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Explicating Perceived Sustainability-Related Climate: A Situational Motivator of Pro-Environmental Behavior

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Abstract: Individuals take cues from their surroundings when deciding whether to perform pro-environmental behaviors. Previous studies have acknowledged the role of structural, policy, and communication efforts to encourage pro-environmental behavior. Such studies demonstrate the importance of evaluating the external contexts when examining behaviors. Yet, there is a lack of explication of what external context is entailed. Expanding the concept of perceived sustainability-related climate (PSRC) used in organizational communication literature, this study proposes two dimensions that shape PSRC in the workplace—structural cues and social cues. The study then generalizes PSRC such that it is applicable in contexts beyond the workplace and proposes a 10-item scale to measure PSRC. Using confirmatory factor analysis, this study tests the factor structure and concurrent validity of the concept. The study also tests convergent validity of PSRC with social norms, perceived behavioral control, and attitudes.

Keywords: pro-environmental behavior; recycling; situational factors; structural cues; social cues

1. Introduction

Explanations of pro-environmental behaviors often focus on the role of personal attributes. Common predictors of behavioral intention include attitude, social norm, perceived behavioral control, and personal norm [1–3]. Briefly, *attitude* refers to overall evaluations of a behavior [1]. *Social norms* are behavioral cues that indicate whether behaviors are acceptable and prevalent among other people [4]. *Perceived behavioral control* refers to individuals' confidence to perform a behavior successfully [1]. Finally, *personal norms* refer to individuals' sense of moral obligation to perform a behavior [5,6]. Typically, individuals are more motivated to perform a behavior when they hold favorable attitudes, perceive supportive social norms, have perceived behavioral control, and have a strong personal norm to perform the behavior. Assuming that pro-environmental behaviors are motivated mainly by *internal* personal attributes, individuals are likely to perform certain pro-environmental behaviors regardless of the *external* context.

Among the personal attributes, studies have found that attitude, perceived behavioral control, and personal norm play crucial roles in motivating behavior [7,8]. To hold a favorable attitude toward a behavior suggests that individuals perceive the behavior to produce desirable outcomes or that the carrying out of the behavior will elicit positive emotions [9,10]. Having high perceived behavioral control to perform a particular behavior 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 [11]. Lastly, individuals with strong personal norm of a behavior believe that they are personally responsible for the problem or solution [12]. When individuals violate their personal norms, they experience negative

emotional arousal [13]. Therefore, they tend to act in accordance with their personal norms to avoid experiencing the expected negative emotions [14,15]. Taken together, attitude, perceived behavioral control, and personal norm, alongside other cognitive factors, play a role in motivating behavior.

Yet, studies repeatedly show that individuals may perform a behavior in one context and not perform it in another. For example, while some studies found a relationship between the pro-environmental behaviors (PEBs) performed at work and those performed at home [16,17], there are also studies that failed to detect a relationship between PEBs in different contexts [18]. This behavioral discrepancy is so prevalent that Staats [19] called for studies of intention and behavior to specify the context. This discrepancy hints at the role of the external context in shaping behavior. Hence, this study seeks to identify what it is about the external context that motivates behavior.

Studies of external context often focus on *situational factors*, which can refer to the built environment, financial or other incentives, or interpersonal factors such as behavioral modelling and communication [20]. The current study regards the built environment and incentives as providing *structural cues* and interpersonal factors as providing *social cues.* Theories that focus on structural cues posit that individuals are inclined to perform behaviors when the external context supports it [21,22]. Theories that focus on social cues suggest that individuals learn behaviors through observing what others are punished or rewarded for doing [21]. Further, practitioners often implement campaigns to communicate key messages to modify and motivate behavior [23], suggesting that communication plays a vital role in shaping behavior. Communication can take place through media channels, and through interpersonal communication with peers, parents, and organizations [23]. Essentially, situational factors can facilitate or inhibit behavior through shaping individuals' ability to perform the behavior and making cognitive processes about the behavior more salient.

Despite attempts to understand the role of situational factors, there has been a lack of explication to encapsulate its conceptual facets. One study took steps toward such explication by describing *objective* and *subjective* situational factors [24]. Whereas objective situational factors concern external facilitation or constraints, subjective situational factors are individuals' perceptions of their ability to perform a behavior, often as a function of objective factors. Then again, objective situational factors may fail to induce behavioral change if individuals fail to notice them or perceive conflicting situational cues [25].

