Assessing the Influence of Story-based Narratives on Pro-Environmental Consumption Behavior Using the Theory of Planned Behaviour (TPB)

by

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Honours Bachelor of Science, University of Toronto, 2016

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We acknowledge and respect the lək'ʷəŋən peoples on whose traditional territory the university stands and the Songhees, Esquimalt and W̱SÁNEĆ peoples whose historical relationships with the land continue to this day.

Supervisory Committee

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Abstract

Much work has been done in communicating environmental messages about climate change to promote pro-environmental beliefs and behaviours, yet individual-level behavioural changes are not occurring rapidly enough to make meaningful reductions in environmental harm. Studies have shown that although information-based and scientific means of communicating about climate change are the most common strategies, they are largely ineffective in encouraging pro-environmental behaviour. As an alternative to these fact-based narratives, stories are proposed as effective tools for environmental communication and promoting behavioural change. To determine the impact of the narrative structure of climate change communication on behaviour, this study examined how exposure to fact-based and story-based narrative structures of environmental messages differentially influence the extent of engagement in pro-environmental consumption behaviour. The Theory of Planned Behaviour (TPB) was used as a framework to examine the attitudinal and behavioural responses to the story-based and fact-based communication conditions. Specifically, we examined the relationship between non-consumption attitudes, subjective norms, perceived behavioural control, behavioural intentions, and non-consumption behaviour, and explored how narrative structure influences the TPB processes for non-consumption. Participants (n=291) were randomly assigned to read a story or factsheet about the environmental consequences of overconsumption of material goods, or a non-relevant text. Pre- and post-test measures of pro-environmental consumption behaviour were conducted 14 days apart. Post-test attitudes, subjective norms, perceived behavioural control, and behavioural intentions towards practicing non-consumption were also measured. Results demonstrated that both story-based and fact-based narratives were effective tools for promoting pro-environmental consumption behaviour, providing some support for the information deficit theory. Four domains

of pro-environmental consumption behaviour were determined as non-consumption, reuse, activism, and green shopping behaviour. The story-based narrative was more effective than the fact-based narrative and the control narrative in increasing non-consumption and green shopping practices, while activism and reuse behaviour were not influenced differently by narrative structure. The TPB was found to be a useful model for assessing non-consumption, such that non-consumption behaviour was predicted by attitudes, perceived behavioural control and subjective norms through the mediating role of behavioural intentions. Non-consumption attitude was the strongest predictor of intentions, and subjective norm was the weakest predictor of intentions. Narrative structures did not have significant effects on the participants' reported non-consumption attitudes, subjective norms, perceived behavioural control or intentions, nor on the relationships between the TPB constructs. The findings suggest that story-based narrative structures are effective tools for delivering climate change information to broad audiences and encouraging pro-environmental behaviour. However, the role of information-based communication should not be discounted. The findings also contribute to the body of research on pro-environmental consumption behaviour by providing a deeper understanding of the psychological mechanisms of non-consumption, an essential yet understudied domain of sustainable behaviour.

Keywords: Narrative, Storytelling, Climate Change Communication, Pro-Environmental Behaviour, Theory of Planned Behaviour, Non-Consumption

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Dedication

I dedicate this thesis to those whose stories of struggle and heroism in the face of the planetary crisis remains unheard.

Literature Review

Despite the scientific and social consensus on the climate crisis, both individual-level and governmental responses to the growing climate emergency remain inadequate. For decades, natural and social scientists have persistently amplified messages regarding the need for radical change in our personal ways of resource use and in the systems that govern our modes of production and consumption. Much work has been done in communicating environmental messages that promote pro-environmental attitudes, norms and behaviours, yet individual-level changes are not occurring rapidly enough to make meaningful reductions in carbon emissions (Intergovernmental Panel on Climate Change, 2018; Olhoff & Christensen, 2018). There is an existing gap between the public's knowledge of climate change and taking the steps necessary to mitigate this crisis, which current environmental communication tactics have not been able to bridge (Bushell et al., 2015; Knutti, 2019).

