0.08
Indian	-0.24	0.27	-.61, .14		-0.05	-0.38	0.21	-.68, -.09		-0.09
Malay	-0.40	0.24	-.73, -.06		-0.12	-0.50	0.19	-.76, -.24		-.15**
Gender (Female = 0)	-0.16	0.10	-.30, -.03		-0.08	-0.18	0.08	-.29, -.07		-.09*
Sector of employment										
Wholesale and retail	-0.11	0.21	-.41, .18		-0.03	-0.19	0.16	-.42, .04		-0.05
Business	0.10	0.15	-.10, .31		0.04	-0.09	0.12	-.26, .07		-0.04
Community	0.13	0.20	-.16, .42		0.03	0.09	0.16	-.14, .31		0.02
Manufacturing	0.12	0.16	-.10, .33		0.04	-0.14	0.12	-.32, .03		-0.05
Financial and Insurance	0.38	0.18	.12, .64		.11*	0.03	0.15	-.18, .23		0.01
Transportation and Storage	0.04	0.22	-.28, .35		0.01	-0.12	0.18	-.37, .13		-0.03
Accommodation and food	0.26	0.31	-.17, .70		0.04	0.19	0.24	-.15, .53		0.03
Construction	0.58	0.22	.26, .89		.13*	0.32	0.18	.07, .56		0.07
Information and Communications	0.15	0.17	-.08, .38		0.05	0.03	0.13	-.16, .21		0.01

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Years in current company	0.02	0.01	.01, .04	0.10	0.01	0.01	-.01, .02	0.03
Education	0.04	0.03	-.01, .08	0.05	0.00	0.03	-.04, .04	0.00
Monthly income	-0.01	0.02	-.03, .02	-0.02	0.00	0.01	-.02, .02	0.00
Age	0.00	0.01	-.01, .01	0.02	0.00	0.01	-.01, .01	-0.01
Social desirability bias	0.23	0.05	.17, .30	.23***	-0.01	0.04	-.01, .01	-0.01
Intention					0.14	0.05	.08, .21	.14**
Habit					0.50	0.05	.43, .58	.51***
Perceived sustainability-related climate					0.10	0.05	.03, .16	.10*
Self-identity Behavior in other context								
Self-identity x Behavior in other context								
Incremental R ²				.10***				.35***

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Variable	Step 3				Step 4			
	b	SE	84% CI	β	b	SE	84% CI	B
Marital status (Married = 0)	-.02	.07	-.12, .09	-.01	-.01	.07	-.12, .09	-.01
Ethnicity								
Chinese	-.01	.13	-.20, .18	.00	.01	.13	-.18, .19	.00
Indian	-.20	.19	-.46, .07	-.04	-.18	.19	-.44, .09	-.04
Malay	-.35	.17	-.59, -.11	-.10*	-.30	.17	-.54, .06	-.09
Gender (Female = 0)	-.16	.07	-.26, -.06	-.08*	-.18	.07	-.28, -.08	-.09*
Sector of employment								
Wholesale and retail	-.05	.15	-.25, .16	-.01	-.07	.15	-.28, .14	-.02
Business	-.02	.11	-.17, .13	-.01	-.03	.10	-.18, .12	-.01
Community	.09	.14	-.11, .29	.02	.07	.14	-.14, .27	.02
Manufacturing	-.01	.11	-.17, .15	.00	.01	.11	-.15, .16	.00
Financial and Insurance	.07	.13	-.11, .26	.02	.07	.13	-.11, .26	.02
Transportation and Storage	.04	.16	-.18, .26	.01	.06	.16	-.17, .28	.01
Accommodation and food	.22	.22	-.09, .53	.03	.24	.22	-.06, .55	.04
Construction	.39	.16	.17, .62	.09*	.40	.16	.17, .62	.09*
Information and Communications	.07	.12	-.09, .24	.02	.10	.12	-.07, .26	.03
Years in current company	.00	.01	-.01, .01	.01	.00	.01	-.01, .01	.01

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Education	.00	.02	-.03, .04	.00	.00	.02	-.03, .03	.00
Monthly income	.00	.01	-.02, .01	-.01	.00	.01	-.02, .01	-.01
Age	.00	.00	-.01, .00	-.04	.00	.00	-.01, .00	-.03
Social desirability bias	-.04	.04	-.09, .01	-.04	-.05	.04	-.10, .00	-.05
Intention	.13	.04	.06, .19	.13**	.13	.04	.07, .20	.13**
Habit	.38	.05	.31, .45	.38***	.38	.05	.31, .45	.38***
Perceived sustainability-related climate	.03	.04	-.03, .09	.03	.04	.04	-.02, .10	.04
Self-identity	.06	.05	-.01, .13	.06	.07	.05	.00, .14	.07
Behavior in other context	.36	.04	.31, .41	.36***	.36	.04	.31, .42	.36***
Self-identity x Behavior in other context					.07	.03	.03, .11	.08*
Incremental R ²				.10***				.01***
Total R ²								.56***

Note. *p < .05, p < .01, p < .001.