That prior research highlights the crucial role of the *perception* of situational factors, which may vary by context. The concept of perceived sustainability-related climate (PSRC) captures this idea, referring to the perception of objective situational factors that foster sustainability. The effect of PSRC occurs partly through enhancing perceived behavioral control [25], which comprises 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 [11]. Externally, individuals' actual access to opportunities, resources, and skills in a given context shapes perceived behavioral control [26]. PSRC can affect both the internal and external components of perceived behavioral control, as physical and social surroundings can facilitate certain behaviors.

Although the concept of PSRC is useful for explaining context-specific effects on pro-environmental behavior, researchers have tested it only in the workplace context. There is a need for a generalized concept that can be used across contexts. Therefore, the current research explicates a generalized form of PSRC. While classic theories used to examine motivations of pro-environmental behaviors focused on internal attributes, this study hopes that through developing a generalized understanding of PSRC, future studies can have more guidance as to the situational factors that are crucial in motivating behavior. We situate this study in the context of recycling at home. We chose to situate the study in the well-studied context of recycling, as we wanted to focus our attention on examining a new concept, rather than spread our attention on examining a new concept and a new behavioral context.

1.1. Perceived Sustainability-Related Climate

People are often motivated to perform pro-environmental behaviors, but their desired behaviors may be constrained if external support is lacking in a given context [27]. Lülfs and Hahn [25] introduced PSRC as a workplace-specific situational variable, which refers to whether employees *perceive* the organization to be active and genuine in fostering sustainability. Whereas objective situational factors are important in facilitating behavior, the *perception* of those factors is essential for motivating behavior [28,29]. For example, having sustainability policies does not mean employees will perceive a positive sustainability climate. Employees may view such policies as a mere façade [30] or an attempt at promoting self-interest instead of promoting pro-environmental behaviors [31].

There are at least two ways to promote PSRC—using structural cues and using social cues. The following sections consider how structural and social cues manifest and shape PSRC in the workplace. In addition, we explicate a generalized form of PSRC that can explain pro-environmental behaviors in different contexts.

1.1.1. Structural Cues

Codes of conduct, regulation, incentives, and infrastructure are all policy measures employers can use to promote organizational values and make them personally relevant to employees [32]. The most successful policies make the targeted behavior easy and rewarding to perform [33], and these implications extend to the promotion of pro-environmental behaviors, such as recycling [34]. Such structural cues can improve employees' perceptions of the organizations' efforts to foster a sustainable climate. Examples of recycling-related policies in the workplace include providing rewards to employees who recycle frequently [33,35] and encouraging recycling during employee training [36].

Organizations can further encourage desired behaviors by giving regular feedback to employees [35,37,38]. Feedback occurs after an employee has performed a behavior [39], and informs them about the positive or negative outcomes of their actions [40]. There is empirical evidence of the positive effects of feedback to promote pro-environmental behaviors, such as energy conservation [37]. In the context of recycling, employees can receive feedback about how much they have recycled, how much their colleagues recycle, or how their recycling behaviors have affected the organization.

1.1.2. Social Cues

In order for employees to be even more motivated to perform voluntary pro-environmental behavior, employers can engage in interpersonal communication, which is a key means of fostering cooperation [41,42]. Social cues focus on communication that aims to inform, explain to, or persuade others about pro-environmental behaviors. The content and purpose of each social cue may vary. For example, some cues may be used for persuasion and motivation, while others can serve as simple reminders.

Experimental studies have examined the effects of social cues to encourage pro-environmental behaviors in the workplace (e.g., Oke, 2015 [43]; Young et al., 2015 [35]). A common finding is that communication by organizational leaders often results in the most behavioral change among employees, especially when leaders articulate the importance of pro-environmental behaviors [35,44,45]. When leaders communicate a clear environmental vision and discuss the importance of sustainability, employees are more motivated to engage in pro-environmental behaviors at work [44,46]. Organizations can also use prompts and informational materials to promote pro-environmental behaviors among employees. A prompt is suitable to remind individuals when and where to perform a behavior in the workplace [47,48]. Even though prompts are the least intrusive and least expensive communication tool to promote recycling, a meta-analysis found that a single prompt was sufficient to increase recycling rates [48]. Even when communication efforts failed to influence internal attributes, such as attitudes, norms, perceived behavioral control, and personal norm, a simple reminder was sufficient to boost recycling behaviors [49], showcasing the potency of prompts. Further,

organizations can use informational materials to boost employees' awareness of how to recycle, when and where to recycle, and why they should recycle [36,50].