Studies have shown that although information-based means of communicating about climate change are the most common environmental communication strategies, they are largely ineffective in promoting pro-environmental attitudes and behaviour (Corner et al., 2012; Kahan et al., 2012). Story-based narratives that describe an account of a protagonist who strives to overcome an environmental issue have the potential to better influence attitudes and beliefs compared to fact-based messages (Grace & Kaufman, 2013). However, few research studies have assessed the influence of story-based narratives on promoting pro-environmental behaviour. To determine the impact of narrative climate change communication on pro-environmental consumption behaviour, this study will examine how exposure to analytical (information-based) and story-based narrative structures of climate change communication differentially influence the frequency of engaging in pro-environmental consumption behaviour. Furthermore, we will apply

the psychological action model, the Theory of Planned Behaviour (Ajzen, 1991), to examine attitudes, subjective norms, perceived behavioural control and behavioural intentions as the psychological underpinnings of pro-environmental consumption behaviour and explore how analytical and story-based narrative structures vary in their influence on these underlying mechanisms.

Facilitating Climate Change Engagement Through Environmental Communication

To address the climate change knowledge-action gap, much work has been done in encouraging public engagement with climate change adaptation and mitigation efforts (Corner et al., 2014). Climate change engagement can be described as a personal state of connection to climate change (Lorenzoni et al., 2007). This state involves individuals' evaluations and responses to climate change, which include affective, behavioural, and cognitive components. Therefore, engagement goes beyond simply knowing about climate change, and encompasses the complex dynamic between how individuals think, feel and act towards this issue. These dynamics influence individuals' varying levels of engagement, from passive compliance with climate change adaptation and mitigation policies to active efforts such as political action (Whitmarsh et al., 2013). Facilitating climate change engagement is then an essential component of any democratic policy action, such that public input and support can inform and accompany major policy decisions (Moser & Dilling, 2011). Climate change communication is one of the means through which active and meaningful engagement may be achieved. Climate change communication connects scientists, politicians, industry, and the public, thus enabling the translation of scientific evidence into corporate practices, policy decisions, public policy support and environmental behaviour (Moser & Dilling, 2011).

Since the 1980's, research on how to communicate climate change more effectively has increased exponentially (Moser, 2010). Climate change communicators have accounted for issues such as diversity of audiences, channels of communication, messenger credibility, and usage of message frames and emotional appeals. These considerations contribute to climate change communication campaigns that aim to educate, increase environmental awareness and concern, and change behaviours (Moser, 2010). A traditional and common practice for communicating with the public about environmental issues is by presenting scientific facts (Nisbet & Schuefele, 2009). This practice is based on the information deficit model, which suggests that providing information to the public about a specific issue and outlining what to do about it has the capacity to change attitudes and therefore behaviour (Wynne, 1993; Wynne, 2006). Although awareness of the root causes of climate change is moderately related to appropriate behavioural responses (O'Connor et al., 2002), better knowledge does not always lead to more effective actions (Gardner & Stern, 2002). Researchers suggest that informational campaigns do not motivate individual engagement with climate change as successfully as has generally been assumed (Whitmarsh et al., 2013). For example, in a study by Corner et al. (2012), individuals exposed to competing climate change information interpreted the convincingness of the claims posed in the message based on their existing worldviews. Individuals evaluated the claims based on their prior skeptical outlook and no changes in attitudes were found as a result of exposure to the informational claims. Another study by Kahan et al. (2012) found that high degrees of science comprehension measured by science literacy and technical reasoning capacity were not associated with increased climate change concern. Therefore, providing the public with additional information, or information presented in a more comprehensible manner, may not elicit significant changes in climate change engagement.

Since the dissemination of scientific information may not lead to significant and consequential climate change engagement, it is imperative to examine more effective means of climate change communication. As an alternative to fact-based narratives, interdisciplinary research proposes stories and narratives as effective tools for climate change communication and promoting social change (Bushell et al., 2017; Gearty, 2015; McComas & Shanahan, 1999; Moezzi et al., 2017). Narrative structures facilitate the inference of causality between the information contained in a message, equipping them with intrinsic persuasive qualities (Curtis, 1994; Dahlstrom, 2010). Through a process called *Narrative Transportation,* narratives are proposed to engage emotional and cognitive resources that minimize counterarguments to the message of the narrative (Green, 2006). Narratives have already been used in science communication to influence beliefs on topics such as HIV/AIDS (Vaughan et al., 2000), vaccines (Brodie et al., 2001), and pro-environmental attitudes (Grace & Kaufman, 2013). Narratives have also been used to increase the likelihood of forming behavioural intentions for quitting smoking (Solja et al., 2018), or engaging in diet and exercise (Niederdeppe et al., 2013). Given the capacity of narratives to elicit affective, cognitive and behavioural responses to information, narrative communication can be a powerful tool for closing the knowledge-action gap and facilitating active engagement with environmental issues. By using narrative structures to develop their climate change messaging, communication campaigns have the unique opportunity to situate the major actors, events and factors related to their environmental issues of interest to effectively influence public perceptions and actions (Flottum & Gjerstad, 2017).

