

Applying the theory of planned behavior and media dependency theory : predictors of public pro-environmental behavioral intentions in Singapore

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**Applying the Theory of Planned Behavior and Media Dependency Theory: Predictors
of Public Proenvironmental Behavioral Intentions in Singapore**

Abstract

Applying the theory of planned behavior and media dependency theory, this study examines the effects of attitude, subjective norms, perceived behavioral control, media dependency, traditional media attention, Internet attention, and interpersonal communication on two types of proenvironmental behaviors—green-buying and environmental civic engagement. Regression analysis of a nationally representative survey of adult Singaporeans ($N = 1,168$) indicated that attitude, perceived behavioral control, media dependency, traditional media attention, and interpersonal communication were positively associated with green-buying. Notably, traditional media attention, as well as interpersonal communication, moderated the influence of media dependency on green-buying behavior. In addition, attitude, descriptive norms, media dependency, Internet attention, and interpersonal communication positively predicted environmental civic engagement. Findings suggest the importance of communication factors in the adoption of the two proenvironmental behaviors.

Keywords: theory of planned behavior, proenvironmental behavior, media dependency, media attention, Internet, interpersonal communication

Applying the Theory of Planned Behavior and Media Dependency Theory: Predictors of Public Proenvironmental Behavioral Intentions in Singapore

In recent years, global climate change has contributed to serious environmental disasters such as heat waves and torrential floods that have claimed many human lives and led to more than US\$200 billion in annual losses worldwide (Intergovernmental Panel on Climate Change [IPCC], 2012). Given that many environmental problems are due to human activities, scholars and policymakers alike have urged individuals to take responsibility in mitigating climate change (National Climate Change Secretariat [NCCS], 2011; Vandenberg, 2004). Individuals can adopt various environmentally responsible behaviors, such as a shift in consumption patterns and environmental activism, in order to sustain the environment (Fielding, McDonald, & Louis, 2008; Urie & Kilbourne, 2011).

With the increased availability of green consumer products, individuals have more opportunities to purchase ecologically safe products to facilitate long-term environmental protection (Alsmadi, 2007). Some examples of ecologically safe products include household items that are manufactured from recycled materials, products in refillable packages, and a wide range of products whose environmentally friendly features are identified with eco-labels. Likewise, many environmental advocacy groups have attempted to promote environmental activism among individuals to ensure environmental sustainability (Fielding et al., 2008). Examples of these behaviors include protesting, rallying, petitioning, and lobbying of the government and businesses. Despite the urgent need for widespread behavioral changes, interventions to encourage green consumerism and active environmental support from the public have met with limited success (Dwyer, Leeming, Cobern, Porter, & Jackson, 1993; Seguin, Pelletier, & Hunsley, 1998).

Most studies in this area have focused narrowly on the role of knowledge in public proenvironmental behaviors (Read, Bostrom, Morgan, Fishhoff, & Smuts, 1994; Semenza et al., 2008). Other than a few notable exceptions (e.g. Chan, 1998; Holbert, Kwak & Shah, 2003; Lowe et al., 2006), many existing studies did not consider other potential factors that may influence behaviors, such as subjective norms, mass media use, interpersonal communication, and media dependency. Notably, Chan (1998) found that attitudes, subjective norms and perceived behavioral control predicted people's intentions to recycle waste, and demonstrated the importance of mass media as a source of subjective norms among people in Hong Kong. However, the study did not consider media dependency as potential predictor of proenvironmental behavioral intention. Moreover, relatively few studies have examined issues regarding environmental communication outside the contexts of the United States and other Western societies. Lee (2008) suggests that examining environmental patterns in non-Western societies may offer insights into the different attitudes, perceptions, and behaviors of the societies' members, which enables an evaluation of how cultural context can influence individuals' proenvironmental behaviors. Thus, differences in sociocultural values and media environments make it worthwhile to examine factors that can motivate individuals to engage in proenvironmental behaviors in non-Western contexts, such as Singapore.

This study applies the theory of planned behavior (TPB; Ajzen, 1991) and media dependency theory (Ball-Rokeach & DeFleur, 1976)—which considers how attitudes, social norms, and perceived behavioral control, as well as media use and dependency, influence behavioral intentions. Media dependency theory assumes that people will rely more on the mass media for information under certain conditions, such as the ready availability of alternative information sources (Ball-Rokeach & DeFleur, 1976; Loges, 1994). Such

dependence on the media has been shown to predict changes in people's attitudes and behaviors (Lowrey, 2004).

In this study, we broadly define proenvironmental behavior as a behavior that could make a considerable difference or impact on the environment by either minimizing damages or maximizing benefits to the environment (Steg & Vleg, 2009). As proenvironmental behavior is multidimensional (Kaiser, 1998), different factors may have variable influence across categories of proenvironmental behaviors (Stern, 2000). For example, Stern (2000) classifies proenvironmental behaviors according to their occurrence in public and private spheres. Public-sphere behaviors include citizenship behaviors such as signing petitions to protect the environment, boycotting companies known to harm the environment, and writing letters to editors. Private-sphere behaviors aim to affect the environment more directly by reducing consumption and changing consumption patterns. Public- and private-sphere behaviors may require different communication strategies to bring about positive behavioral outcomes. Steg and Vlek (2009) highlight factors such as normative concerns and contexts that could differentially affect various types of proenvironmental behaviors. To maximize the effectiveness of proenvironmental behavioral interventions, communication messages should be carefully tailored to the target behavior and address specific factors that underlie the target behavior (Steg & Vlek, 2009). Thus, this study will examine two categories of proenvironmental behaviors—environmental civic engagement and green buying—that may help further distinguish public- and private-sphere behaviors, respectively.

Study Context: Singapore

Our study examines proenvironmental behavior in Singapore, a densely populated country in Southeast Asia, which provides a unique context with regard to natural resource management. Singapore is a sovereign island city-state of just over 5 million residents, comprising Chinese, Malays, Indians, and several racial minorities (Singapore Department of

Statistics, 2011). Singapore is a multi-religious country, where 83% of the population practices Buddhism, Taoism, Christianity, Islam, or Hinduism, while 17% indicates no religious affiliation (Singapore Department of Statistics, 2010). As one of the top ten most globalized cities in the world, Singapore is markedly westernized and cosmopolitan (Foreign Policy, 2010). With a strong free-market economy, Singapore has a gross domestic product per capita of US\$61,400 (Central Intelligence Agency, 2013). Despite its Western orientation, Singapore firmly retains some of its Asian roots. The ruling government institutes a set of “Asian values,” which emphasizes preference for social harmony and consensus, collective well-being of the community, and respect for authority and the nation (Dalton & Ong, 2003). Singapore’s mix of East and West offers a unique context to study effects of the media system and societal norms on individuals’ proenvironmental behaviors.

As an urbanized, low-lying tropical island, Singapore is especially susceptible to the problem of rising sea levels and other effects of climate change (IPCC, 2012; NCCS, 2012b). To combat the threats of climate change, the environmental authorities in Singapore have leveraged on state-owned mass media to initiate several communication campaigns aimed at raising awareness and motivating environmentally responsible behavior among the public (National Environmental Agency (NEA), 2008, 2010).¹ The largest free-to-air television and radio broadcasters in Singapore are wholly owned by a state-investment company (Central Intelligence Agency, 2013). Furthermore, the Singapore government holds tight control of the press through management shares instead of direct ownership (George, 2005; Human Rights Watch, 2013). Being internationally recognized as a country with a highly effective and efficient government (World Bank, 2011), the relevant authorities in Singapore have both

¹ For example, several national news outlets featured the recent “Clean and Green” campaign that aims to motivate the public to engage in environmentally responsible behaviors (TODAYonline, 2011). *Saving Gaia*, a documentary series that highlighted information on environmentally friendly behavior, was aired for several weeks on local television stations (Ooi, 2010; See, 2010).

the motivation and the means to promote environmental awareness to the public through the mass media.

Singapore is also one of the most wired countries in the world (Kluver & Banerjee, 2005). Government regulation of the Internet has been minimal (George, 2003) and new media have given citizens more opportunities to express their political viewpoints than have mainstream media (George & Raman, 2008). This greater freedom has in turn facilitated greater civic engagement among Singapore citizens (Skoric & Poor, 2013). Therefore, the new media may have a similar positive impact on issue-specific participation in such areas as environmental protection.

According to a recent public opinion poll conducted by the Singapore National Climate Change Secretariat (NCCS), 86% of Singaporeans believe that they play a part in taking action on climate change and 56% believe that individuals are most responsible for taking action (NCCS, 2012a). Rosenthal, Lee, Ho, and Detenber (2013) compared Singapore public opinion with the results of a Pew survey in the U.S., and found that more than 90% of Singaporeans said they believe the Earth is getting warmer, whereas less than two-thirds of Americans expressed the same view. Despite this positive state of public opinion, Singapore recorded the highest carbon footprint per capita among the Asia-Pacific countries (World Wildlife Fund, 2012). Therefore, it is worthwhile to apply the theory of planned behavior and media dependency theory to examine how various social-psychological factors will motivate Singaporeans to engage in proenvironmental behaviors. Findings of this study may benefit relevant authorities as they develop useful proenvironmental intervention strategies.

Theory of Planned Behavior

Ajzen (1991) developed the theory of planned behavior (TPB) to understand the psychological underpinnings of volitional behavior. In particular, the theory proposes that there are three key antecedents of behavioral intention: attitudes, subjective norms, and

perceived behavioral control. The TPB assumes that behavioral intention is a good proxy for actual behavior, which researchers have validated (e.g., Ajzen & Fishbein, 2005).

As an important feature of the TPB, attitudes are an individual's degree of liking or disliking a behavior object that guides consistent behavioral responses (Fishbein & Ajzen, 1975; Gross & Niman, 1975). People generally try to engage in behaviors that result in "good" outcomes and avoid behaviors that result in "bad" outcomes. Attitudes can reflect *instrumental* qualities (e.g., usefulness) and *experiential* qualities (e.g., pleasantness) of a behavior (Ajzen & Driver, 1992). Perceived utility drives some behaviors (e.g., taking public transportation, brushing teeth), whereas enjoyment drives other behaviors (e.g., playing sports, going to a movie); though, most behaviors likely contain a blend of instrumental and experiential qualities (Ajzen & Driver, 1992; Bellows-Riecken, Rhodes, & Hoffert, 2008).