1.2. Toward a Generalized Concept

The concept of PSRC, as previously explicated, has limited applicability. It begs the question: Do individuals perceive a sustainability-related climate in contexts other than work? If the answer is yes, then there is value in expanding the concept. The following sections give a more general definition of PSRC to make the concept applicable to a wider range of contexts. In this general sense, PSRC refers to whether individuals perceive that, in any given context, structural and social cues foster pro-environmental behavior.

1.2.1. Structural Cues beyond the Workplace

First, it is useful to take a broader view of structural cues, which are essentially formal initiatives taken to promote sustainable behavior. Such initiatives may arise outside work environments when, for example, authorities implement campaigns to facilitate pro-environmental behaviors. These authorities could be the government, but could also be a neighborhood or community association, or any other group or entity that has the prerogative to engage in initiatives promoting sustainable behaviors in a given context.

Authorities can provide support to residents to perform pro-environmental behaviors using three means. First, authorities can install infrastructure that would facilitate pro-environmental behaviors. Some examples of such infrastructure include smart grid systems [51], bicycle racks [52], and recycling bins [47]. Empirical studies provide evidence that the installation of such infrastructure boosts pro-environmental behaviors. Second, authorities can provide monetary incentives to individuals who perform a desired pro-environmental behavior. Although incentives can be a good way to get people to start a behavior, they sensitize individuals to external rewards [48] and the behavior may cease after removing the incentives [53]. A third way is by providing feedback, such as when individuals learn about how their electricity consumption compares with those of their neighbors [54]. Individuals can use that information to set a desired level of consumption and feel more satisfied about their behavior [54]. Not only can infrastructure, incentives, and feedback make performing certain behaviors easier, financially rewarding, and more fulfilling they may enhance PSRC by giving individuals a sense that authorities in a given context support sustainability.

1.2.2. Social Cues beyond the Workplace

The essence of social cues is the use of interpersonal and mediated communication to promote pro-environmental behaviors. In contexts outside work, authorities and referent social groups can use communication to inform, remind, and encourage individuals to engage in pro-environmental behaviors. The presence of supportive communication about pro-environmental behaviors can foster the perception that people in the community value sustainability.

There are several examples of the effects of social cues in the home context. For one, community leaders who interact with residents can be effective at encouraging residents to engage in pro-environmental behaviors, like recycling [55]. Elsewhere, communities have seen positive behavior change after using mediated and interpersonal communication to educate residents on why they should and how they can recycle [56,57]. In one community, door-to-door distribution of recycling information encouraged half of its residents to convert to larger volume recycling carts [58]. Such communication efforts can demonstrate to residents that the community cares about sustainability, which can affect residents' PSRC. In other contexts, sustainability-related communication should have similar effects.

The key objective of this study is to develop a conceptual definition of a generalized PSRC. In addition, it aims to provide a preliminary empirical test of PSRC. However, structural and social cues might shape perceptions of social acceptability of a behavior (subjective norms), individuals' confidence in performing a behavior (perceived behavioral control), and evaluations of a behavior

(attitude). Therefore, we examine the relationship between PSRC and those three factors, which can help situate PSRC within broader theories of behavioral intention. Finally, as the purpose of developing PSRC is to gain a better understanding of behavioral intention, this study also examines the relationship between PSRC and recycling intention.

This study uses the home as the behavioral context to gain a preliminary understanding of the PSRC concept. This is because the workplace is generally a more public space, while the home is a private space. People behave differently in a public space and a private space [48]. By testing a concept that was introduced in a public context in the private sphere, this study extends the applicability of the PSRC concept.