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Appendix F. Hierarchical linear regression model predicting recycling behavior at work

Regression coefficients								
Variable	Model 1				Model 2			
	b	SE	84% CI	β	b	SE	84% CI	β
Marital status (Married = 0)	-.07	.11	-.22, .08	-.04	-.08	.09	-.20, .05	-.04
Ethnicity								
Chinese	-.41	.19	-.67, -.14	-.17*	-.21	.15	-.43, .01	-.09
Indian	-.42	.27	-.80, .04	-.17	-.30	.22	-.61, .02	-.07
Malay	-.34	.24	-.68, .00	-.17	-.28	.20	-.56, .00	-.08
Gender (Female = 0)	.04	.10	-.10, .17	-.17	-.10	.08	-.21, .02	-.05
Sector of employment								
Wholesale and retail	-.35	.21	-.64, -.05	-.08	-.23	.17	-.47, .02	-.05
Business	-.03	.15	-.23, .18	-.01	-.17	.12	-.34, .01	-.06
Community	.04	.21	-.25, .34	.01	.02	.17	-.22, .26	.01
Manufacturing	-.19	.16	-.41, .03	-.07	-.17	.13	-.35, .02	-.06
Financial and Insurance	.08	.19	-.19, .34	.02	-.12	.15	-.33, .10	-.03
Transportation and Storage	-.35	.23	-.67, -.03	-.08	-.22	.19	-.49, .04	-.05
Accommodation and food	.01	.31	-.44, .45	.00	.04	.26	-.32, .40	.01
Construction	-.02	.23	-.34, .30	-.01	-.07	.19	-.33, .20	-.02

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Information and Communications	-.03	.17	-.26, .21	-.01		-.02	.14	-.22, .17	-.01
Years in current company	.02	.01	.01, .04	.10		.01	.01	.00, .02	.05
Education	.02	.04	-.03, .07	.03		-.01	.03	-.05, .03	-.02
Monthly income	.00	.02	-.02, .03	.01		.00	.01	-.02, .02	-.01
Age	.01	.01	.00, .02	.08		.01	.01	.00, .01	.06
Social desirability bias	.21	.05	.15, .28	.21***		-.05	.04	-.11, .01	-.05
Intention						.15	.05	.08, .23	.15**
Habit						.35	.06	.27, .43	.35***
Perceived sustainability-related climate						.23	.05	.16, .30	.23***
Self-identity Behavior in other context									
Self-identity x Behavior in other context									
Incremental R ²				.08***					.30***

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Variable	Model 3				Model 4			
	b	SE	84% CI	β	b	SE	84% CI	β
Marital status (Married = 0)	-.04	.08	-.15, .07	-.02	-.04	.08	-.15, .07	-.02
Ethnicity								
Chinese	-.26	.14	-.45, -.07	-.11	-.25	.14	-.45, -.06	-.10
Indian	-.23	.20	-.51, .05	-.05	-.23	.20	-.51, .05	-.05
Malay	-.13	.18	-.38, .12	-.04	-.13	.18	-.38, .12	-.04
Gender (Female = 0)	-.01	.07	-.11, .09	-.01	-.02	.07	-.12, .08	-.01
Sector of employment								
Wholesale and retail	-.22	.15	-.44, -.01	-.05	-.22	.15	-.44, .01	-.05
Business	-.17	.11	-.32, -.02	-.07	-.17	.11	-.32, -.02	-.07
Community	-.04	.15	-.25, .18	-.01	-.04	.15	-.25, .18	-.01
Manufacturing	-.18	.12	-.34, -.02	-.06	-.18	.12	-.34, -.02	-.06
Financial and Insurance	-.19	.14	-.38, .00	-.05	-.19	.14	-.38, .00	-.05
Transportation and Storage	-.25	.17	-.48, -.01	-.05	-.24	.17	-.48, -.01	-.05
Accommodation and food	-.15	.23	-.47, .17	-.02	-.15	.23	-.47, .18	-.02
Construction	-.30	.17	-.54, -.07	-.07	-.30	.17	-.54, -.07	-.07
Information and Communications	-.11	.12	-.28, .07	-.03	-.10	.12	-.27, .07	-.03

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Years in current company	.01	.01	-.01, .02	.02	.01	.01	-.01, .02	.02
Education	-.02	.03	-.05, .02	-.02	-.02	.03	-.05, .02	-.03
Monthly income	.00	.01	-.02, .02	.00	.00	.01	-.02, .02	-.01
Age	.01	.01	.00, .01	.05	.01	.01	.00, .01	.06
Social desirability bias	-.05	.04	-.10, .00	-.05	-.05	.04	-.11, .00	-.05
Intention	.15	.05	.09, .22	.15**	.16	.05	.09, .22	.16**
Habit	.30	.05	.22, .37	.30***	.30	.05	.22, .37	.30***
Perceived sustainability-related climate	.22	.04	.16, .28	.22***	.22	.05	.16, .28	.22***
Self-identity	-.21	.05	-.27, -.14	-.21***	-.20	.05	-.27, -.14	-.20***
Behavior in other context	.45	.04	.40, .51	.45***	.45	.04	.39, .51	.45***
Self-identity x Behavior in other context					.01	.03	-.03, .06	.02
Incremental R ²				.14***				.00
Total R ²								.52***

Note. *p < .05, p < .01, p < .001.