A second key concept of the TPB concerns subjective norms, which are people's perception of the occurrence of a behavior among others, as well as the perception of others' approval or disapproval of certain behavior. Respectively, the TPB labels these perceptions and observations as *descriptive norms* and *injunctive norms*, which together reflect perceived social pressure. Descriptive norms provide an indication of how strong the norm is and how predominant it is among others (Cialdini, Reno, & Kallgren, 1990; Paek, 2009).

Descriptive and injunctive norms can exist on a personal level and at the societal level. At the personal level, people can hold perceptions of the level of support of a certain behavior among their important referent groups, while at the societal level, people can hold beliefs about the support of the behavior in their society (e.g., Park, Klein, Smith, & Martell, 2009; Hong, Rice, & Johnson, 2012). Due to the fact that people often make social comparisons of their behavior with their referent groups, they are more likely to be affected by beliefs about in-group behaviors than by out-group behaviors (Yanovitzky, Stewart, & Lederman, 2006). Given the general finding that descriptive and injunctive norms have varying impacts on

behavioral intentions (e.g., Ho, Poorisat, Neo, & Detenber, *forthcoming*; Park & Smith, 2007; Rimal & Real, 2003), it is worthwhile to examine them as distinct factors of behavioral intention in our study.

Finally, perceived behavioral control is individuals' judgments of their ability to control the performance of a specific set of actions (Ajzen, 1991). This concept is roughly equivalent to perceived self-efficacy from social cognitive theory (Bandura, 1982). Perceived behavioral control can vary across contexts and situations (Ajzen, 1991), and perceived behavioral control predicts environmentally responsible behaviors (e.g., Aguilar-Luzón, García-Martínez, Calvo-Salguero, & Salinas, 2012; Tang, Chen, & Luo, 2011).

Numerous studies have examined the antecedents of green behavior using the TPB. A study of 27 countries found that perceived control over proenvironmental behavior significantly predicted people's willingness to sacrifice, which, in turn, predicted recycling behavior, refraining from driving, and environmental citizenship (Oreg & Katz-Gerro, 2006). Likewise, Tikir and Lehman (2011) found that attitudes toward using public transportation and relevant subjective norms explained about 30% of the variance in individuals' intention to use public transportation as a way of being environmentally friendly.

In general, numerous cross-cultural studies have shown that the TPB framework is generalizable to most Western and non-Western contexts (e.g., Cheng & Ng, 2006; Hagger et al., 2007; Lee, Hubbard, O'Riordan, & Kim, 2006; Park & Levine, 1999; Bagozzi, Wong, Abe, & Bergami, 2000). Nonetheless, a small number of these studies have also demonstrated slight variations across cultures. Bagozzi et al. (2000) showed that Americans (representing a more individualistic culture) tend to place greater emphasis on attitudes, while people from China (representing a more collectivistic culture) tend to attribute more importance to subjective norms when deciding whether to patronize a fast food restaurant. Likewise, Lee et al. (2006) found that more collectivistic individuals tend to place greater weight on subjective

norms, while more individualistic people tend to place greater emphasis on perceived behavioral control when it comes to intention to quit smoking. Despite these findings, the relative importance of each TPB component seems to rely more on the characteristic of the target behaviors under inquiry rather than cross-cultural differences (Cheng & Ng, 2006; Trafimow & Finlay, 1996).

Since previous studies have shown that the TPB is a useful framework for describing the antecedents of proenvironmental behavior (e.g., Bamberg, Ajzen, & Schmidt, 2003; Hwang, Kim, & Jeng, 2000; Kaiser, Hübner, & Bogner, 2005) and empirical evidence has supported the cross-cultural generalizability of the TPB (e.g., Cheng & Ng, 2006; Hagger et al., 2007), we posit the following hypotheses in the context of Singapore:

H1: Attitude toward proenvironmental behaviors is positively related to (a) green-buying and (b) civic engagement behavioral intentions.

H2: Descriptive norm is positively related to (a) green-buying and (b) civic engagement behavioral intentions.

H3: Injunctive norm is positively related to (a) green-buying and (b) civic engagement behavioral intentions.

H4: Perceived behavioral control is positively related to (a) green-buying and (b) civic engagement behavioral intentions.

Communication and Proenvironmental Behavior

In addition to the TPB constructs, we suggest that communication can play an important role in motivating environmentally responsible behaviors. Studies have demonstrated that the mass media can shape public attitudes toward environmental issues (e.g., Arlt, Hoppe, & Wolling, 2011; Hansen, 2011) and encourage people to engage in proenvironmental behaviors (e.g., Leiserowitz, 2004). Interpersonal communication has been shown to motivate such proenvironmental behaviors as recycling (Burn, 1991; Nixon and

Saphores, 2009). Furthermore, media dependency, or reliance on the media, can also motivate the adoption of desirable behaviors (Lowrey, 2004). In fact, numerous studies in health communication have shown that the mass media can directly encourage individuals to engage in healthy behaviors, and also indirectly, through individuals' social networks and communities (for a review, see Abrams & Maibach, 2008). In addition, Griffin, Neuwirth, and Dunwoody (1999) developed the risk information seeking and processing model by examining information seeking and processing as an antecedent to behavior, alongside the TPB variables. Given these considerations, it is worthwhile to examine the influence of the communication factors on proenvironmental behaviors, in addition to the TPB variables.

Media Attention

Media attention refers to people's tendency to consciously devote cognitive effort to particular types of media messages (Slater, Goodall, & Hayes, 2009). Several models of information processing and persuasion, such as the elaboration likelihood model (Petty & Cacioppo, 1986) propose that attention to message contents is a necessary condition for persuasive effects. Furthermore, Eveland (2001) proposed in the cognitive mediation model that attention precedes cognitive elaboration and learning from media content. Thus, people's attention to media messages can affect both persuasive and learning effects. Consequently, media attention has increasingly been regarded as an important predictor of message influence (Slater et al., 2009; Slater, Hayes, & Ford, 2007).

Recent studies have shown positive relationships between media use and proenvironmental behaviors. Holbert, Kwak, and Shah (2003) found that viewing of public affairs television content and fact-based programs such as nature documentaries generated positive effects on people's proenvironmental behaviors. Similarly, moviegoers reported higher motivation to engage in environmentally friendly behaviors after watching *The Day After Tomorrow* (Leiserowitz, 2004; Balmford et al., 2004). Lowe, Brown, Dessai, de França

Doria, Haynes, and Vincent (2006) found that watching the film yielded at least short-term effects on people's attitudes toward climate change. Participants expressed strong motivation to take action to mitigate climate change, but also high uncertainty about how and what behaviors to adopt in their daily lives. More recently, Howell (2011, 2013) demonstrated that *The Age of Stupid*, a film portraying how climate change has devastated the world in 2055, had a short-term positive impact on audience's motivation to adopt environmentally responsible behaviors in the U.K. Findings from these studies suggest that media messages can potentially influence people's proenvironmental behaviors.

Proenvironmental media messages can include both environmental news coverage and public intervention campaigns seeking to promote awareness of environmental issues and adoption of proenvironmental behaviors. We propose that people who attend more to environmental news are more likely to elaborate on and acquire knowledge from the content. Similarly, attention to campaign messages can increase the likelihood that people will experience persuasive effects. Hence, we propose that:

H5: Attention to proenvironmental messages in traditional media is positively related to (a) green-buying and (b) civic engagement behavioral intentions.

We propose further that traditional media effects on proenvironmental behaviors can be extended to include attention to online content. Zhao (2009) found that individuals who are frequent users of the Internet tend to be more knowledgeable about environmental issues. The Internet allows environmental institutions to promote their campaigns to a large and diverse audience, and to offer the audience an online platform to deliberate about environmental issues and mobilize action (Zelwietro, 1998). People can easily participate in environmental causes on the Internet, for instance, by making online monetary donation to environmental organizations (Howard, 2001) or by endorsing an online petition to support an environmental cause (Schäfer, 2012). In particular, websites with high interactivity and

regular updates are effective at enhancing environmental activities of online communities (Park & Yang, 2012). Online participation tends to extend to offline participation as well.

Wellman, Haase, Witte, and Hampton (2001) found that the amount of time and involvement people invest in online political activities were positively associated with their offline political activities. Therefore, we posit that:

H6: Attention to proenvironmental messages on the Internet is positively related to (a) green-buying and (b) civic engagement behavioral intentions.

Interpersonal Communication

While researchers have examined how interpersonal communication reinforces mass media effects, they have also considered how interpersonal communication can substitute mass communication as a source of information to influence people's behaviors (Rogers, 2003). People who obtain enough information about environmental issues from interpersonal channels depend less on mass media for information. Extant studies on information processing have proposed the concept of "information sufficiency" as a core determinant of such substitution effects (e.g., Kahlor, Dunwoody, Griffin, Neuwirth, & Giese, 2003; Lee, 2010). We assert that interpersonal communication can be a substitute for mass media content as a source of environmental information. Research suggests that interpersonal discussion of topics such as health issues is related to risk perceptions, but does not offer enough insight with regard to the direction of the relationship (Dunlop, Wakefield, & Kashima, 2008). Other research has recognized interpersonal communication as a source of social norms and perceived efficacy, and has demonstrated its effects on people's attitudes and behaviors (e.g., Clark & Finley, 2007; de Groot & Steg, 2007; Kahlor, 2007).

Some research speaks directly to the effects of interpersonal communication on proenvironmental behavior. Nixon and Saphores (2009) estimated odds ratios for the effect of different information sources on recycling behavior. They found that people who received

information about recycling from family and friends were 3.24-times more likely to recycle than were people who received no information. This odds ratio was higher than that for any other single information source (which included print, television, radio, work/school, printed displays, and the Internet). Moreover, people who discussed public affairs more frequently with others also displayed higher levels of civic engagement (Ho et al., 2011; Scheufele, 2000). Therefore, we posit that:

H7: Interpersonal communication about the environment is positively related to (a) green-buying and (c) civic engagement behavioral intentions.