2. Materials and Methods

2.1. Sample

We analyzed cross-sectional survey data from full-time employees in Singapore. In October 2017, we randomly sent survey invitations to 2500 members of an opt-in Qualtrics-brokered online survey panel. Participants had to be a full-time employee of a company, a Singapore citizen or permanent resident, and 21 years or older to participate. In order to increase representativeness of the sample, we imposed demographic quotas based on gender, age, education level, race, and monthly income (According to the Department of Statistics Singapore (2017), the median income earned in Singapore is $4056; median age is 40.5 years; gender ratio is 49.0% males and 51.0% females; and the majority of residents are of Chinese ethnicity (74.3% Chinese, 13.4% Malays, 9.1% Indians, and 3.2% Others).). This resulted in 465 completed surveys, and an AAPOR response rate (formula 3) of 24%. The final sample was mostly male (57%), reflecting the reality that the Singapore workforce is made up of more males than females [59]. The sample had a median age of 35 years (M = 35.90, SD = 8.78); and was 78.1% Chinese, 10.3% Malay, 5.2% Indian, and 6.5% from other races. The median level of educational attainment was a bachelor's degree and the median personal monthly income bracket was SGD 5000 to SGD 5999. The median number of years respondents worked in their current company was 5.0 (M = 6.07, SD = 4.71).

2.2. Measurement

Appendix A presents the full questionnaire.

2.2.1. Perceived Sustainability-Related Climate

We measured PSRC using 10 items, which indicated three dimensions: general PSRC, perceptions of structural cues, and perceptions of social cues. Although the items refer to sustainability in the home context, their application to other contexts requires only slight modification of wording. Table 1 presents the item wordings and descriptive statistics.

We measured general PSRC using four items adapted from Norton et al. [29]. The items asked about how much respondents perceive the neighborhood cares about the environment. We measured perceptions of structural cues using three items that asked to what extent respondents felt supported and rewarded for recycling and received feedback about the impact of their recycling. Finally, we measured perceptions of social cues using three items that asked to what extent respondents were reminded and encouraged to recycle and felt informed about recycling initiatives happening in their community. Three of the six items from the latter two dimensions were adapted from a study examining the role of leadership support on pro-environmental behaviors in the workplace [60].

The latter two dimensions lack prior operationalization; thus, we crafted three of the PSRC measurement items anew ("My community provides rewards to residents for recycling at home," "People in my neighbourhood encourage me to recycle at home," and "People in my neighbourhood remind me to recycle at home.") Response options for all 10 items ranged from 1 (*strongly disagree*) to 7 (*strongly agree*), where a higher score indicates greater PSRC at home.

Table 1. Item wording and descriptive statistics of PSRC items.

Item Wording	Abbreviation	*M*	*SD*
People in my neighbourhood are worried about their environmental impact.	PSRC1	4.38	1.51
People in my neighbourhood are interested in supporting environmental causes.	PSRC2	4.51	1.40
People in my neighbourhood believe it is important to protect the environment.	PSRC3	4.66	1.43
People in my neighbourhood are concerned with becoming more environmentally friendly.	PSRC4	4.53	1.46
I receive support for my recycling behaviour at home.	PSRC5	4.82	1.51
My community provides rewards to residents for recycling at home.	PSRC6	4.02	1.66
People in my neighbourhood inform me about the environmental impact of my recycling at home.	PSRC7	4.12	1.67
I am informed about recycling initiatives happening in my neighbourhood.	PSRC8	4.36	1.66
People in my neighbourhood encourage me to recycle at home.	PSRC9	4.22	1.65
People in my neighbourhood remind me to recycle at home.	PSRC10	4.20	1.69

2.2.2. Subjective Norm

Respondents answered four seven-point Likert items, two measuring an injunctive norm and two measuring a descriptive norm. We developed these items based on Ajzen and Fishbein's (2010) recommendations. Response options ranged from 1 (*strongly disagree*) to 7 (*strongly agree*), where a higher score indicates stronger recycling subjective norm. After removing one item measuring descriptive norm, the measure had acceptable reliability to measure recycling subjective norm at home (M = 4.95, SD = 1.32, Cronbach's α = 0.90).

2.2.3. Perceived Behavioral Control

Respondents answered three seven-point Likert items adapted from Norton et al. [29] measuring their confidence to perform recycling. Response options ranged from 1 (*strongly disagree*) to 7 (*strongly agree*), where a higher score indicates greater perceived behavioral control. We removed one item due to poor reliability. The remaining two items had good reliability (M = 5.15, SD = 1.32, Spearman-brown coefficient = 0.87).

2.2.4. Attitude toward Recycling

For each context, respondents answered five semantic differential scales adapted from Ofstad, Tobolova, Nayum, and Klöckner [61] to measure attitudes toward recycling. Response options ranged from 1 to 7, with a higher score representing a more positive attitude (M = 5.93, SD = 1.38, Cronbach's α = 0.96).

