



Planting the Green Idea:

A Study of Medium Effectiveness on Behavioural Intentions

Using the Theory of Planned Behaviour

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Abstract

The Theory of Planned Behaviour (TPB) proposed by Ajzen has traditionally been used by researchers to predict behaviour, explain behavioural changes and to design behaviour interventions to elicit changes. This study seeks to apply TPB to the much neglected research area of “green” behaviour in the context of Singapore.

Using a randomly selected sample of $N = 203$, a self-administered household survey was conducted to study how attention to TV, newspapers and the Internet may affect the predictive factors (attitudes, perceived social norms, and perceived behavioural control) of behavioural intentions in TPB. Attempt was also made to verify if TPB is valid in the local context with regard to “green behaviour”.

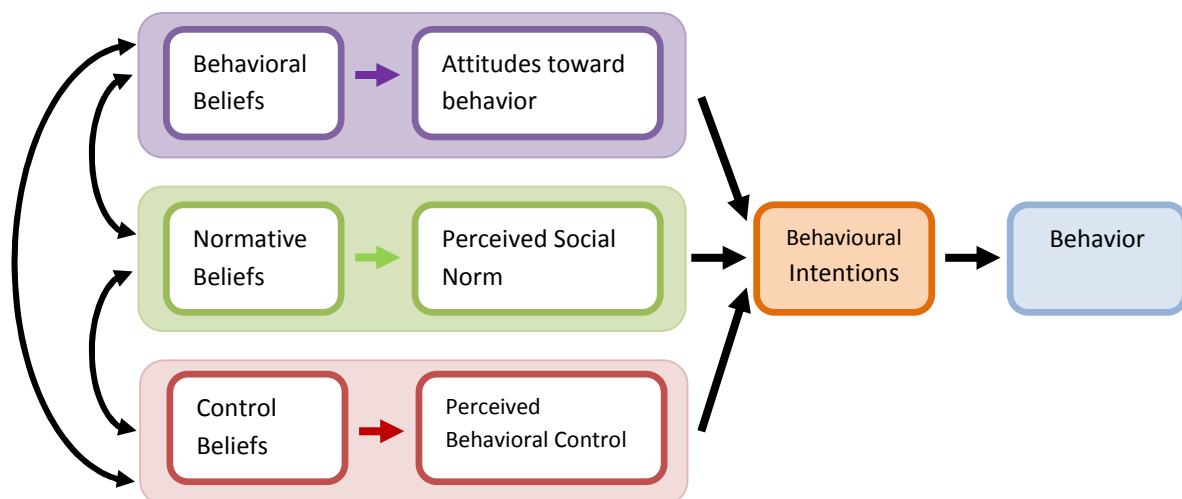
Our findings show that TPB is applicable in the local context with all three predictive factors showing a positive and statistically significant relationship with behavioural intentions, which is a reliable predictor of behaviour. Attention to newspapers exhibited a significant and positive relationship with perceived social norm and behavioural control but not attitudes. Attention to TV showed a significant positive relationship with perceived social norms, an inverse relationship with perceived behavioural control, and no relationship with attitudes. Attention to the Internet was not statistically significantly associated with any of the three predictors of behavioural intentions. We conclude that the newspaper is thus the medium that exhibits the strongest effect on proenvironmental behaviour.

We hope that our research will aid in the understanding of varying effects different media channels can have on individual behavior. With such knowledge, media policy-makers and government authorities can also be better informed in encouraging other kinds of positive behaviour through cost-effective means.

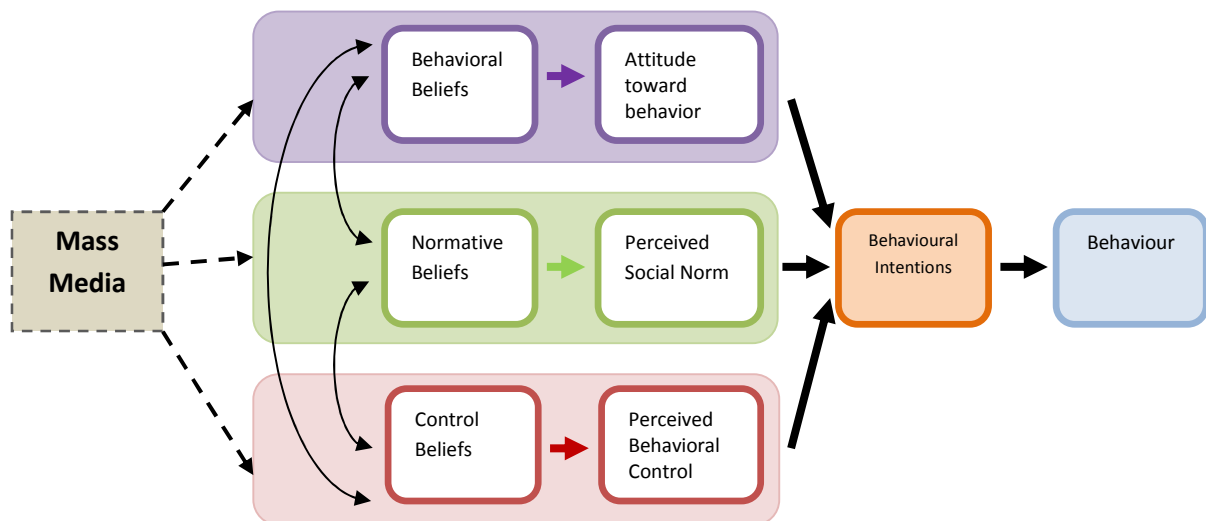
Planting the Green Idea: A Study of Medium Effectiveness on Behavioural Intentions Using the Theory of Planned Behaviour

The Theory of Planned Behaviour (TPB) explains behavioural intentions and subsequent behaviour of individuals as a result of three factors: personal attitudes, perceived social norms and perceived behavioural control (see Fig. 1). TPB is often used in communication research to predict and examine media use for individuals via the uses and gratifications perspective (Kink & Hess, 2008; Lange, 2010; Pelling & White, 2009). However, a research gap exists in integrating the model with mass media communication within the media effects orientation.