Media Dependency

Media attention alone is insufficient to model the effects of media on environmentally responsible behaviors. Some people may pay attention to media, but not feel that the media instruct their behavior. The concept of media dependency can explain instrumental media uses toward forming and performing proenvironmental behavior. Media dependency theory represents a framework to understand the complex relationships among people, the media, and other social systems. Ball-Rokeach and DeFleur (1976) originally conceptualized the theory for application to multiple levels of analysis. The macro level is concerned with structural dependency relations between audiences, the mass media, and other social institutions. At this level, the theory proposes that people will rely more on the mass media for information under conditions of uncertainty and societal disruptions, such as during natural disasters or political crises.

At the micro level of analysis, media dependency has an asymmetrical effect in which the attainment of the goals and needs of individuals is contingent on the information resources controlled by social and media institutions (Ball-Rokeach, 1985). Specifically, individuals are guided by three types of goals—understanding, action orientation, and play—which predict individual media use toward fulfilling these goals and reflect important aspects

of media dependency. Loges (1994) further segments these goals into individual and social dimensions. At the micro level, the theory suggests that certain factors can increase individuals' reliance on the media and, consequently, message effects. These factors include the availability of alternative information sources and social contextual factors, such as the presence of threat (Loges, 1994; Morton & Duck, 2001).

Despite this proposition, few studies on media dependency at the individual level have considered these enhanced effects on people's attitudes and behaviors. Lowrey (2004) surveyed a random sample of residents in the metropolitan area of Memphis, Tennessee, to examine individual media dependency following the September 11, 2001 terrorist attacks in the United States. Findings showed that individual-level media dependency was a significant predictor of changes in people's attitudes and behaviors.

Media coverage of contradicting perspectives and choice of news frames has in many countries contributed to public uncertainty and debate about the causes and effects of climate change (e.g., Dirikx & Gelders, 2007; Schuldt, Konrath, & Schwarz, 2011). Nonetheless, it is plausible that extensive news coverage of environmental issues might cultivate a climate of perceived risk in society by increasing public awareness about the impacts of climate change and other environmental problems (Hansen, 2011). Hence, we posit that:

H8: Media dependency is positively related to (a) green-buying and (b) civic engagement behavioral intentions.

Media dependency theory also suggests an increase in media effects on individuals, when media dependency is intensified as a result of increased attention during media exposure, as well as the likelihood of communication about the message after exposure (Ball-Rokeach, Rokeach, & Grube, 1984). However, due to the dearth of research on the interaction between media attention and media dependency, and also on the interaction

between interpersonal communication and media dependency, we do not formally hypothesize these differences, but simply put forth the following research questions:

RQ1: Do different levels of attention to traditional media differentially affect the relationship between media dependency and (a) green-buying intention and (b) civic engagement?

RQ2: Do different levels of attention to the Internet differentially affect the relationship between media dependency and (a) green-buying intention and (b) civic engagement?

RQ3: Do different levels of interpersonal communication differentially affect the relationship between media dependency and (a) green-buying intention and (b) civic engagement?

Method

We collected responses to a survey using random-digit-dialed computer assisted telephone interviews during one week in January 2011. The interviewers were trained undergraduates from a large public university in Singapore. The survey was conducted in the most frequently spoken languages in Singapore—English, Mandarin, and Malay—to ensure the inclusion of most Singaporeans' opinions (Singapore Department of Statistics, 2011). For each connected household, interviewers asked to speak with the youngest male, aged 18 years or above, who was at home. If no eligible male was present at the time of the call, interviewers asked to speak to the oldest female in the household. This within-household sampling technique has been effective in yielding nationally representative samples with statistics that are comparable with the population parameters in countries such as the U.S. (Kennedy, 1993) and Singapore (e.g., Ho, Chen, & Sim, 2012; Ho, Detenber, Malik, & Neo, 2012). In total, 1168 respondents completed the survey. We calculated a response rate of

33.4% using AAPOR Formula 3. The age, gender distribution, and education of our sample were comparable to that of the general population.²

Measures

To measure respondents' proenvironmental behavioral intentions, we modified nine items from the General Ecological Behavior scale (Kaiser, Doka, Hofstetter, & Ranney, 2003). We conducted maximum likelihood exploratory factor analysis with oblique rotation to assess the dimensionality of the criterion variables. The analysis returned two factors with eigenvalues greater than 1. The pattern matrix showed good simple structure, where items for each behavior had strong loadings on a single factor ($\bar{\lambda} = .72$), and weak loadings on the other factor ($\bar{\lambda} = .03$). This indicated that the two factors that emerged were conceptually distinct and mapped onto our conceptual labels of "green-buying intentions" and "civic engagement intentions." For these and all other composite measures, we computed variables as item means.

Green-buying intentions. Five items measured respondents' intentions to engage in green-buying behaviors in the next six months. Respondents indicated their agreement with statements (1 = *strongly disagree*, 7 = *strongly agree*) about their intentions to buy products in refillable packages, products with green labels, products that come with minimal packaging, paper and plastic products that are made from recycled materials, and to avoid buying products which have potentially harmful environmental effects ($M = 4.88$, $SD = 1.43$, Cronbach's $\alpha = .88$).

² Our sample demographics are similar in terms of age and education to the characteristics of the 2010 Singapore population census (Singapore Department of Statistics, 2011). The median age reported in the census was 37.4 years and the median age in our sample was 39 years old. The median education level attained in the census was secondary education while the median education level of our respondents was "A-Level." There were some differences in the variables of gender and household income. There was a slight overrepresentation of female respondents in our sample (56.8%) as compared to the census (50.6%). The median household income in the Singapore census was \$5,000 but the median household income of our respondents was "\$3,001 to \$4,000." However, these differences are not of major concern, as we will be treating them as control variables instead of independent variables in our study.

Civic engagement intentions. Respondents indicated their agreement (1 = *strongly disagree*, 7 = *strongly agree*) with four items regarding their intentions to contribute money to support an environmental group or organization, boycott companies known to harm the environment, write a letter to the editor of a newspaper about the environment, and sign a petition in support of promoting the environment ($M = 3.60$, $SD = 1.42$, Cronbach's $\alpha = .78$).

Attitudes toward proenvironmental behaviors. We adapted four items from a study by Ajzen (2006), which assessed respondents' belief that engaging in proenvironmental behaviors is enjoyable, beneficial, important, and pleasant (1 = *strongly disagree*, 7 = *strongly agree*; $M = 5.08$, $SD = 1.42$, Cronbach's $\alpha = .91$).

Subjective norms. We adapted and modified six items from Park and Smith (2007) to measure descriptive (three items) and injunctive norms (three items). To measure descriptive norms, respondents indicated their agreement with the statements that their family members, close friends, and the general public "engage in proenvironmental behaviors on a regular basis" (1 = *strongly disagree*, 7 = *strongly agree*). The measure of injunctive norms asked respondents to indicate their level of agreement with the statements that their family members, close friends, and the general public would approve of their engagement in proenvironmental behaviors (1 = *strongly disagree*, 7 = *strongly agree*). A strong descriptive norm indicates that respondents perceive proenvironmental behaviors to be prevalent ($M = 3.97$, $SD = 1.26$, Cronbach's $\alpha = .71$), while a high injunctive norm indicates that they perceive social pressure to engage in proenvironmental behaviors ($M = 4.67$, $SD = 1.35$, Cronbach's $\alpha = .82$).

Perceived behavioral control. Respondents indicated their agreement (1 = *strongly disagree*, 7 = *strongly agree*) with the following five statements: "it is possible for me to adopt...", "it is up to me whether I adopt...", "I believe I have complete control over

adopting...,” “if I wanted to, I could adopt...,” and “I have the financial ability to adopt...” proenvironmental behaviors on a regular basis ($M = 4.93$, $SD = 1.25$, Cronbach’s $\alpha = .85$).

Attention to proenvironmental messages. Respondents reported how much attention they pay to proenvironmental messages in television, print newspapers, and the Internet (1 = *no attention at all*, 7 = *very close attention*). Three items referenced general proenvironmental messages, news about local environmental crises, and news about global environmental crises for each medium. We computed one variable to reflect *attention to proenvironmental messages in traditional media* ($M = 4.45$, $SD = 1.48$, Cronbach’s $\alpha = .87$) and one to reflect *attention to proenvironmental messages on the Internet* ($M = 3.62$, $SD = 1.84$, Cronbach’s $\alpha = .96$).

Interpersonal communication. Respondents reported the frequency of their interpersonal discussion with friends, family, and colleagues about environmental issues (1 = *never*, 7 = *all the time*; $M = 3.37$, $SD = 1.47$, Cronbach’s $\alpha = .84$).

Media dependency. Eight items reflected four dimensions of informative goals—social understanding, self-understanding, interaction orientation, and action orientation—which we adapted from Loges (1994). These items measured respondents’ reliance on print newspapers (four items) and television news (four items). Respondents indicated their agreement with the statements (1 = *strongly disagree*, 7 = *strongly agree*): Reading newspapers/Watching television “helps me find out about climate change,” “helps me observe how others deal with climate change,” “gives me ideas about how to discuss the issue of climate change with others,” and “helps me figure out how I can conserve the environment” ($M = 4.81$, $SD = 1.30$, Cronbach’s $\alpha = .91$).

Control variables. We included age ($M = 39.39$, $SD = 14.23$), gender (1 = female, 2 = male; 56.8% female), education level³ ($Mdn = 6$ or “A-level,” $SD = 2.00$), household income level ($Mdn = 4$ or “\$3,001 to \$4,000,” $SD = 3.04$), and religious guidance as control variables in this study. Religious guidance was measured using a single item, in which respondents were asked: “How much guidance does religion play in your everyday life?” (1 = *no guidance at all*, 7 = *a great deal of guidance*; $M = 4.42$, $SD = 2.16$).

Analytical Approach

We conducted ordinary least squares hierarchical regression analysis in SPSS. We analyzed two criterion variables—intentions to engage in (1) green-buying behavior and (2) environmental civic engagement—and four groups of predictor variables incrementally in the regression model. The four groups of predictor variables were (a) demographic variables; (b) theory of planned behavior variables—attitudes, subjective norms, and perceived behavioral control; (c) communication variables—interpersonal communication, Internet attention, traditional media attention, and media dependency; and (d) the interaction terms. We computed the interaction terms by multiplying the standardized scores of the communication variables with the standardized score of media dependency.