2.2.5. Recycling Intention

We measured recycling intention using three seven-point Likert items adapted from Park and Ha [62]. The items referred to behavioral intention during the next month, which is consistent with Ajzen's (2002) recommendations. Response options ranged from 1 (*strongly disagree*) to 7 (*strongly agree*), where a higher score indicates greater recycling intention at home (M = 5.38, SD = 1.26, Cronbach's α = 0.92).

2.3. Analytical Approach

We used *Mplus version 5.2* to conduct a confirmatory factor analysis of the 10 PSRC items. We did not conduct exploratory factor analysis as we already had an understanding of the underlying latent variable structures [63]. We tested three models, which differed in the dimensional representation

of PSRC. Model 1 treated all 10 PSRC items as indicators of a unidimensional construct. Model 2 differentiated between general PSRC as one factor and the combination of structural and social cues as a second factor. Model 3 differentiated among all three dimensions of PSRC.

Following the confirmatory factor analysis, we examined the correlations among dimensions to evaluate concurrent validity. That test compared the structural and social dimensions of PSRC with general PSRC (Models 2 and 3). Finally, we estimated an additional model, Model 4, which included subjective norm, perceived behavioral control, and attitude. Correlations between PSRC and subjective norm, perceived behavioral control, attitude, and recycling intention provided a test of convergent validity.

We used the following criteria to ascertain good model fit: (1) the relative chi-square ratio ($\chi 2/df$) should not exceed 5 [64], (2) the root mean square error of approximation (RMSEA) should fall below 0.08 [65] and, (3) the values obtained for both the comparative fit index (CFI) and Tucker–Lewis Index (TLI) should exceed 0.95 [66]. In addition, we use the adjusted Bayesian information criterion (aBIC) to make direct comparisons among models, where a lower value indicates better fit.

3. Results

3.1. Confirmatory Factor Analysis

Table 2 presents descriptions and model fit indices for all the models tested. The fit of Model 1 was marginally acceptable after freeing seven parameters based on theoretically meaningful modifications [67]. Most of the modifications suggest that general PSRC is distinct from structural and social cues. This was unsurprising, as we expected PSRC to be a multi-dimensional concept. The fit of Model 2 was acceptable, this time after freeing two parameters. Model 3 had a similar acceptable fit, also after freeing two parameters, one of which was also freed in Model 2.

The three-factor model (see Table 2) had slightly better fit than the two-factor model based on aBIC. In addition, the two-factor and three-factor models have the largest CFI and TLI values. However, all three models had acceptable fit, which suggests that researchers could use any of the three versions if a particular statistical model necessitated it. In all three models, the standardized factors loadings of all 10 items were larger than 0.40, indicating good composite reliability.

Table 2. Model fit of alternative models tested.

Model	Number of Factors	Dimensions	Freed Parameters	$\chi 2/df$	CFI	TLI	RMSEA	aBIC
1	1	PSRC	7	4.03	0.98	0.97	0.081	13087.54
2	2	General PSRC, structural cues and social cues	2	3.93	0.98	0.97	0.079	13088.55
3	3	General PSRC, structural cues, social cues	2	3.59	0.98	0.97	0.075	13076.35
4	2	Model 2, subjective norm, perceived behavioral control, attitude, recycling intention	2	2.77	0.97	0.96	0.062	28737.28

3.2. Construct Validity

3.2.1. Concurrent Validity

Concurrent validity was established by examining the correlations between general PSRC—which is an existing construct—and the two newly explicated dimensions. The two-factor model showed a strong correlation ($r = 0.80$, $p < 0.001$). The three-factor model also showed strong correlations,

with general PSRC being positively related to structural cues ($r = 0.77$, $p < 0.001$), and social cues ($r = 0.79$, $p < 0.001$). This analysis revealed a potential problem with the three-factor model: structural cues and social cues were very highly correlated ($r = 0.95$, $p < 0.001$), which suggests little value in separating those two dimensions. Hence, the two-factor model is superior (please refer to Figure A1). Table 3 presents the factor loadings for the two-factor model.

Table 3. Perceived sustainability-related climate (PSRC) factor structure.