Fig. 1. Model of Theory of Planned Behaviour



As such, this study seeks to apply the TPB framework to determine the persuasive efficacy of different mediums on behavioural intention. The relationship between attention to mass media, the three predictive factors of behavioural intention, and subsequent behavioral intention will be investigated. In addition, different channels may affect behavioral intention differently. Unique characteristics of different media may result in the medium having a greater effect on its audience than the message itself, as informed by Marshall MacLuhan's Medium Theory (1964). Thus, we postulate a tentative model for our research (see Fig 2).

Fig. 2. Proposed Tentative Model

This research shall focus on the topic of ‘green’ behaviour in Singapore. ‘Green’ behavior in the context of this study refers to the commonly known 3Rs of “Reduce”, “Reuse”, and “Recycle”, as promoted by the National Environment Agency (NEA) of Singapore (Government of Singapore, 2007). The NEA has promoted the concept of 3Rs in Singapore via various initiatives like the provision of “3R fund” for companies and schools to cultivate pro-environmental behavior (National Environment Agency, 2008). Hence, the concept of 3Rs should be familiar to Singaporean Citizens and Permanent Residents, who are the subjects of our study.

Globally, environmental concerns receive relatively little coverage in the media due to the conflict of interests with advertisers (Maxwell & Roberts, 2007) and a perceived lack of news value (Shanahan, 2009). Locally, public reception toward environmental issues has also been lukewarm, with a recycling rate of only 56% (IMCSD, 2009). In response, the government has introduced new initiatives to increase the environmental awareness of the public in an effort to transform Singapore into a ‘green hub’ (Economic Development Board, 2007). The recency of this topic in the public mindset makes it a good point of focus for this study.

Literature Review

TPB predicts one's behaviour as a function of behavioural, normative, and control beliefs (Ajzen, 1991). Behavioural beliefs refer to the evaluation of the probable outcomes of the behaviour and results in the formation of either a positive or a negative attitude toward it. Normative beliefs about significant others' perception on the behaviour produces subjective norm, also known as the perceived social norm. Control beliefs influences the perceived behavioural control of an individual over the behaviour. Perceived behavioural control is essentially similar to perceived self-efficacy (Ajzen, 2002b), which is described as one's self-evaluation of his abilities to implement certain actions (Bandura, 1986). Both terms will be used interchangeably in this paper. These three factors are the immediate factors in predicting behavioural intentions, which in turn leads to the behaviour itself (Hrubes & Ajzen, 2001).

Ajzen (2003) established behavioural intention as the immediate precursor of behavioural change and an effective and reliable predictor of eventual behaviour. A recall of tangible 'green' behaviour might be inaccurate if our respondents deem such behaviour insignificant. The budget and scope of this study also does not allow us to carry out a comprehensive observation and measurement of actual behaviour. Thus, the three predictive factors and behavioural intentions will be our variables of investigation.

TPB is commonly used to examine behavioural intent in areas of health and political communication (Andrews, Silk, & Eneli, 2010; Johnson Avery, 2007; Wang, 2009). Local scholars have also applied the theory in similar inquiries in the context of Singapore (Ho, Lee, & Hameed, 2008; Hua, Loh, Detenber, & Tan, 2006). The theory has exhibited robustness in explaining up to 39% and 27% of the variance behind behavioural intentions and tangible behaviour respectively (Armitage & Conner, 2001). However, the theory has seen limited use in the study of environmental behavior in Singapore.

In a study of proenvironmental behaviour in Hong Kong, Chan (1998) found that the three predictive variables in TPB explained 44% of the variance in behavioural intentions. However, perceived behavioural control did not have a significant correlation with behavioural intention in the study. Oreg and Katz-Gerro's study (2006) suggests that this could be due to the differing influence cultural settings have on one's behavioral intentions through the three predictive factors in question.

Singapore is a globalised asian country with a westernised outlook similar to Hong Kong. Hong Kong's recycling rate stands at 31% in 2009 (Xinhua News Agency, 2009), lower than Singapore's 56%. Superficially, this might appear to give weight to TPB being able to predict behavioural intentions with regard to green behaviour. However, this might not hold as Singapore is not as culturally homogeneous as Hong Kong. Therefore, the three predictive variables might predict behavioural intentions to differing extents as well. Given the lack of scholarly attention in this area, we first aim to test the theory locally:

- H1: Personal attitudes toward 'green' behaviour is positively associated with behavioural intentions toward 'green' behaviour.
- H2: Perceived social norms toward 'green' behaviour is positively associated with behavioural intentions toward 'green' behaviour.
- H3: Perceived behavioural control toward 'green' behaviour is positively associated with behavioural intentions toward 'green' behaviour.

Attention to Media and its Effects

The influence of media upon users has been investigated within the media effects paradigm to a variety of conclusions. While past research has not specifically investigated the direct relationships between media and TPB, they have shown that logical links can be drawn between media usage and the three predictive factors in TPB. For instance, Halady and Rao (2009) found that awareness on the impact of climate change and existing initiatives to

combat the phenomenon is positively correlated to one's tendency to engage in 'green' behavior. Awareness is informed largely by the mass media. In addition, non-fictional broadcast programmes on environmental issues was also found to result in higher incidences of pro-environmental behaviour (Holbert, Kwak, & Shah, 2003). These effects on behaviour due to attention to environmental information on television should be captured by behavioural intentions as behavioural intentions is a strong predictor of subsequent behaviour.