Results

Table 1 displays the hierarchical regression model predicting green-buying intention. Income was positively related to green-buying intention ($\beta = .06$, $p < .05$). Females were more likely than males to indicate green-buying intention ($\beta = -.10$, $p < .001$). Age, education, and religious guidance were not significantly related to green-buying intention. The demographic variables accounted for 8.20% of the variance in green-buying intention.

[Insert Table 1 about here.]

³ Education levels were 1 = “No formal education,” 2 = “Primary 6 or below,” 3 = “Some secondary education,” 4 = “N-Level/ITE,” 5 = “O-Level,” 6 = “A-Level,” 7 = “Diploma,” 8 = “Degree,” and 9 = “Postgraduate.” A-Level is roughly equivalent to an associate’s degree in the U.S.

With regard to the main effects of the TPB-related variables, both attitude ($\beta = .28, p < .001$) and perceived behavioral control ($\beta = .08, p < .05$) were positively associated with green-buying intention, supporting H1a and H4a. Descriptive norm was initially significantly associated with green-buying intention, but this relationship diminished to non-significance after controlling for communication variables subsequently. Injunctive norm was not associated with green-buying intention. Hence, H2a and H3a were not supported. The TPB block explained 27.0% of the variance in green-buying intention.

When the communication variables were entered into the equation, traditional media attention ($\beta = .14, p < .001$), interpersonal communication ($\beta = .12, p < .001$), and media dependency ($\beta = .08, p < .01$) were positively related to green-buying intention. Therefore, H5a, H7a, and H8a were supported. However, Internet attention was not associated with green-buying intention. Hence, H6a was not supported. The communication block explained a further 5.60% of the variance in green-buying intention.

Finally, block 4 contained the interaction effects that address RQ1a-RQ3a. The interaction of traditional media attention and media dependency ($\beta = -.05, p < .05$), and the interaction of interpersonal communication and media dependency ($\beta = -.06, p < .05$) were significantly associated with green-buying intention. However, the interaction between Internet attention and media dependency on the outcome variable was not significant. Figure 1 depicts the regression of green-buying intention on media dependency at three levels of media attention. The figure shows that media dependency has the strongest positive effect on green-buying intention when media attention is low. In other words, traditional media attention moderated the relationship between media dependency and green-buying: the relationship was stronger for those who pay less attention to traditional media than for those who pay more attention. Likewise, Figure 2 shows the regression of green-buying intention on media dependency at three levels of interpersonal communication. The figure shows that

media dependency has the strongest positive effect on green-buying intention when interpersonal communication is low. The overall regression model accounted for 41.2% of the variance in green-buying intention.

[Insert Figures 1 and 2 about here.]

Table 2 shows the hierarchical regression model predicting environmental civic engagement intention. Among the demographic control variables, age ($\beta = .06, p < .05$) and religious guidance ($\beta = .08, p < .001$) were positively, and education ($\beta = -.07, p < .01$) was negatively related to civic engagement intention. Gender and income were not significantly related to civic engagement intention. The demographic variables accounted for 8.40% of the variance in civic engagement intention.

[Insert Table 2 about here.]

Regarding the TPB variables, attitude ($\beta = .23, p < .001$) and descriptive norms ($\beta = .20, p < .001$) were positively related to civic engagement intention, supporting H1b and H2b. However, injunctive norm and perceived behavioral control were not significantly related to civic engagement intention. Hence, H3b and H4b were not supported. The TPB block explained an additional 25.9% of the variance in civic engagement intention.

For the communication variables, Internet attention ($\beta = .10, p < .001$), interpersonal communication ($\beta = .19, p < .001$), and media dependency ($\beta = .12, p < .001$) were positively associated with civic engagement intention. Therefore, H6b, H7b, and H8b were supported. Traditional media attention, however, was not associated with civic engagement intention. Hence, H5b was not supported. The communication block explained an additional 6.40% of the variance in civic engagement intention. For RQ1b, RQ2b, and RQ3b, none of the interaction effects on civic participation was significant. The regression model explained a total of 40.8% of the variance in civic engagement intention.

Discussion

This study contributed to existing research by considering other communication variables in tandem with the TPB variables that might motivate green-buying and environmental civic engagement. With regard to the TPB antecedents of behavioral intention, our results indicate that attitude, perceived behavioral control, media dependency, traditional media attention, and interpersonal communication were positively associated with green-buying intention. Furthermore, traditional media attention and interpersonal communication moderated the influence of media dependency on green-buying behavior. In addition, attitude, descriptive norms, media dependency, Internet attention, and interpersonal communication positively predicted civic engagement intention.

Overall, our findings partially supported the TPB in predicting proenvironmental behavioral intention. Attitude and perceived behavioral control were positive predictors of green-buying intention, which is consistent with the results of previous studies (Gatersleben, Steg, & Vlek, 2002; Litvine & Wüstenhagen, 2011). This result suggests that to the extent that Singaporeans favor purchasing green products to mitigate the effect of environmental degradation, they are more likely to engage in green-buying behavior. In addition, Singaporeans feel that green-buying is within their volitional control and that this perception positively influences their green-buying intention. Generally positive perceptions of behavioral control may reflect the increased availability of green label consumer products in the marketplace. Specifically, the Singapore Green Label, which originated in 1992, endorses consumer products that have relatively few undesirable effects on the environment (Singapore Environment Council, 2013). A shift in market availability is fuelled further by companies that incorporate environmentally friendly features and green labeling into their products as a form of corporate social responsibility. Such visible changes in the marketplace

may give consumers greater confidence in their ability to purchase environmentally friendly products.

While descriptive norm was initially associated with green-buying intention, its effect was fully explained away by the communication variables that were subsequently entered into the regression model. Likewise, injunctive norm did not show an impact on green-buying. In other words, perceptions that others engage in the behavior or that they approve of the behavior did not influence green-buying behavior. One possible explanation may lie in how people often learn about environmental issues. Since it is a private sphere behavior, people are often limited in their opportunities to directly observe how other people engage in green buying. Thus, people's observations of others making environmentally friendly purchases may be indirect, coming largely from the mass media or from hearing other people talk about it. Descriptive norm was significantly correlated with all the communication variables in our study, indicating possible shared variance between the two sets of variables. As observation of others is the basis of a descriptive norm, it is not surprising that the effect of descriptive norm on green buying intention was explained away by the communication variables. These findings are also somewhat consistent with previous studies that show attitude to be a much stronger and consistent predictor of behavioral intention than subjective norm in the TPB model (Armitage & Conner, 2001). Overall, our findings highlight the importance of attitude and perceived behavioral control in the context of green-buying.

Both attitudes and descriptive norm positively predicted civic engagement, which corresponds with results from previous studies (e.g., Fielding et al., 2008) and suggests that, like green-buying intention, attitude plays a big role in motivating environmental civic engagement among Singaporeans. The positive association between descriptive norm and civic engagement suggests that individuals are more likely to engage in environmental activism if they believe that others are engaging in environmental activism. However, our

findings showed that injunctive norms and perceived behavioral control were not related to civic engagement. The general political climate of Singapore might explain the non-significant association between perceived behavioral control and civic engagement. Singaporeans might perceive engagement in environmental activism to be challenging—a belief that stems from reluctance to engage in civic activities in general. Hence, perceived barriers might account for the non-significant association between perceived behavioral control and civic engagement behavior in the context of climate change. On the whole, our findings show that the predictive power of the TPB model varies among sub-types of proenvironmental behaviors. Future research might seek to identify characteristics that differentiate various sub-types. Such a study could clarify antecedents of proenvironmental behavioral intention and, ideally, actual behavior.

Based on media dependency theory, we found that various communication factors can influence green-buying and environmental civic engagement intentions. Our analyses yielded mixed results for the effects of traditional media attention and Internet attention on our two outcome variables. We found that attention to proenvironmental messages in newspapers and on television predicted green-buying behavior, while attention to proenvironmental messages on the Internet predicted civic engagement behavior. These findings suggest that communication factors can be important determinants of proenvironmental behavior, but that their influence is variable across sub-types of proenvironmental behavior. Nonetheless, our findings corroborate current views of the importance of mass media in shaping public opinion and behavior with regard to the environment (e.g., Hansen, 2011). The government-controlled broadcast and print media in Singapore frequently run campaigns to raise public awareness of environmental conservation and to offer environmental friendly guidelines to the public. Prominent campaigns such as the Clean and Green Singapore and the Earth Hour, and documentary series such as *Saving Gaia*, have been running for many years in local

media outlets. These campaigns feature proenvironmental messages that aim to motivate adoption of environmentally responsible behaviors, like purchasing green products. Since research have shown that individuals who pay attention to media content tend to elaborate and learn from media messages (e.g., Eveland, 2001; Ho, Peh, & Soh, 2013), it is not surprising that attention to proenvironmental messages in traditional media predicts green-buying behavior.

However, we found that Internet attention, instead of traditional media attention, predicted environmental civic engagement. This finding comports with prior findings that Internet use for informational purposes promotes higher levels of social capital (Shah, Kwak & Holbert, 2001). Moreover, it is convenient for people to participate in environmental causes on the Internet by donating online to environmental organizations and by signing online petition to support environmental causes. People who are involved with political activities tend to be involved with offline political activities, as well. On the other hand, traditional media messages in Singapore tend to discourage political participation among citizens as a reflection of the general political climate in Singapore. Indeed, the traditional media in Singapore are oriented to serve the interest of the government (Lee, 2010). Furthermore, tight government control over public discourse and dissent in Singapore has affected how the citizens engage with political issues (Sim, 2006). Scholars have noted the low level of civic engagement in Singapore and documented feelings of indifference and apathy among Singaporeans toward civic participation (e.g., Skoric & Ng, 2009). In contrast, the Internet is relatively unregulated in Singapore. With few exceptions (e.g., regarding subjects of race, religion, and politics), the government minimally restricts public discourses online. Such relative laxity could plausibly explain the positive relationship between Internet attention and environmental civic engagement.