Item	Factor	
	1	2
PSRC1	0.84	
PSRC2	0.92	
PSRC3	0.88	
PSRC4	0.81	
PSRC5		0.62
PSRC6		0.75
PSRC7		0.89
PSRC8		0.85
PSRC9		0.94
PSRC10		0.92

3.2.2. Convergent Validity

Given the potential for multicollinearity in the three-factor model, we used the two-factor model to test convergent validity. This analysis looked at the correlations between PSRC and concepts to which it should relate, namely, subjective norm, perceived behavioral control, attitude, and recycling intention. Results showed that PSRC was strongly correlated with subjective norm (General PSRC: $r = 0.57$, $p < 0.001$; Structural-social PSRC: $r = 0.53$, $p < 0.001$) and perceived behavioral control (General PSRC: $r = 0.57$, $p < 0.001$; Structural-social PSRC: $r = 0.80$, $p < 0.001$). It was weakly correlated with attitude toward recycling (General PSRC: $r = 0.29$, $p < 0.001$; Structural-social PSRC: $r = 0.19$, $p < 0.001$). Finally, it was moderately correlated with recycling intention (General PSRC: $r = 0.45$, $p < 0.001$; Structural-social cues PSRC: $r = 0.39$, $p < 0.001$). Table 4 presents the correlations between variables.

Table 4. Correlations between variables.

	1	2	3	4	5	6
1. PSRC: General	-					
2. PSRC: Structural cues and social cues	0.80 ***	-				
3. Attitude	0.29 ***	0.19 ***	-			
4. Subjective norm	0.57 ***	0.53 ***	0.41 ***	-		
5. Perceived behavioral control	0.57 ***	0.51 ***	0.45 ***	0.75 ***	-	
6. Recycling intention	0.45 ***	0.39 ***	0.46 ***	0.74 ***	0.72 ***	-

4. Discussion

This study explicated and operationalized a generalized form of PSRC. That concept refers to the perception of external surroundings in facilitating pro-environmental behaviors. The idea of PSRC originated in studies of pro-environmental behaviors in the workplace. The current work extends Lülfs and Hahn's [25] explication, which described the concept as the outcome of objective organizational efforts, such as codes of conduct. We took a more nuanced view of the situational factors that influence PSRC, focusing on the contributions of structural cues and social cues, and examined the generalized form of PSRC in the context of pro-environmental behaviors at home.

Despite initially theorizing of PSRC as a three-factor concept, results suggest that a two-factor model is superior on statistical grounds. That model distinguished between general PSRC and situational PSRC. The situational dimension reflects both structural and social cues, which were very

highly correlated in the three-factor model. Their strong correlation is unsurprising, as structural elements generally require some sort of communication to spread awareness and acceptance of initiatives [68]. Also, the use of communication to encourage behavior change will be more successful when other facilitating factors are in place, such as infrastructure [57]. Those facilitating factors often have policy bases. Therefore, this study affirms the importance of policymakers and communication practitioners working hand in hand to design and implement policies.

4.1. Theoretical Implications

The data revealed that PSRC is strongly related to both subjective norm and perceived behavioral control. Such findings support the notion that the perception of one's surroundings and incentives (structural cues) and communication (social cues) can facilitate pro-environmental behaviors, but are not the same things as perceived behavioral control and subjective norms. PSRC was only weakly related to attitude toward recycling. The weak relationship between PSRC and attitude suggests that simply modifying individuals' surroundings will do little to affect how they feel about the behavior. Further, PSRC had a moderately strong relationship with recycling intention. A plausible explanation is that perceptions of situational factors directly influences subjective norm and perceived behavioral control, which in turn shape behavioral intention. That is, we suspect the relationship between PSRC and behavioral intention is indirect. A post-hoc test using SPSS PROCESS macro supports this suspicion. Using Model 4 of the SPSS PROCESS macro, we tested the indirect effects of PSRC on intention via subjective norm, perceived behavioral control, and attitude. The results revealed that general PSRC and structural–social PSRC were not directly associated with recycling intention (PSRC General: $b = -0.01$, 95% CI [−0.09, 0.07]; Structural–social PSRC: $b = -0.03$, 95% CI [−0.10, 0.04]). However, PSRC was significantly indirectly associated with recycling intention via subjective norm, perceived behavioral control, and weakly through attitude. The indirect relationships between PSRC and intention via subjective norm (PSRC General: $b = 0.20$, 95% CI [0.12, 0.29]; Structural–social PSRC: $b = 0.19$, 95% CI [0.12, 0.28]) and perceived behavioral control (PSRC General: $b = 0.18$, 95% CI [0.11, 0.26]; Structural–social PSRC: $b = 0.18$, 95% CI [0.11, 0.25]) were notable. The indirect relationship between PSRC and intention via attitude was more negligible (PSRC General: $b = 0.05$, 95% CI [0.02, 0.08]; Structural–social PSRC: $b = 0.03$, 95% CI [0.01, 0.06]). A similar idea has appeared in an organizational communication context [69]. When employees feel their employer supports a particular behavior, they have a more positive attitude, perceive a stronger norm, and feel they have more behavioral control. As a result, they have a stronger intention to perform the behavior, despite organizational support not being directly related to intention. That prior study has direct import regarding PSRC in a work context, but such cognitive mediation ought to occur in any context where situational factors can support behavior.