For the purpose of this study, we have chosen to investigate three major mass media mediums: newspapers, television, and the Internet. The amount of attention paid to environmental information in each medium will be used to operationalise the level of media exposure. (See Appendix G)

Relationship Between Attention to Media and Attitudes

For print media, news frames alters and organises how audience perceive and understand an issue (Domke, Shah, & Wackman, 1998). Consequently, the audience develops an attitude toward the issue based upon the framing. In addition, Riffe and Hrach (2009) found that the amount of attention paid to print and television news on environmental risks is positively related to the audience's risk perception. Risk perception was found to be inversely related to attitudes in a study of the influence of food safety information on purchase behavior (Lobb, Mazzocchi, & Traill, 2005). The greater the level of consumers' risk perceptions of food safety, the less likely they would purchase certain unsafe food due to a negative evaluation of such groceries.

Broadcast media was also found to affect personal attitudes. A longitudinal study in Scotland found that respondents who paid more attention to advertisements on television and cinemas and hence exhibited higher recall reported significant change in attitude against speeding (Stead, Tagg, MacKintosh, & Eadie, 2005). This explains how attention paid to media can negatively influence attitudes toward antisocial behaviour.

Evidences suggest that the amount of attention paid to news media on all three channels might positively influence attitudes toward prosocial behaviour. Thus, the first part of our hypotheses relating to attitudes are:

- H4a: The amount of attention paid to environmental information in the newspapers is positively associated with personal attitudes toward ‘green’ behaviour.
- H4b: The amount of attention paid to environmental information on the television is positively associated with personal attitudes toward ‘green’ behaviour.
- H4c: The amount of attention paid to environmental information on the Internet is positively associated with personal attitudes toward ‘green’ behaviour.

Relationship Between Attention to Media and Perceived Social Norms

Literature has consistently found that perceived social norms can be affected by mass media to a large extent (Gunther, Bolt, Borzekowski, Liebhart, & Dillard, 2006). Chan’s study of proenvironmental behavior (1998) found that mass media strongly influenced perceptions of social norms toward the issue. This influence was found to be even greater than that of interpersonal networks even though social norms are built upon expectations of significant others, and should thus be more affected by interpersonal networks. It could be explained by the transmission of news knowledge, which can influence perceived social norms through the agenda-setting process by salience transfer (McCombs & Shaw, 1972).

In addition, Cultivation Theory suggests that one’s perception of the world is congruent with that portrayed in the media, especially television, due to long-term exposure (Gerbner, Gross, Morgan, & Signorielli, 2002). For instance, increased negative media attention on youth binge drinking has been linked to greater tendency for individuals to believe that their peers is not in favour of the behaviour (Yanovitzky & Stryker, 2001).

The amount of attention paid to issues in the media (and hence, the exposure to media) can thus positively predict how its consumers perceive the level of importance that society places on the issues in question. Hence, our hypotheses relating to perceived social norms are:

- H5a: The amount of attention paid to environmental information in the newspapers is positively associated with perceived social norms toward 'green' behaviour.
- H5b: The amount of attention paid to environmental information on the television is positively associated with perceived social norms toward 'green' behaviour.
- H5c: The amount of attention paid to environmental information on the Internet is positively associated with perceived social norms toward 'green' behaviour.

Relationship Between Attention to Media and Perceived Behavioural Control

Research has shown that media exposure can empower users on certain issues. Exposure to news was found to have significant positive association with one's perceived efficacy in holding social conversations requiring general knowledge (Tewksbury, Hals, & Bibard, 2008). It was found that browsing political news on any of the media channels could lead to an increased level of confidence in the discussion of political matters.

In addition, attention to health information on television could lead to an increase in perceived self-efficacy. Helme, Donohew, Baier and Zittleman (2007) found that exposure of experimental subjects to television commercials discussing ways to prevent smoking resulted in a higher level of self-efficacy toward not smoking. Similarly, Guevara, Wolf, Grum, and Clark (2003) found significant relationship between children's media consumption and their perceived abilities to handle their asthmatic relapses in a meta-analysis.

There is also evidence of an indirect relationship between media attention and self-efficacy. Paek et al. (2010) examined this in his study of exposure to emergency news, and audience's subsequent perceived abilities to cope with emergencies.

The hypotheses relating to perceived behavioural control are thus:

- H6a: The amount of attention paid to environmental information in the newspapers is positively associated with perceived behavioural control toward 'green' behaviour.
- H6b: The amount of attention paid to environmental information on the television is positively associated with perceived behavioural control toward 'green' behaviour.
- H6c: The amount of attention paid to environmental information on the Internet is positively associated with perceived behavioural control toward 'green' behaviour.

Channel Differences

The Medium Theory advanced by McLuhan (1964) posits that media channels can have a greater influence than their content. This has received support in recent comparison studies done across various mediums in news and advertising research. Dissimilar degrees of influence were found on aspects such as content credibility and attention to media (Banning & Sweetser, 2007; Culbertson, Evarts, Richard, Sandell, & Stempel, 1994; Dahlen, 2005). The distinctions between the different media channels necessitates an inquiry into their potentially different impacts on the three predictive factors in TPB.