Our study also found that interpersonal communication is positively associated with proenvironmental behavioral intentions, which is consistent with prior findings (e.g., Nixon & Saphores, 2009). Our finding that interpersonal communication predicted both green-buying and civic engagement intentions suggests that interpersonal communication may play an integral role in campaigns that promote proenvironmental behaviors. Indeed, prior research suggests that interpersonal communication can act as a substitute to mass media sources in terms of generating attitudinal and behavioral outcomes, such as the adoption of healthy lifestyle behaviors (e.g., Lee, 2010). Moreover, researchers have shown that interpersonal communication can mediate the effect of mass media messages in raising issue awareness (e.g., Binder, 2010) and promoting the adoption of desirable behaviors (e.g., Boster, Carpenter, Andrews, & Mongeau, 2012).

Finally, we found that media dependency was positively associated with green-buying and civic engagement intentions, which substantiates the notion that people may turn to the media to an extent for informational and behavioral guidance. Furthermore, perceived threats of environmental risks (e.g., severe weather events related to climate change) may have heightened people's reliance on media for information about the environment. Such a process would be consistent with media dependency theory (Loges, 1994; Morton & Duck, 2001). This finding illustrates the instrumental role of media dependency in motivating proenvironmental behavior.

Furthermore, we found that media dependency had the strongest positive effects on green-buying intention when traditional media attention and interpersonal communication are low. This suggests that the relationship between media dependency and behavioral intention is not straightforward. People who have high media dependency are likely to surround themselves with media messages, as they believe that the mass media would instruct their behavior and offer an avenue for their understanding. When highly media dependent people

immerse themselves in a mediated environment, it gives them greater opportunities to encounter or notice proenvironmental media messages, without necessarily devoting full attention to the content. For example, studies have shown that inattentive processing often occurs during mere encounter with messages on television (Chaffee & Scheluder, 1986; Eveland, 2002; Kosicki & McLeod, 1990). Therefore, it is possible that the inattentive processing of media content among highly media dependent people could enhance their green-buying intention, in the absence of full attention. This implies that instilling a greater reliance on the media for proenvironmental messages among the public may be beneficial for campaigners as it can activate those who pay less attention to traditional media and those who infrequently discuss environmental issues with others to engage in proenvironmental behaviors such as green-buying.

Interestingly, the interaction between Internet attention and media dependency on green-buying intention was not significant. We suspect this null finding partly reflects our measurement of media dependency, in which the items reflected reliance on print and broadcast media, and not on the Internet. As mentioned earlier, mass media in Singapore typically do not contain messages that promote political or civic engagement. This could possibly explain why the interaction effects for environmental civic engagement turned out to be non-significant, as well.

Some findings from this study may be generalizable to populations in other major Asian cities such as Hong Kong, Shanghai, Seoul, and Taipei. Like Singapore, these Asian cities are international financial and business hubs, with strong economic fundamentals and infrastructure (Alberts, 2010; Florida, 2012; World Economic Forum, 2012). These urban cities are very cosmopolitan, yet they still retain many of their Asian beliefs and values (Chia et al., 2007). Given that a bulk of prior research has suggested the generalizability of the TPB framework (e.g., Cheng & Ng, 2006; Chu & Chiu, 2003; Hagger et al., 2007), it is reasonable

to generalize the TPB-related findings of our study to some other Asian cities. In addition, recent studies have shown that the Internet can facilitate online civic engagement among citizens in digital East Asian cities such as Hong Kong, Singapore, Seoul, and Taipei (e.g., Lin, Cheong, Kim, Jung, 2010). Therefore, our finding that Internet attention predicts environmental civic engagement among Singaporeans may be generalizable to some of these Asian cities, as well. Nonetheless, traditional media can vary widely among Asian territories, ranging from high press freedom in places like Hong Kong and South Korea to low press freedom in countries such as mainland China and Singapore (Freedom House, 2013). Hence, future research might replicate this study in other Asian countries to clarify the role of communication factors in proenvironmental behavioral intentions.

Our study has a number of limitations. First, our analysis of cross-sectional data prevents causal inference. Although our regression analyses imply that the variance in the dependent variable is due to its antecedents, we could just as easily analyze the opposite causal sequence. A longitudinal survey or experimental design could help clarify causation. Second, our media dependency measures excluded Internet dependency. Future research will need to include it to better understand the effects of Internet dependency and Internet attention on proenvironmental behaviors. Third, our study applied the TPB and media dependency theory in the context of proenvironmental behavior without fully integrating both theories. Future research could extend the TPB model by better integrating its key constructs with the communication variables. For example, when Griffin et al. (1999) developed the risk information seeking and processing model, they carefully described how informational subjective norms and perceived information gathering capacity may affect people's risk information seeking behaviors. Perhaps future studies could better integrate the TPB by examining how proenvironmental information seeking behaviors relate to informational subjective norms and perceived information gathering capacity.

Despite these limitations, our study has some practical implications for environmental campaign management, especially those that target specific behaviors. Campaigners and policymakers might achieve their goals more effectively by using a combination of communication channels to stimulate proenvironmental behaviors among the public. For instance, opinion-leader campaigns, which combine traditional media strategies with the recruitment of opinion leaders, could be developed to raise awareness about environmental issues and to mobilize environmental activism. These opinion leaders could extend their influence in the offline and online contexts. Studies have shown that careful training and monitoring of digital opinion leaders can produce an effective two-step flow influence to promote more public dialogue and proenvironmental behavior (e.g., Nisbet & Kotcher, 2009). Moreover, our results show that religious guidance may motivate environmental civic engagement. Therefore, religious leaders could be one important source of opinion leaders that campaigners could tap into to mobilize environmental activism.

Environmental groups and policymakers can also buttress efforts to organize public engagement efforts regarding environmental issues, especially when research have shown that the impact of such public outreach often extends beyond the immediate participants (e.g., Besley, Kramer, Yao, Toumey, 2008). For example, citizen engagement programs could be initiated, in which participants could disseminate information about environmental sustainability with their friends, coworkers, and family through interpersonal discussion after attending the program. It is worthwhile to increase public dependency on the media to enhance such proenvironmental actions as green-buying. For example, elevated media coverage of climate change risk may drive media dependence, which could influence green-buying and perhaps other private-sphere behaviors. Practitioners should also continue to develop campaigns that aim to cultivate positive attitudes toward proenvironmental behaviors. Campaign messages may instill self-efficacy beliefs by telling the public where and how they

could purchase green products, for instance. Finally, campaigners could leverage on the highly interactive features of the Internet, such as social media, as an effective way of stimulating proenvironmental civic engagement.

References

- Abroms, L.C., & Maibach, E.W. (2008). The effectiveness of mass communication to change public behavior. *Annual Review of Public Health, 29*, 219–234.
- Aguilar-Luzón, M.C., García-Martínez, J.M.A., Calvo-Salguero, A., & Salinas, J.M. (2012). Comparative study between the theory of planned behavior and the value-belief-norm model regarding the environment, on Spanish housewives' recycling behavior. *Journal of Applied Social Psychology, 42*(11), 2797–2833.
- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*(2), 179–211.
- Ajzen, I. (2006). *Constructing a TPB questionnaire: Conceptual and methodological considerations*. Retrieved from <http://people.umass.edu/aizen/pdf/tpb.measurement.pdf>
- Ajzen, I., & Driver, B. L. (1992). Application of the theory of planned behavior to leisure choice. *Journal of Leisure Research, 24*(3), 207–224.
- Ajzen, I., & Fishbein, M. (2005). The influence of attitudes on behavior. In D. Albarracín, B. T. Johnson, & M. P. Zanna (Eds.), *The handbook of attitudes* (pp. 173–221). Mahwah, NJ: Erlbaum.
- Alberts, H.R. (2010, July 13). Asia's up-and-coming financial centers. *Forbes*. Retrieved from <http://www.forbes.com/2010/07/13/asia-financial-centers-markets-economy-ranking.html>
- Arlt, D., Hoppe, I., & Wolling, J. (2011). Climate change and media usage: Effects on problem awareness and behavioral intentions. *International Communication Gazette, 73*(1–2), 45–63.
- Armitage, C.J., & Conner, M. (2001). Efficacy of the theory of planned behavior: A meta-analytic review. *British Journal of Social Psychology, 40*(4), 471–499.

- Alsmadi, S. (2007). Green marketing and the concern over the environment: Measuring environmental consciousness of Jordan consumers. *Journal of Promotion Management, 13*(3–4), 339–361.
- Bagozzi, R.P., Wong, N., Abe, S., & Bergami, M. (2000). Cultural and situational contingencies and the theory of reasoned action: Application to fast food restaurant consumption. *Journal of Consumer Psychology, 9*(2), 97–106.
- Ball-Rokeach, S.J. (1985). The origins of individual media-system dependency. *Communication Research, 12*(4), 485–510.
- Ball-Rokeach, S.J., & DeFleur, M.L. (1976). A dependency model of mass-media effects. *Communication Research, 3*(1), 3–21.
- Ball-Rokeach, S.J., Rokeach, M., & Grube, J.W. (1984). *The great American values test: Influencing behavior and belief through television*. New York: Free Press.
- Balmford, A., Manica, A., Airey, L., Birkin, L., Oliver, A., & Schleicher, J. (2004). Hollywood, climate change, and the public. *Science, 305*, 1713.
- Bamberg, S., Ajzen, I., & Schmidt, P. (2003). Choice of travel mode in the theory of planned behavior: The roles of past behavior, habit, and reasoned action. *Basic and Applied Social Psychology, 25*(3), 175–188.
- Bandura, A. (1982). Self-efficacy mechanism in human agency. *American Psychologist, 37*(2), 122–147.
- Bellows-Riecken, K. H., Rhodes, R. E., & Hoffert, K. M. (2008). Motives for lifestyle and exercise activities: A comparison using the theory of planned behaviour. *European Journal of Sport Science, 8*(5), 305–313.
- Besley, J.C., Kramer, V.L., Yao, Q., Toumey, C. (2008). Interpersonal discussion following citizen engagement about nanotechnology: What, if anything, do they say? *Science Communication, 30*(2), 209–235.