4.2. Limitations and Directions for Future Research

This study had limitations related to using a web-based questionnaire, cross-sectional self-reports. Although using an online research panel limits the generalizability of the findings by under-representing non-Internet users, this limitation is perhaps less severe in Singapore, where the broadband penetration rate is more than 80% [70].

Further, this study provides only a preliminary test of the PSRC concept. We were unable to establish discriminant validity. Therefore, we are unable to fully assess construct validity of PSRC. Future studies would need to use independent samples and perhaps triangulation via multiple methods for a more robust validation.

Similarly, our study's focus on a single behavioral context was a limitation. As it stands, the current analysis is more of a case study showing the validity of the concept with respect to a single behavior. More studies are required to test the concept and relationships between variables in additional behavioral contexts. Further testing could validate the general application of the PSRC concept.

Future studies can also examine the relationship between perceptions of external surroundings and the actual surroundings. Additionally, studies can examine the relative importance of structural and social cues in shaping PSRC. There may also be personal attributes such as group identity and habit that moderate the relationship between PSRC and pro-environmental behavior intentions. PSRC might also be more crucial in shaping behavior in certain contexts. For instance, PSRC might motivate pro-environmental behaviors more in places where individuals have yet to form routines than in places where people have established well-rehearsed routines. Future studies can also examine if there are unique cultural or workplace factors that may diminish or augment the influence of PSRC on pro-environmental intention.

5. Conclusions

Heightened attention to environmental issues has motivated scholars from across disciplines to understand why people engage in pro-environmental behaviors. Although technological and policy solutions may partially address these issues, the key to preserving the environment is changing human behavior; the key to modifying behavior remains a black box. Efforts to modify behavior often have weak to moderate effects, suggesting that other crucial motivational factors remain elusive to practitioners and researchers. Understanding how situational factors—and the perception of situational factors—facilitates or hinders behavior can help to advance scientific understanding of human behaviors.

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Appendix A Questionnaire

Introduction

Researchers from the Wee Kim Wee School of Communication and Information, Nanyang Technological University (NTU) want to understand Singapore citizens' **thoughts about recycling** and **recycling behaviours**. You will be asked to read a few statements about recycling and asked to indicate how much you agree with each statement.

We appreciate your participation in this study as your feedback is important in guiding scholarly research and recycling strategies.

Are you a Singaporean or Singapore Permanent Resident?

- ○ Singaporean
- ○ Singapore Permanent Resident
- ○ I am a foreigner.

Are you currently employed?

- ○ Yes
- ○ No
- ○ I am self-employed.

What is your employment type in your company?

- ○ Full-time
- ○ Part-time
- ○ Contract

What is your year of birth? ____

Now, we would like to know about your thoughts and behaviours regarding recycling **at home**.

Please read the statements on the next page carefully and indicate your level of agreement to each statement.

Please read the statements and select the option that best describes how much you agree with it.

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
I intend to recycle at home within the next month.							
I will try to recycle at home within the next month.							
I plan to recycle at home within the next month.							

For me, recycling when I am at home would be considered . . .

Bad : 1 : 2 : 3 : 4 : 5 : 6 : 7 : Good

Useless : 1 : 2 : 3 : 4 : 5 : 6 : 7 : Useful

Unpleasant : 1 : 2 : 3 : 4 : 5 : 6 : 7 : Pleasant

Foolish : 1 : 2 : 3 : 4 : 5 : 6 : 7 : Wise

Worthless : 1 : 2 : 3 : 4 : 5 : 6 : 7 : Worthwhile

Please read the statements and select the option that best describes how much you agree with it.