The newspaper is an "active medium" that requires considerably higher levels of cognitive involvement compared to the "passive" television medium (Dutta-Bergman, 2004). The Internet also demands a considerable amount of cognitive processing and thus generates greater involvement due to its higher degree of interactivity (Kim & Stout, 2010). Bae and Kang (2008) found that issue involvement influences the three predictive factors in TPB and results in different levels of behavior through the Elaboration Likelihood Model. A greater amount of involvement from an "active" medium would thus be more likely to lead to the central route of persuasion. The subsequent behavioral intentions would then be more intense and resistant to change as compared to the influence of the "passive" television medium.

Eveland, Seo, and Marton (2002) also found that television and print newspapers tend to generate better news recall but Internet sites improve knowledge structuring. In addition, the interactivity of the Internet was hypothesized to reinforce learning and information recall by increasing cognitive involvement (Liu & Schrum, 2002). Different levels of news recall and knowledge structuring can influence perceived social norms differently as it shapes the public agenda (Behr & Iyengar, 1985). The longevity of a topic in the public mindset is an indicator of its relative importance. Thus, different mediums can impact perceived social norms to varying extents, giving rise to different degrees of behaviour.

Theoretically, the three channels should be distinct enough to have characteristic influences upon the three predictive factors in TPB. Thus, we raise the following question to compare the persuasive efficacy of the three channels.

- RQ1: Which medium will exhibit the greatest level of impact on behavioral intention?

Methods

A household self-administered survey with a 3-stage cluster sampling was conducted to obtain a sample size $n = 203$ of respondents that are 18 years or older (giving a margin of error of about $\pm 7\%$) for this study. (See Appendix A for the detailed sampling procedure)

The survey was administered on the weekend of 16th and 17th of October 2010, between 1100 to 2100 Hrs, when most respondents should be available at home. (See Appendix B for survey items.) Respondents were promised confidentiality and of the leaving of contact numbers was optional (see Appendix F). The overall response rate is 48.8% based on the AAOPR response rate formula 1 calculation (see Appendix C).

Three linear regression analyses were used to investigate the relationship between the independent and dependent variables. The variables were entered into the regression model

based on their assumed order as illustrated in Fig. 2 and each of the hypotheses. In Analysis 1 (i.e. H1, H2 & H3), the control variables (i.e. age, gender) were entered into the first block, followed by the predictors of behaviour (i.e. attitudes, perceived social norms and perceived behavioural control). Behavioural intentions was the dependent variable.

In analysis 2 (H4, H5 & H6), control variables was entered into the first block, followed by attention to environmental information in media (i.e. attention to TV, attention to newspaper and attention to Internet). Attitudes, perceived social norms and perceived behavioral control were each tested individually as the dependent variable in this analysis.

In analysis 3, the complete proposed model as illustrated in Fig. 2 was tested. Control variables was entered into the first block, followed by attention to media, and then the predictors of behaviour. Behavioral intentions was the dependent variable.

Table 1 Descriptive statistics (means and standard deviations) of control, SES, attention, behavioural predictors and behavioural intentions (N = 203)

	M	SD		M	SD
Control Variables			Attention		
Age	36.53	11.88	Attention to TV	4.28	1.42
Gender	55.7% male	-	Attention to Newspaper	4.38	1.38
SES			Attention to Internet	3.75	1.60
Education	3.00 (Median = GCE 'A' Level, Polytechnic/ IB)	1.13	Behavioural Predictors		
Household Income	5.00 (Median = \$4000 - \$4999)	2.23	Attitudes	5.66	0.99
Others			Perceived Social Norms	4.45	1.20
Race	1.00 (Median = Chinese)	1.78	Perceived Behavioural Control	4.74	1.03
			Behavioural Outcome		
			Behavioural Intention	5.06	0.99

Table 1 summarises the descriptive statistics for all the variables. Missing variables were replaced by mean substitution. We included age ($M = 36.53$, $SD = 17.07$) and gender (55.7% male) as the control variables. The Social Economic Status (SES) of the respondents is captured via their education (Median = 3.00 or “GCE ‘A’ Level, Polytechnic/ IB”) and household income (Median = 5.00 or “\$4000 - \$4999”).

Attention to environmental information on different media channels were measured with a four-item index on a five-point scale. We typified environmental information to consist of environmental policies, risks, campaigns, and behaviours. The scores for the four items were then averaged to form the measures for attention to television ($M = 4.28$, $SD = 1.42$, Cronbach’s Alpha = 0.916), attention to newspapers ($M = 4.38$, $SD = 1.38$, Cronbach’s Alpha = 0.921) and attention to the Internet ($M = 3.75$, $SD = 1.60$, Cronbach’s Alpha = 0.950).

The instrument items measuring TPB variables were adapted from “Constructing a TpB Questionnaire: Conceptual and Methodological Considerations” proposed by Ajzen (2002a). Each indicator was scored on a seven-point scale. Attitude is defined as the “individual’s overall assessment of the performance of a behaviour” and was measured with an average index of seven items ($M = 5.66$, $SD = 0.99$, Cronbach’s Alpha = 0.796) with a semantic differential scale. Perceived behavioural control seeks to capture an individual’s perceived ability to perform the behaviour and was an average index of four items ($M = 4.74$, $SD = 1.03$, Cronbach’s Alpha = 0.615). Perceived social norms consists of both injunctive norm (significant others’ approval of behaviour) and descriptive norm (significant others’ performance of the behaviour) and was an average index of four items ($M = 4.45$, $SD = 1.02$, Cronbach’s Alpha = 0.803). Finally, behavioral intentions was measured with a nine-item average index on a seven-point scale ($M = 5.06$, $SD = 0.99$, Cronbach’s Alpha = 0.900).