- Binder, A.R. (2010). Routes to attention or shortcuts to apathy? Exploring domain-specific communication pathways and their implications for public perceptions of controversial science. *Science Communication*, 32(3), 383–411.
- Boster, F.J., Carpenter, C.J., Andrews, K.R., & Mongeau, P.A. (2012). Employing interpersonal influence to promote multivitamin use. *Health Communication*, 27(4), 399–407.
- Burn, S. M. (1991). Social psychology and the stimulation of recycling behaviors: The block leader approach. *Journal of Applied Social Psychology*, 21(8), 611–629.
- Central Intelligence Agency. (2013). *CIA – The World Factbook – Singapore*. Retrieved from <https://www.cia.gov/library/publications/the-world-factbook/geos/sn.html>
- Chaffee, S. H., & Scheluder, J. (1986). Measurement and effects of attention to media news. *Human Communication Research*, 13, 76–107.
- Chan, K. (1998). Mass communication and pro-environmental behavior: Waste recycling in Hong Kong. *Journal of Environmental Management*, 52(4), 317–325.
- Cheng, C., & Ng, A.-K. (2006). Psychosocial factors predicting SARS-preventive behaviors in four major SARS-affected regions. *Journal of Applied Social Psychology*, 36(1), 222–247.
- Chia, H.-B., Egri, C.P., Ralston, D.A., Fu, P.P., Kuo, M.-H., C., Lee, C.-H., Li, Y., & Moon, Y.-L. (2007). Four tigers and the dragon: Values differences, similarities, and consensus. *Asia Pacific Journal of Management*, 24(3), 305–320.
- Chu, P., & Chiu, J. (2003). Factors influencing household waste recycling behavior: Test of an integrated model. *Journal of Applied Social Psychology*, 33(3), 604–626.
- Cialdini, R. B., Reno, R. R., & Kallgren, C. A. (1990). A focus theory of normative conduct: Recycling the concept of norms to reduce littering in public places. *Journal of Personality and Social Psychology*, 58(6), 1015–1026.

- Clark, W. A., & Finley, J. C. (2007). Determinants of water conservation intention in Blagoevgrad, Bulgaria. *Society & Natural Resources*, 20(7), 613–627.
- Dalton, R.J., & Ong, N-N.T. (2003). Authority orientations and democratic attitudes: A test of the ‘Asian Values’ hypothesis. *Japanese Journal of Political Science*, 6(2), 211–231.
- de Groot, J., & Steg, L. (2007). General beliefs and the theory of planned behavior: The role of environmental concerns in the TPB. *Journal of Applied Social Psychology*, 37(8), 1817–1836.
- Dirikx, A., & Gelders, D. (2007). To frame is to explain: A deductive frame-analysis of Dutch and French climate change coverage during the annual UN Conferences of the Parties. *Public Understanding of Science*, 19(6), 732–742.
- Dunlop, S., Wakefield, M., & Kashima, Y. (2008). Can you feel it? Negative emotion, risk, and narrative in health communication. *Media Psychology*, 11(1), 52–75.
- Dwyer, W. O., Leeming, F. C., Cobern, M. K., Porter, B. E., & Jackson, J. M. (1993). Critical review of behavioral interventions to preserve the environment: Research since 1980. *Environment and Behavior*, 25(3), 275–321.
- Eveland, W. P. (2001). The cognitive mediation model of learning from the news: Evidence from nonelection, off-year election, and presidential election contexts. *Communication Research*, 28(5), 571–601.
- Eveland, W. P. (2002). News information processing as mediator of the relationship between motivation and political knowledge. *Journalism and Mass Communication Quarterly*, 79, 26–40.
- Fielding, K.S., McDonald, R., & Louis, W.R. (2008). Theory of planned behavior, identity and intentions to engage in environmental activism. *Journal of Environmental Psychology*, 28(5), 318–326.

- Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention, and behavior: An introduction to theory and research*. Reading, MA: Addison-Wesley.
- Florida, R. (2012, May 8). What is the world's most economically powerful city? *The Atlantic*. Retrieved from <http://www.theatlantic.com/business/archive/2012/05/what-is-the-worlds-most-economically-powerful-city/256841/>
- Foreign Policy. (2010). *The Global Cities Index 2010*. Retrieved from http://www.foreignpolicy.com/articles/2010/08/11/the_global_cities_index_2010
- Freedom House (2013). *Freedom of the press 2013*. Retrieved from <http://www.freedomhouse.org/report/freedom-press/freedom-press-2013>
- Gatersleben, B., Steg, L., & Vlek, C. (2002). Measurement and determinants of environmentally significant consumer behavior. *Environment and Behavior*, 34(3), 335–362.
- George, C. (2003). The Internet and the narrow tailoring dilemma for “Asian” democracies. *The Communication Review*, 6(3), 247-268.
- George, C. (2005). Calibrated coercion and the maintenance of hegemony in Singapore. *Asia Research Institute working paper series no. 48*. Retrieved from http://www.ari.nus.edu.sg/docs/wps/wps05_048.pdf
- George, C., & Raman, R. (2008). When big media meet ‘we’ media in Singapore. *Australian Journalism Review*, 30(2), 61–73.
- Griffin, R. J., Dunwoody, S., & Neuwirth, K. (1999). Proposed model of the relationship of risk information seeking and processing to the development of preventive behaviors. *Environmental Research*, 80, 230–245.
- Gross, S. J., & Niman, C. M. (1975). Attitude-behavior consistency - Review. *Public Opinion Quarterly*, 39(3), 358–368.
- Hagger, M.S., Chatzisarantis, N.L.D., Barkoukis, V., Wang, J.C.K., Hein, V., Pihu,

- M., Soós, I. & Karsal, I. (2007). Cross-cultural generalizability of the theory of planned behavior among young people in a physical activity context. *Journal of Sport & Exercise Psychology*, 29(1), 1–20.
- Hansen, A. (2011). Communication, media and environment: Towards reconnecting research on the production, content and social implications of environmental communication. *International Communication Gazette*, 73(1–2), 7–25.
- Ho, S. S., Binder, A. R., Becker, A. B., Moy, P., Scheufele, D. A., Brossard, D., & Gunther, A. C. (2011). The role of perceptions of media bias in general and issue-specific political participation. *Mass Communication and Society*, 14(3), 343–374. [DOI: 10.1080/15205436.2010.491933]
- Ho, S. S., Chen, V. H. H., & Sim, C. (2012). The spiral of silence: Examining how cultural predispositions, news attention, and opinion congruency relate to opinion expression. *Asian Journal of Communication*. DOI: 10.1080/01292986.2012.725178
- Ho, S. S., Detenber, B. H., Malik, S., & Neo, R. L. (2012). The roles of value predispositions, communication, and third person perception on public support for censorship of films with homosexual content. *Asian Journal of Communication*, 22(1), 78–97.
- Ho, S. S., Peh, X., & Soh, V. W. L. (2013). The cognitive mediation model: Factors influencing public knowledge of the H1N1 pandemic and intention to take precautionary behaviors. *Journal of Health Communication*. DOI: 10.1080/10810730.2012.743624
- Ho, S. S., Poorisat, T., Neo, R. L., & Detenber, B. H. (forthcoming). Examining how presumed media influence affects social norms and adolescents' attitudes and drinking behavior intentions in rural Thailand. *Journal of Health Communication*.
- Holbert, R. L., Kwak, N., & Shah, D. V. (2003). Environmental concern, patterns of

- television viewing, and pro-environmental behaviors: Integrating models of media consumption and effects. *Journal of Broadcasting & Electronic Media*, 47(2), 177–196.
- Hong, T., Rice, J., & Johnson, C.C. (2012). Ethnic group and temporal influences of social norms: Smoking behavior among a panel of adolescents. *Journal of Communication*, 62(1), 158–174.
- Howard, B. (2001). EcoISP. *E Magazine*, 12(6), 11–12.
- Howell, R. A. (2013). It's *not* (just) “the environment, stupid!” Values, motivations, and routes to engagement of people adopting lower-carbon lifestyles. *Global Environmental Change*, 23(1), 281–290.
- Howell, R. A. (2011). Lights, camera... action? Altered attitudes and behaviour in response to the climate change film *The Age of Stupid*. *Global Environmental Change*, 21(1), 177–187.
- Human Rights Watch (2013). *World report 2013: Singapore*. Retrieved from <http://www.hrw.org/world-report/2013/country-chapters/singapore>
- Hwang, Y.H., Kim, S.L., & Jeng, J.M. (2000). Examining the causal relationships among selected antecedents of responsible environmental behavior. *The Journal of Environmental Education*, 31(4), 19–24.
- Intergovernmental Panel on Climate Change. (2012). *Managing the risks of extreme events and disasters to advance climate change adaptation: Summary for policymakers*. Retrieved from <https://docs.google.com/file/d/0B1gFp6Ioo3akYklZcWkwWHJud00/edit>
- Jin, Y., Pang, A., & Cameron, G.T. (2006). Strategic communication in crisis governance: Analysis of the Singapore management of the SARS crisis. *The Copenhagen Journal of Asian Studies*, 23, 81–104.