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
People I spend time with at home think that I should recycle at home.							
People I spend time with at home expect me to recycle at home.							
It is normal for people I spend time with at home to recycle at home.							
People I spend time with at home do not recycle when they are at home.*							

Note. * represents items removed due to poor reliability.

Please read the statements and select the option that best describes how much you agree with it.

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
Recycling at home is easy for me.							
Conditions at home make it hard to recycle. *							
If I wanted to, I could easily recycle when I am at home.							

Note. * represents items removed due to poor reliability.

Please read the statements and select the option that best describes how much you agree with it.

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
People in my neighbourhood are worried about their environmental impact.							
People in my neighbourhood are interested in supporting environmental causes.							
People in my neighbourhood believe it is important to protect the environment.							
People in my neighbourhood are concerned with becoming more environmentally friendly.							
I receive support for my recycling behaviour at home.							
My community provides rewards to residents for recycling at home.							
People in my neighbourhood inform me about the environmental impact of my recycling at home.							
I am informed about recycling initiatives happening in my neighbourhood.							
People in my neighbourhood encourage me to recycle at home.							
People in my neighbourhood remind me to recycle at home.							

Appendix B Factor Structure of PSRC

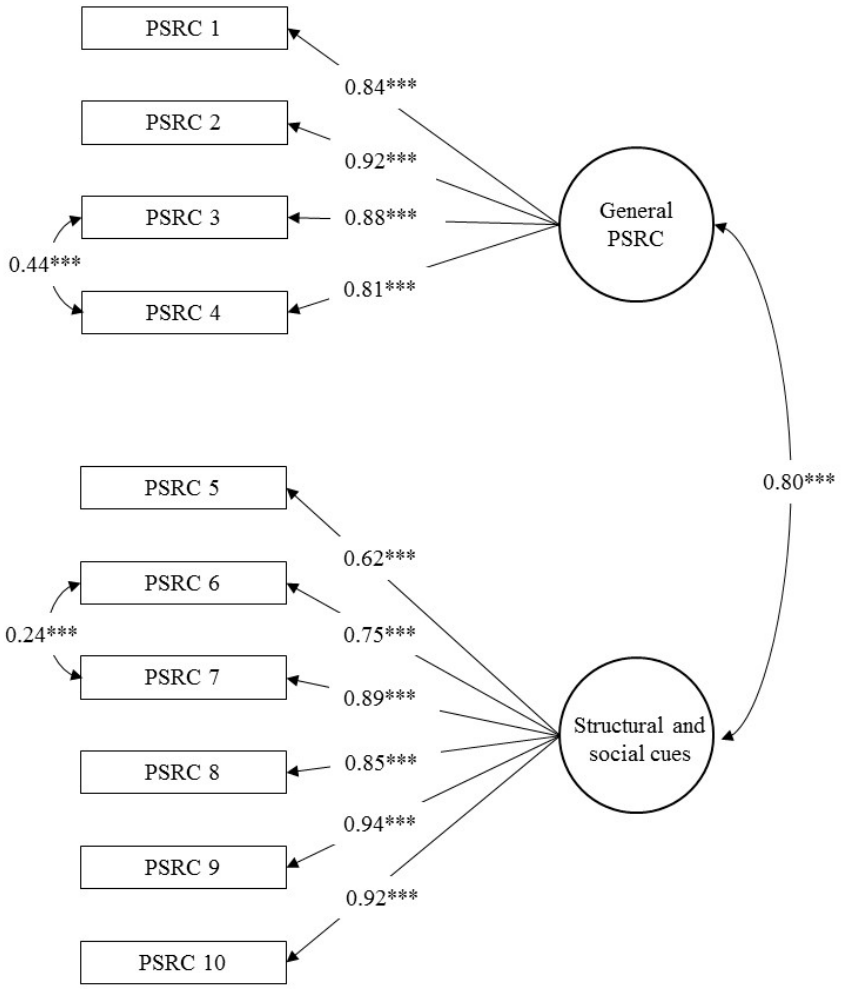

Figure A1. Visual representation of PSRC factor structure.

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