Results

Analysis 1

Table 2 (See Appendix D) shows the linear regression analysis for TPB as seen in Fig. 1. We controlled for two demographic variables of age and gender in the first block of the regression model. We then entered the three variables of attitudes, perceived behavioural control, and perceived social norms into the second block of the model.

Age and gender were not statistically significant in accounting for the behavioural intentions of the respondents. After controlling for the two demographic variables, behavioural intentions toward 'green' behaviour was positively related to attitudes ($\beta = .18, p < .001$), perceived behavioral control ($\beta = .41, p < .001$) and perceived social norms ($\beta = .28, p < .001$). A positive attitude toward 'green' behaviour, a high level of perceived social pressure toward performing 'green' behaviour, and a high level of perceived self-efficacy in performing such behaviour would lead to a greater intention to enact 'green' behaviour. Hence, *H1*, *H2* and *H3* were supported. The second block explained 39.0% of the variance in behavioural intentions. Taken together, the model explained 39.17% of the variance in behavioural intentions.

Analysis 2

Table 3 (See Appendix E) shows the linear regression analysis for the effects of attention to environmental information on various media (TV, newspaper, and the Internet) on attitudes, perceived social norms, and perceived behavioural control respectively. The two demographic variables of age and gender were controlled for in the first block of the regression model. We then entered the three media into the second block of the model.

Age and gender were not significantly related to the three predictive factors in TPB.

After controlling for the demographic variables, attitude was not significantly associated with attention to TV, attention to newspapers, or attention to the Internet. Hence, *H4a*, *H4b* and *H4c* was not supported.

Perceived behavioral control was found to be negatively related to attention to TV ($\beta = -.18, p < .05$) and positively related to attention to newspapers ($\beta = .30, p < .01$). The results suggest that an increased amount of attention to TV corresponded with a decreased perception of behavioural control. Also, paying more attention to the newspapers was related to a greater perception of behavioural control. Perceived behavioural control had no significant relation to attention to the Internet. Hence, *H5a* is supported, but not *H5b* and *H5c*. The attention to media block explained 8.9% of the variance in perceived behavioral control.

Perceived social norms was found to be significantly associated with attention to newspapers ($\beta = .23, p < .05$) but not attention to TV nor attention to the Internet. This indicates that the greater amount of attention paid to newspapers was associated with a greater perception of social norms favourable toward green behaviour. Hence, *H6a* is supported but not *H6b* and *H6c*. The attention to media block explained for 7.4% in the variance of perceived social norms.

Analysis 3

Table 4 below shows the linear regression analysis for the tentative model as proposed in Fig. 2 to predict behavioural intentions. Two demographic variables of age and gender were used as controlling variables in the first block of the regression model. The attention variables to the three types of media were entered into the second block of the model. The last block consisted of the variables attitudes, perceived behavioural control and perceived social norms.

Table 2 Linear Regression Analysis for Proposed Model

Variables	Standardized Coefficient Beta	R ²
Block 1: Demographics		
Age	0.09	
Gender	-0.04	
Incremental R ² (%)		1.70
Block 2: Attention		
TV	0.07	
Newspapers	0.18*	
Internet	0.08	
Incremental R ² (%)		21.40
Block 3: Predictors of Behavioural Outcome		
Attitudes	0.16**	
Perceived Behavioral Control	0.34***	
Perceived Social Norms	0.23***	
Incremental R ² (%)		24.70
Total R ² (%)		47.80

* p<0.05, ** p<0.01, *** p<0.001

Attention to newspapers is the only media that is positively associated with behavioural intentions ($\beta = .35$, $p < .001$). This suggests that a greater amount of attention to the newspaper was related to a greater tendency toward ‘green’ behaviour. Altogether, the attention to media block accounted for 21.4% of the variance in behavioural intentions.

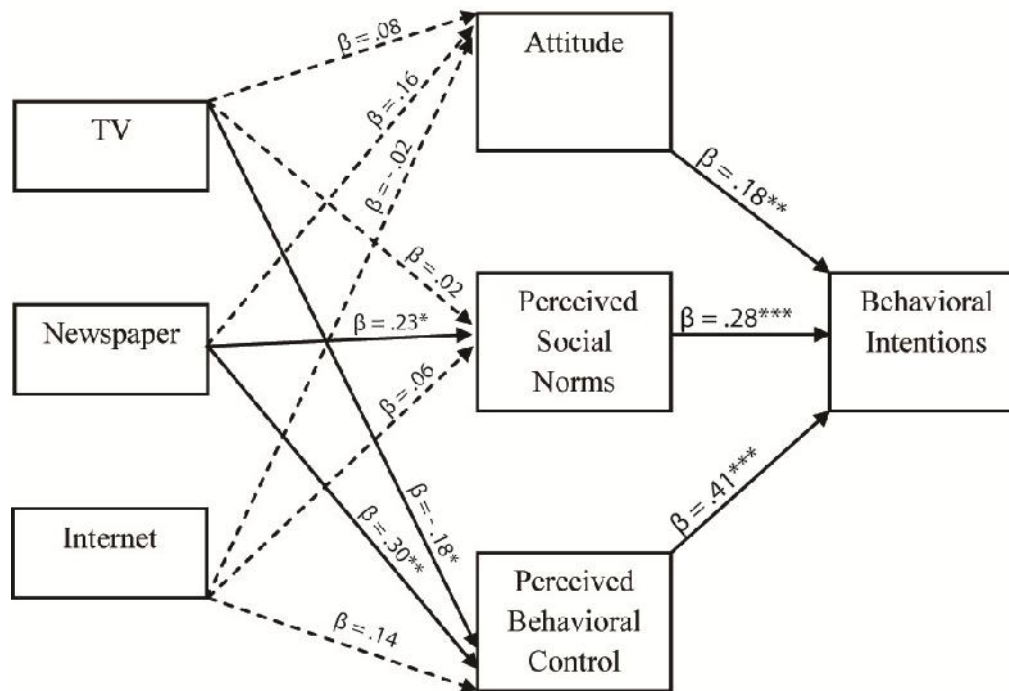
Behavioural intentions is also positively related to attitudes ($\beta = .16$, $p < .01$), perceived behavioural control ($\beta = .34$, $p < .001$), and perceived social norms ($\beta = .23$, $p < .001$). This third block explained 24.7% of the variance in behavioural intentions. The full model explained for 47.8% of the total variance in behavioural intentions.