- Kahlor, L.A. (2007). An augmented risk information seeking model: The case of global warming. *Media Psychology, 10*(3), 414–435.
- Kahlor, L.A., Dunwoody, S., Griffin, R.J., Neuwirth, K., & Giese, J. (2003). Studying heuristic-systematic processing of risk communication. *Risk Analysis, 23*(2), 355–368.
- Kaiser, F. G. (1998). A general measure of ecological behavior. *Journal of Applied Social Psychology, 28*(5), 395–422.
- Kaiser, F. G., Doka, G., Hofstetter, P., & Ranney, M. A. (2003). Ecological behavior and its environmental consequences: a life cycle assessment of a self-report measure. *Journal of Environmental Psychology, 23*(1), 11–20.
- Kaiser, F. G., Hübner, G., & Bogner, F. X. (2005). Contrasting the theory of planned behavior with the value-belief-norm model in explaining conservation behavior. *Journal of Applied Social Psychology, 35*(10), 2150–2170.
- Kennedy, J.M. (May 1993). A comparison of telephone survey respondents selection procedure. Paper presented at the *Annual Meeting of the American Association for Public Opinion Research*, St. Charles, IL. Retrieved from <http://www.indiana.edu/~csr/aapor93.html>
- Kluver, R., & Banerjee, I. (2005). The Internet in nine Asian nations. *Information, Communication & Society, 8*(1), 30–46.
- Kosicki, G. M., & McLeod, J. M. (1990). Learning from political news: Effects of media images and information processing strategies. In S. Kraus (Ed.), *Mass communication and political information processing* (pp. 69–83). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Lee, K. (2008). Making environmental communications meaningful to female adolescents: A study in Hong Kong. *Science Communication, 30*(2), 147–176.
- Lee, C.-J. (2010). The interplay between media use and interpersonal communication in the

- context of healthy lifestyle behaviors: Reinforcing or substituting? *Mass Communication and Society*, 13(1), 48–66.
- Lee, H.-R., Hubbard, A.S.E., O’Riordan, C.K., & Kim, M.-S. (2006). Incorporating culture into the theory of planned behavior: Predicting smoking cessation intentions among college students. *Asian Journal of Communication*, 16(3), 315–332.
- Leiserowitz, A. (2004) Before and after The Day After Tomorrow: A U.S. study of climate change risk perception. *Environment*, 46(9), 22–37.
- Lin, W.-Y., Cheong, P. H., Kim, Y.-C., & Jung, J.-Y. (2010). Becoming citizens: Youths’ civic uses of new media in five digital cities in East Asia. *Journal of Adolescent Research*, 25(6), 839–857.
- Litvine, D., & Wüstenhagen, R. (2011). Helping “light green” consumers walk the talk: Results of a behavioral intervention survey in the Swiss electricity market. *Ecological Economics*, 70(3), 462–474.
- Loges, W.E. (1994). Canaries in the coal mine: Perceptions of threat and media system dependency relations. *Communication Research*, 21(1), 5–23.
- Lowe, T., Brown, K., Dessai, S., de França Doria, M., Haynes, K., & Vincent, K. (2006). Does tomorrow ever come? Disaster narrative and public perceptions of climate change. *Public Understanding of Science*, 15(4), 435–457.
- Lowrey, W. (2004). Media dependency during a large-scale social disruption: The case of September 11. *Mass Communication & Society*, 7(3), 339–357.
- Menon, K.U. (2006). SARS revisited: Managing “outbreaks” with “communications”. *Annals Academy of Medicine Singapore*, 35, 361–367.
- Morton, T.A., & Duck, J.M. (2001). Communication and health beliefs: Mass and interpersonal influences on perceptions of risk to self and others. *Communication Research*, 28(5), 602–626.

- National Climate Change Secretariat. (2011, April 6). *About us*. Retrieved from <http://app.nccs.gov.sg/page.aspx?pageid=114>
- National Climate Change Secretariat. (2012a). *NCCS public perception survey 2011 finds strong public support for climate change action in Singapore*. Singapore: National Climate Change Secretariat.
- National Climate Change Secretariat. (2012b). *Climate change & Singapore*. Retrieved from <http://app.nccs.gov.sg/nccs-2012/index.html>
- National Environmental Agency. (2008, April 26). *NEA to households: Cut your energy bills by 10%*. Retrieved from http://app2.nea.gov.sg/news_detail.aspx?news_sid=20080715639643177734
- National Environmental Agency. (2010, June 6). *News release: National Environment Agency adopts a more integrated strategy to curb littering in Singapore*. Retrieved from http://app2.nea.gov.sg/news_detail.aspx?news_sid=20100607732194423387.
- Nisbet, M.C., and Kotcher, J.E. (2009). A two-step flow of influence? Opinion-leader campaigns on climate change. *Science Communication*, 30(3), 328–354.
- Nixon, H., & Saphores, J. D. M. (2009). Information and the decision to recycle: Results from a survey of US households. *Journal of Environmental Planning and Management*, 52(2), 257–277.
- Ooi, B. K. (2010, June 28). Being Gaia-friendly comes naturally to her. *Today*, p. 4.
- Oreg, S., & Katz-Gerro, T. (2006). Predicting proenvironmental behavior cross-nationally: values, the theory of planned behavior, and value-belief-norm theory. *Environment and Behavior*, 38(4), 462–483.
- Paek, H. (2009). Differential effects of different peers: Further evidence of the peer proximity thesis in perceived peer influence on college students' smoking. *Journal of Communication*, 59(3), 434–455.

- Park, H. S., Klein, K. A., Smith, S. W., & Martell, D. (2009). Separating subjective norms, university descriptive and injunctive norms, and U.S. descriptive and injunctive norms for drinking behavior intentions. *Health Communication, 24*(8), 746–751.
- Park, H. S., & Smith, S. W. (2007). Distinctiveness and influence of subjective norms personal descriptive and injunctive norms, societal descriptive and injunctive norms on behavioral intent: A case of two behaviors critical to organ donation. *Human Communication Research, 33*(2), 194–218.
- Park, N., & Yang, A. (2012). Online environmental community members' intention to participate in environmental activities: An application of the theory of planned behavior in the Chinese context. *Computers in Human Behavior, 28*(4), 1298–1306.
- Petty, R. E., & Cacioppo, J. T. (1986). The elaboration likelihood model of persuasion. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 19, pp. 123–205). New York: Academic Press.
- Read, D., Bostrom, A., Morgan, M. G., Fischhoff, B., & Smuts, T. (1994). What do people know about global climate change? Part 2. Survey studies of educated laypeople. *Risk Analysis, 14*(6), 971–982.
- Rimal, R. N., & Real, K. (2003). Understanding the influence of perceived norms on behavior. *Communication Theory, 13*(2), 184–203.
- Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). New York: Free Press.
- Rosenthal, S., Lee, E. W. J., Ho, S. S. & Detenber, B. H. (2013). Perceptions of climate change in Singapore and the United States. *Proceedings of the 2013 Conference on Communication and the Environment*. Cincinnati, OH: The International Environmental Communication Association.
- Schäfer, M.S. (2012). Online communication on climate change and climate politics: A literature review. *Wiley Interdisciplinary Reviews: Climate Change, 3*(6), 527–543.

- Scheufele, D. A. (2000). Talk or conversation? Dimensions of interpersonal discussion and their implications for participatory democracy. *Journalism & Mass Communication Quarterly*, 77, 727–743.
- Schuldt, J.P., Konrath, S.H., & Schwartz, N. (2011). “Global warming” or “climate change”? Whether the planet is warming depends on question wording. *Public Opinion Quarterly*, 75(1), 115–124.
- See, S. (2010, June 5). MediaCorp’s “Saving Gaia” campaign kicks off on World Environment Day. *Channel NewsAsia*. Retrieved from <http://www.channelnewsasia.com/stories/singaporelocalnews/view/1061160/1/html>
- Seguin, C., Pelletier, L.G., & Hunsley, J. (1998). Toward a model of environmental activism. *Environment and Behavior*, 30(5), 628–652.
- Semenza, J. C., Hall, D. E., Wilson, D. J., Bontempo, B. D., Sailor, D. J., & George, L. A. (2008). Public perception of climate change: Voluntary mitigation and barriers to behavior change. *American Journal of Preventive Medicine*, 35(5), 479–487.
- Shah, D. V., Kwak, N., & Holbert, R. L. (2001). “Connecting” and “disconnecting” with civic life: Patterns of Internet use and the production of social capital. *Political Communication*, 18, 141–162.
- Sim, S.-F. (2006). Obliterating the political: One-page ideological dominance and the personalization of news in Singapore 21. *Journalism Studies*, 7(4), 575–592.
- Singapore Department of Statistics. (2011). *Population trends 2011*. Retrieved from <http://www.singstat.gov.sg/pubn/popn/population2011.pdf>
- Singapore Department of Statistics. (2010). *Census of population 2010: Statistical release 1 on demographic characteristics, education, language, and religion*. Retrieved from <http://www.singstat.gov.sg/news/news/press12012011.pdf>
- Singapore Environment Council (2013). *Overview Singapore GLS*. Retrieved from

<http://www.sec.org.sg/search/40-awards-and-endorsements/85-overview-singapore-gls>

- Skoric, M.M., & Ng, D.Y.Y. (2009). Bowling online, not alone: Online social capital and political participation in Singapore. *Journal of Computer-Mediated Communication*, *14*(2), 414–433.
- Skoric, M.M., & Poor, N. (2013). Youth engagement in Singapore: The interplay of social and traditional media. *Journal of Broadcasting & Electronic Media*, *57*(2), 187–204.
- Slater, M. D., Goodall, C. E., & Hayes, A. F. (2009). Self-reported news attention does assess differential processing of media content: An experiment on risk perceptions utilizing a random sample of U.S. local crime and accident news. *Journal of Communication*, *59*(1), 117–134.
- Slater, M.D., Hayes, A.F., & Ford, V.L. (2007). Examining the moderating and mediating roles of news exposure and attention on adolescent judgments of alcohol-related risks. *Communication Research*, *34*(4), 355–381.
- Steg, L., & Vlek, C. (2009). Encouraging pro-environmental behavior: An integrative review and research agenda. *Journal of Environmental Psychology*, *29*(3), 309–317.
- Stern, P. (2000). Toward a coherent theory of environmentally significant behavior. *Journal of Social Issues*, *56*(3), 407–424.
- Tang, Z., Chen, X., & Luo, J. (2011). Determining socio-psychological drivers for rural household recycling behavior in developing countries: A case study from Wugan, Hunan, China. *Environment and Behavior*, *43*(6), 848–877.
- Tikir, A., & Lehmann, B. (2011). Climate change, theory of planned behavior and values: A structural equation model with mediation analysis. *Climate Change*, *104*(2), 389–402.

- TODAYonline. (2011). *Clean and green campaign Singapore launched*. Retrieved from <http://www.todayonline.com/Singapore/EDC111029-0000436/Clean-and-Green-Singapore-campaign-launched>
- Trafimow, D., & K. A. (1996). The importance of subjective norms for a minority of people: Between-subjects and within-subjects analyses. *Personality and Social Psychology Bulletin*, 22, 820–828.
- Transparency International. (2012). *Corruption perceptions index 2012*. Retrieved from <http://cpi.transparency.org/cpi2012/results/>
- Urien, B., & Kilbourne, W. (2011). Generativity and self-enhancement values in eco-friendly behavioral intentions and environmentally responsible consumption behavior. *Psychology & Marketing*, 28(1), 69–90.
- Vandenberg, M. P. (2004). From smokestack to SUV: The individual as regulated entity in the new era of environmental law. *Vanderbilt Law Review*, 57(2), 515–535.
- Wellman, B., Hasse, A.Q., Witte, J., & Hampton, K. (2001). Does the Internet increase, decrease or supplement social capital: Social networks, participation, and community commitment. *American Behavioral Scientist*, 45(3), 436–455.
- World Bank. (2011). *Worldwide governance indicators*. Retrieved from http://info.worldbank.org/governance/wgi/sc_country.asp
- World Economic Forum. (2012). *The financial development report*. Retrieved from http://www3.weforum.org/docs/WEF_FinancialDevelopmentReport_2012.pdf
- World Wildlife Fund. (2012). *Living Planet Report 2012*. Retrieved from http://wwf.panda.org/about_our_earth/all_publications/living_planet_report/2012_lpr/
- Yanovitzky, I., Stewart, L. P., & Lederman, L. C. (2006). Social distance, perceived drinking by peers, and alcohol use by college students. *Health Communication*, 19(1), 1–10.

Zelweiro, J. (1998). The politicization of environmental organizations through the Internet.

The Information Society, 14, 45–56.

Zhao, X. (2009) Media use and global warming perceptions: A snapshot of the reinforcing

spirals. *Communication Research, 36*(5), 698–723.

Running head: MEDIA DEPENDENCY AND PROENVIRONMENTAL BEHAVIORS

Table 1. Hierarchical Multiple Regression Predicting Green Buying Intention.

Variable	Zero-Order Correlation	Model 1		Model 2		Model 3	
		B(SE)	β	B(SE)	β	B(SE)	β
<i>Block 1: Demographics</i>							
Age	.07*	.01(.00)	.07*	.00(.00)	.01	.00(.00)	.00
Gender (1 = Female, 2 = Male)	-.16***	-.43(.08)	-.15***	-.31(.07)	-.11***	-.29(.07)	-.10***
Education	.08**	.04(.02)	.06	.05(.02)	.07*	.02(.02)	.03
Income	.13***	.06(.02)	.12***	.03(.01)	.07*	.03(.01)	.06*
Religious Guidance	.19***	.12(.02)	.18***	.03(.02)	.05	.01(.02)	.02
ΔR ² (%)			8.20***				
<i>Block 2: TPB Variables</i>							
Attitude	.53***			.34(.04)	.35***	.28(.03)	.28***
Descriptive Norm	.42***			.18(.04)	.16***	.08(.04)	.07
Injunctive Norm	.42***			.03(.04)	.03	.03(.04)	.03
Perceived Behavioral Control	.47***			.11(.04)	.10**	.09(.04)	.08*
ΔR ² (%)					27.0***		
<i>Block 3: Communication</i>							
Traditional Media Attention	.43***					.19(.04)	.14***
Internet Attention	.18***					.03(.02)	.04
Interpersonal Communication	.44***					.11(.03)	.12***
Media Dependency	.42***					.12(.04)	.08**
ΔR ² (%)							5.60***
<i>Block 4: Interactions</i>							
Traditional Media Attention x Media Dependency	-.14***					-.06(.03)	-.05*
Internet Attention x Media Dependency	-.12***					-.22(.03)	-.02
Interpersonal Communication x Media Dependency	-.13***					-.07(.03)	-.06*
ΔR ² (%)							0.40***
Total R ² (%)							41.2***

Note. * $p < .05$. ** $p < .01$. *** $p < .001$. Cell entries are final standardized regression coefficients for Block 1, 2, and 3, and before-entry standardized regression coefficient for Block 4.

Table 2. Hierarchical Multiple Regression Predicting Environmental Civic Engagement.

Variable	Zero-Order Correlations	Model 1		Model 2		Model 3	
		B(SE)	β	B(SE)	β	B(SE)	β
<i>Block 1: Demographics</i>							
Age	.14***	.01(.00)	.10***	.01(.00)	.05	.01(.00)	.06*
Gender (1 = Female, 2 = Male)	-.07*	-.10(.08)	-.04	.07(.07)	.01	.05(.07)	.02
Education	-.08**	.04(.02)	-.05	.02(.02)	-.03	-.05(.02)	-.07**
Income	-.02	.01(.02)	.02	-.00(.01)	-.01	-.01(.01)	-.01
Religious Guidance	.26***	.16(.02)	.24***	.07(.02)	.11***	.05(.02)	.08***
ΔR ² (%)			8.40***				
<i>Block 2: TPB Variables</i>							
Attitude	.49***			.30(.04)	.30***	.23(.03)	.23***
Descriptive Norm	.50***			.35(.04)	.31***	.22(.04)	.20***
Injunctive Norm	.43***			.03(.04)	.03	.04(.04)	.03
Perceived Behavioral Control	.38***			-.03(.04)	-.02	-.05(.04)	-.04
ΔR ² (%)					25.9***		
<i>Block 3: Communication</i>							
Traditional Media Attention	.37***					.02(.04)	.01
Internet Attention	.18***					.08(.02)	.10***
Interpersonal Communication	.48***					.18(.03)	.19***
Media Dependency	.41***					.17(.04)	.12***
ΔR ² (%)							6.40***
<i>Block 4: Interaction</i>							
Traditional Media Attention x Media Dependency	-.07*					-.02(.03)	-.02
Internet Attention x Media Dependency	-.11					-.06(.03)	-.04
Interpersonal Communication x Media Dependency	-.05					-.01(.03)	-.01
ΔR ² (%)							0.00
Total R ² (%)							40.8***

Note. **p* < .05. ***p* < .01. ****p* < .001. Cell entries are final standardized regression coefficients for Block 1, 2, and 3, and before-entry standardized regression coefficient for Block 4.

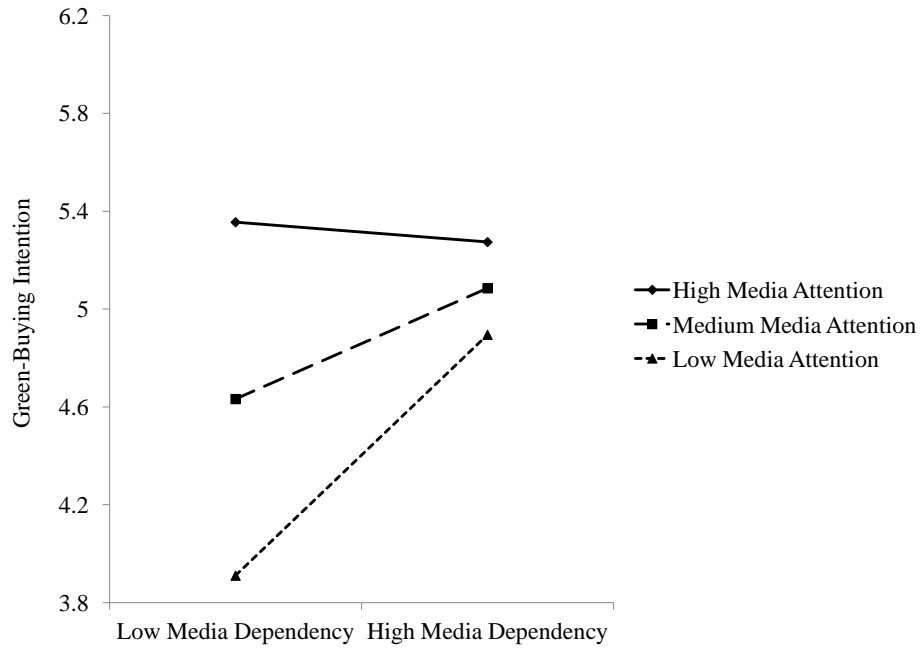


Figure 1. Interaction between media dependency and traditional media attention on green-buying intention.

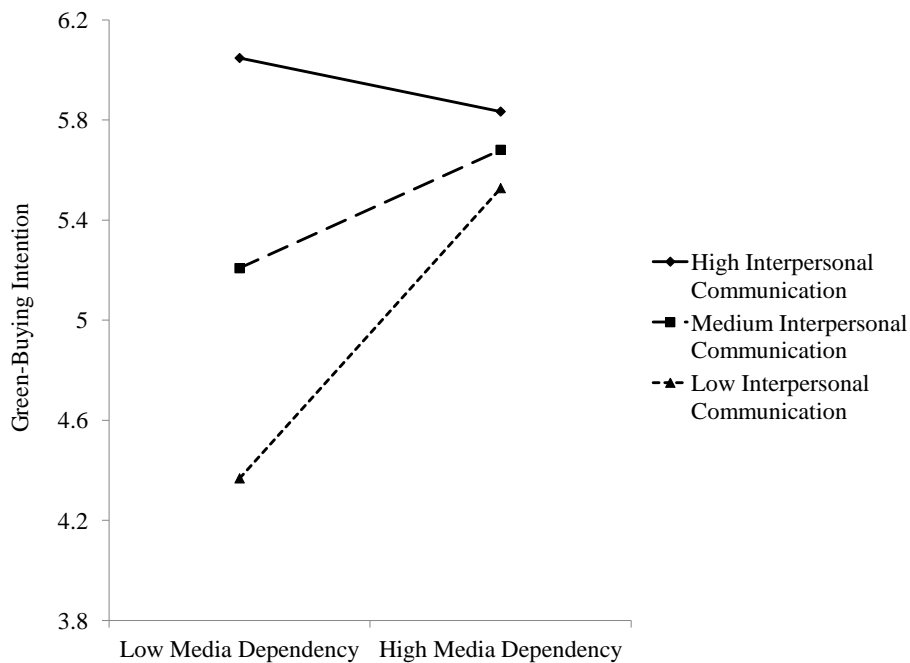


Figure 2. Interaction between media dependency and interpersonal communication on green-buying intention.

Note: estimated values, which controlled for all the demographic and independent variables, are depicted in the figures. Scale ranges were only partially displayed on the Y-axis for both figures.