Analysis 4

Fig. 3 summarises the relationship between the variables derived from the survey result. Newspapers exhibits the strongest effect of association on behavioural intentions with a significant indirect effect via perceived social norm and perceived behavioral control (RQ1).

TV appears to be the next strongest medium with a significant indirect effect on behavioural intention via perceived behavioral control. However, the direction of relationship is the reverse of that hypothesized.

Fig. 3. Effects of Attention to Media on Theory of Planned Behaviour



Discussion

The first objective of this study was to affirm if TPB holds true in Singapore when it comes to ‘green’ behaviour. TPB was shown to be fairly robust in predicting behavioural intentions toward ‘green’ behaviour in our study, explaining 39.17% of the variance. In addition, all three predictive variables in TPB had a significant and positive relationship with behavioural intentions. This finding further strengthens TPB’s validity, even in a setting of heterogeneous culture such as Singapore.

Furthermore, our proposed model explained 47.80% of the variance in behavioural intentions. Thus, the model is of use for future research in investigating the effects of different media on behaviour due to its strong predictive power. It also enables media effects researchers to better understand the pathway of the effects in question through TPB.

In testing the proposed model, it was also found that attitudes toward 'green' behaviour was not significantly related to attention to all three mediums. This could be explained by the high level of homogenous and favourable attitudes toward 'green' behaviour. Only 7.4% of the respondents demonstrated an attitude of "slightly negative" or "worse" on the "Attitude" composite scale in the questionnaire. While environmental issues might be relatively new to the public mentality, the increased coverage and governmental emphasis might have reinforced existing attitudes resulting in predominantly positive evaluations regardless of amount of one's attention to the media. We propose that future studies should employ "harder" questions to measure attitudes so as to elicit a greater variance from the respondents. The measures employed for this study (see appendix B) may be inadequate for measuring attitudes toward a 'motherhood' prosocial activity.

Attention to television sources of environmental issues was found to be negatively related to perceived behavioural control. This could be attributed to the television medium's capability and propensity for carrying non-rational messages such as fear appeals (Sharma, 2007). Television programmes regularly utilizes fear appeal strategies such as highlighting the possibilities of inevitable catastrophies due to global warming. leading the catastrophic conditions which are inevitable. The same strategies are also regularly used in disaster movies such as "The Day After Tommorrow", "2012", or documentaries such as "An Inconvenient Truth", instead of emphasising mitigating actions that audiences can take. As a result, respondents who pay a great amount of attention to environmental information on the television might feel helpless instead of being empowered and report a low level of perceived self-efficacy over 'green' behaviour that can mitigate such devastating outcomes.

It was surprising to find that the amount of attention paid to environmental information on the Internet was neither significantly related to the three predictors of behavioural intentions nor behavioural intentions itself. This is despite past literature

suggesting that the interactivity of the Internet should lead to better information retention and greater behavioural change. It could be that users need to first form a positive attitude toward the Internet medium before behavioural change can be effected (Ahn, 2009). Ease of user control over the Internet medium is an important factor in determining how positive one feels toward the information derived from the medium, and by extension, the likelihood of any resulting behavioural change. In an analysis of respondents of age ≤ 45 , attention to the Internet was positively related to perceived self-efficacy ($\beta = .25, p < .01$). Older people who are not as confident in using the Internet might have viewed its information in a less valuable light, which dilutes its influence on attitudes and subsequent behavioural intentions.

Internet use is purpose-driven. It depends on two types of motivations – intrinsic, perceived enjoyment garnered from the source, or extrinsic, perceived usefulness of the source (Teo, Lim, & Lai, 1999). Users might not pay active attention to environmental issues online unless they are actively searching for it. Individuals must also have some recollection of an issue first in order to carry out an information search of the same issue (Peterson & Merino, 2003). Mainstream media such as the television and the newspaper could play a ‘funneling’ effect in directing readers online for more information. Online information might thus be supplementary to mainstream media. This can explain why attention to Internet sources of environmental issues does not predict behavioural intentions as traditional mainstream media has a greater and more significant effect.

The final objective of this study is to investigate the type of media that would be the most effective in influencing “green” behaviour in Singapore. Newspapers seem to be the most effective from our results as attention to newspapers had a significant and positive relationship with perceived social norms, perceived behavioural control, and also behavioural intentions. It is the only media that is positively associated with behavioural intentions.

24.1% of our respondents read “The Straits Times” only, which circulation in Singapore is the highest at 374 000 (Audit Bureau of Circulation Singapore, 2009). In addition, there are only two publishers of local newspapers in Singapore, Singapore Press Holdings and Mediacorp Private Limited. Having few publishers could mean that newspapers source from the same wire agencies and report on the same news. The lack of diversity in print news might reinforce a singular perspective on environmental issues. When news frames resonates with audiences’ issue schemas, they will generate more frame-related thoughts and develop stronger frame consistent attitudes (Shen, 2003). With only one main source of information, it is likely that the news frames are similar and thus synergise with each other to result in a stronger effect on behavioural intention. In contrast, there are multiple avenues of information on the Internet and on the television (which include local free-to-air channels and international channels from two cable TV operators). For instance, 100% of our respondents watch two or more television channels.

Also, the newspaper medium, especially the Straits Times, is generally regarded as being a credible source of information amongst Singaporeans. The government has emphasised the need for local print media to be credible and of high journalistic quality (Cenite, Shing Yee, Teck Juan, Li Qin, & Xian Lin, 2008). As a proof of its quality of reporting, it has also won top journalism awards in Asia (Lee, 2010; Tan, 2008). Source credibility relates to trustworthiness, which influences attitudes and beliefs on brand purchase behaviour (Yoon, Choong Hyun, & Min-Sun, 1998). This source credibility could account for the saliency of newspaper’s effect on the area of ‘green’ behaviour as well.

It is crucial to note that our study only sampled 200 respondents, which is far less than the recommended amount of 1000. Thus, we run a greater risk of Type II error: rejecting alternative hypotheses that might actually be correct. The scope of the study should be

expanded to 1000 respondents, surveyed over a greater number of postal districts and blocks in order to generate more representative and accurate results.

A study of environmental issues is also inherently complicated as it comprises several different classes of behaviour in the 3Rs. We have attempted to capture a full spectrum of proenvironmental behaviour in the study in attempting to achieve greater content validity. However, many TPB studies mentioned previously have investigated very specific behaviours such as drink-driving and smoking. The lack of statistically significant results in other areas might be an indication that further narrowing of the behaviour needs to be done i.e. from the 3Rs to a specific activity such as recycling. As suggested by Boldero (1995), the multi-faceted nature of environmental behaviour might necessitate different instruments or even different models that are customized for the explanation of different behaviour.

In conclusion, our study has hinted at the overall effectiveness of newspapers in promoting 'green' behaviour. Yet, this is not an end-all answer for the government to dedicate all its available resources toward a single media in encouraging "green" behaviour. Additional research needs to be done in this area to conclusively validate such a finding. Planting a 'green' idea is vastly different from planting other prosocial ideas. However, the principles are essentially similar. The TPB and our extended model represents a useful tool for us to examine message effectiveness across both mediums and topics.

Thus, future research should study other behaviours in areas of health or political communication to determine if the nature of the message and its intended behaviour also affects the effectiveness of the medium. After all, factors such as the amount of information and persuasive strategy would also figure into the choice of media. The results from such research will prove invaluable for governmental bodies in making decisions regarding the allocation of their campaign budgets to plant desirable ideas.

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Appendix A

The Singapore Postal Code System (SPCS) is employed for sampling in this study. The Singapore Postal Code consist of 6 digits. The first 2 digits in the postal code signify the Postal Area or Sector Code, with numbers ranging from 01 – 82 (74 is unassigned in SPCS). The last 4 digits signify the delivery point within the sector. In public housing, which houses 90% of the Singapore population, the block number is built into the 4-digit delivery number. For private housing however, the 4-digit delivery number is assigned according to the alphabetical order of the name of the street on which the property in question is located within the Sector.

Making use of this characteristic of the SPCS, we first stratified the list of sector codes based on their geographical locations. Central and South are combined to give 4 regions along side West, North and East. (Technically speaking, the central and south are both geographically south). A simple random sampling is then conducted with the help of Microsoft Excel to obtain 2 sectors per region.

District	Central	South	West	North	East
Sector no.	01, 02, 03, 04, 05, 06, 07, 08 17, 18, 19	09, 10, 14, 15, 16, 22, 23, 24, 25, 26, 27	11, 12, 13, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71	28, 29, 30, 56, 57, 72, 73, 75, 76, 77, 78, 79, 80	20, 21, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48 49, 50, 51, 52 53, 54, 55, 81, 82
Total	11	11	17	13	29

With the sector code selected, a second round of simple random sampling consisting of four digits is carried out to obtain 5 residential blocks/areas within each sector. The resulting 6

digit postal code is then enter into online postal code database provided by Singpost (<http://www.street-directory.com/singpost/singpost.cgi>) to derive the exact coressponding location denoted by the postal code. Non-residential area chosen like industrial area and commercial building are excluded from the 200 respondents.

Five households per block/area are then chosen for the survey via a third round of simple random sampling. Researchers are instructed to rely on the letter boxes as a sampling frame with the letter boxes numbered in running order from left to right beginning from the top-left corner to the bottom-right corner. 5 random numbers are drawn and the corresponding household will be interviewed. Private Condominums are sampled using the same method. Other landed properties such as bungalow and semi-detached housings are assigned their own unique postal code in the SPCS and hence, the third stage is not required and only 1 household will be selected from the unique 6-digit postal code. In such situation, an extra set of 6-digit postal code will be selected with 4 households per block chosen. (minus 1 for the landed property)

The exclusion of third stage of sampling for selected landed properties gives them an unfair advantage in being selected into the probability sampling. However, to exclude them will mean excluding a distinct class of people of certain social economic status from our sample. We thus decide to include them should they be chosen.

We then request for the household member who is 18 and above and have just spent his/her last birthday. As only the English version of the questionnaire is available, we have also requested that the respondent be able to comprehend and converse in English.

The interviewers are instructed to interview the next available unit on the left follow by the right (and alternate between these two contingency options until one is available) in the event whereby the interview attempt is unsuccessful.

Appendix B

Section A: Attention to Media

For Television (TV)
1. In the past 12 months, how often do you watch TV? How much attention do you pay to the following information on <u>Television</u> ?
2. Environmental policies 3. Environmental risks 4. Environmental campaigns 5. Environmentally friendly behaviours
For Newspaper(s)
6. In the past 12 months, how often do you read Newspaper(s)? How much attention do you pay to the following information on <u>Newspaper(s)</u> ?
7. Environmental policies 8. Environmental risks 9. Environmental campaigns 10. Environmentally friendly behaviours
For Internet
11. In the past 12 months, how often do you use the Internet? How much attention do you pay to the following information on the <u>Internet</u> ?
12. Environmental policies 13. Environmental risks 14. Environmental campaigns 15. Environmentally friendly behaviours

Section B: Attitude

Overall, I think engaging in green behavior is...									
		extremely	quite	slightly	neither	slightly	quite	Extremely	
16.	Good	1	2	3	4	5	6	7	Bad
17.	Making a difference	1	2	3	4	5	6	7	Not making a difference
18.	Good practice	1	2	3	4	5	6	7	Bad practice
19.	Convenient	1	2	3	4	5	6	7	Troublesome
20.	Not Meaningful	1	2	3	4	5	6	7	Meaningful
21.	Unimportant	1	2	3	4	5	6	7	Important
22.	Beneficial	1	2	3	4	5	6	7	Not Beneficial

Section C: Perceived Behavioral Control, Perceived Social Norm and Behavioral Intention

23. Most people who are important to me think that I should engage in green behaviour.
24. It is expected of me that I engage in green behaviour.
25. I feel under social pressure to engage in green behaviour.
26. People who are important to me want me to engage in green behaviour.
27. For me to engage in green behaviour is easy.
28. I am confident that I can engage in green behaviour if I wanted to.
29. The decision to engage in green behaviour is beyond my control.
30. Whether or not I engage in green behaviour is not entirely up to me.
31. I want to reuse non-biodegradable items in the next 12 months.
32. I intend to sort my waste into different recyclable materials (paper, plastic, metal, glass) in the next 12 months.
33. I expect myself to engage in green behaviour in the next 12 months.
34. I want to donate items that I no longer use in the next 12 months.

35. I expect myself to reduce my energy consumption in the next 12 months.
36. I want to engage in green behaviour in the next 12 months.
37. I expect myself to reduce my water consumption in the next 12 months.
38. I intend to purchase items made of materials that can be recycled in the next 12 months.
39. I intend to engage in green behaviour in the next 12 months.

Section D: Demographics

40. What is your gender?
41. What is your age?
42. What is your race?
43. What is your highest educational level attained?
44. What is your gross household monthly income?
45. What are the TV channels that you currently watch?
46. What are the newspapers that you currently read?
47. Telephone Number

Appendix C

Response Rate Calculation Based on AAOPR Method 1:

$$RR1 = \frac{I}{(I + P) + (R + NC + O) + (UH + UO)}$$
$$= 48.8 \%$$

- Interviews
 - Complete interview (I) = 203
 - Partial interview (P) = 3
- Eligible cases that are not interviewed (non-respondents)
 - Refusals and break-offs (R) = 127
 - Non-contacts (NC) = 74
 - Others (O) = 9
- Cases of unknown eligibility
 - Unknown if housing unit (UH) = 0
 - Unknown, other (UO) = 0

Appendix D

Table 3 Linear Regression Analysis for Theory of Planned Behaviour

Variables	Standardized Coefficient Beta	R ²
Block 1: Demographics		
Age	0.12*	
Gender	-0.49	
Incremental R ² (%)		0.17
Block 2: Predictors of Behaviour		
Attitudes	0.18**	
Perceived Behavioral Control	0.41***	
Perceived Social Norms	0.28***	
Incremental R ² (%)		39.00
Total R ² (%)		39.17

* p<0.05, ** p<0.01, *** p<0.001

Appendix E

Table 4 Linear Regression Analysis for attention to media on attitude, perceived behavioural control and perceived social norm

Variables	Standardized Coefficeint Beta	R ²
Effects of Attention to Media on Attitudes		
Block 1: Demographics		
Age	-0.15	
Gender	0.04	
Incremental R ² (%)		1.30
Block 2: Attention		
TV	0.08	
Newspapers	0.16	
Internet	- 0.02	
Incremental R ² (%)		4.20
Total R ²		5.50
Effects of Attention to Media on Perceived Behavioral Control		
Block 1: Demographics		
Age	-0.03	
Gender	0.05	
Incremental R ² (%)		0.40
Block 2: Attention		
TV	-0.18*	
Newspapers	0.30**	
Internet	0.14	
Incremental R ² (%)		8.90
Total R ²		9.30
Effects of Attention to Media on Perceived Social Norms		
Block 1: Demographics		
Age	0.02	
Gender	-0.01	
Incremental R ² (%)		0.40
Block 2: Attention		
TV	0.02	
Newspapers	0.23*	
Internet	0.06	
Incremental R ² (%)		7.40
Total R ²		7.80

* p<0.05, ** p<0.01, *** p<0.001

‘Appendix F’ has been removed as it contains respondents’ contact information.

Appendix G

Measuring Media Exposure

The measure of the amount of attention paid to media is more effective in measuring the effects of exposure to media than measuring the frequency of media exposure alone. This is because attention implies a greater amount of cognitive processing of the information which will impact their eventual response (Slater, Goodall, & Hayes, 2009). Pure exposure to the media might not explain one's concerns over the issues. Furthermore, different media tends to require users to commit different duration of time during consumption. For instance, watching TV will typically require more time compare to newspaper due to the nature of programming though the information coveyed may be the same. As such, this research will measure the amount of attention paid to environmental information in each of the three mass media channels to operationalise the level of media exposure.