Mechanisms of Narrative Persuasion

Narratives have been used as the primary mode of communication through time and across cultures (Rubin, 1995). Evolutionary biologists propose that storytelling emerged 100,000

years before the appearance of logical and argumentative modes of social interaction, such that using storytelling for social communication has led to the evolution of the human brain to process information in terms of stories by searching for and using story elements to create meaning (Haven, 2007; Bruner, 1990). Some scholars have gone as far as to call human beings "homo narrans" to emphasize human beings' prioritization and reliance on the coherence and fidelity of stories in their decision making (Fisher, 1984; Ranke 1967).

Bruner (1986) argues for two modes of thinking: logico-scientific and narrative thinking. He argues that narrative processing abilities appear early in childhood while logical modes of thought develop later in life, suggesting that the human brain is programmed to process information in narrative form while logical thinking is learned. Narrative thinking's advantage over logical thinking may stem from its ability to process complexity, non-linearity, and unpredictability (Tsoukas & Hatch, 2001), which are inherent characteristics of complex issues such as climate change (Bushell at al., 2017). In comparison to fact and data-based texts, narratives facilitate increased recall and better comprehension (Zabrucky & Moore, 1999), more efficient transfer of information to long-term memory, and more motivation and interest (Glaser et al., 2009). Narratives also have persuasive qualities. That is, processing information in the form of a narrative may limit cognitive resistance, reduce counterarguments to the content of the message, and possibly lead to behaviours that are inconsistent with the recipients' existing attitudes (Slater & Rouner, 2002; Niederdeppe et al., 2011).

The terms *story* and *narrative* are used interchangeably in the literature (Moezzi et al., 2017). Therefore, it is important to clarify the distinctions among these terms and aim to reach more consistent research conceptualizations of these terms in general. Narratives are distinguished by their temporality and have the ability to weave separate events into an

interdependent whole (Somers, 1994). Different types of narratives exist within the realm of climate change communication. For example, fact-based narratives that aim to facilitate more comprehensible and coherent understanding of scientific data are common in media reports and science communication. Stories constitute a specific category of narratives (Sole & Wilson, 2002), which include elements such as main character(s), plot, goals, and setting (Haven, 2007). Story-based narratives utilize these characteristics to structure information and communicate them to an audience (Haven, 2007). In this study, we refer to stories as narratives that include such traditional story elements.

Stories following the journey of a protagonist absorb the reader within the narrative by eliciting emotional responses (Green & Brock, 2000). As a result, individuals may identify with the main characters and develop beliefs consistent with the story. This hypothesized mechanism is referred to as Narrative Transportation (Gerrig, 1993). In the context of climate change communication, stories have the capacity to increase emotional engagement and reduce psychological distance associated with climate change (Van der Linden et al., 2015; Van Boven et al., 2010). Therefore, narrative transportation associated with processing stories may equip environmental messages with persuasive capacities, such that story-based narratives can better evoke pro-environmental behaviour change compared to analytic and fact-based narratives.

Stories and Pro-environmental Behaviour

Prior research has shown that exposure to the story of a protagonist who encounters an environmental issue can facilitate engagement with climate change. Gustafson et al. (2020) found that exposure to a radio story of an individual's personal experience with witnessing the impacts of climate change in their immediate environment positively influenced beliefs and perceptions of risk associated with global warming by eliciting emotional reactions to the story.

In a study by Grace and Kaufman (2013), students of agriculture were exposed to a fact-based narrative about sustainable agricultural practices or a story-based narrative about an individual's personal encounter with sustainable agricultural practices in a farm, orally and in written formats. Students who were exposed to a story about an individual's personal encounter with farming practices showed more positive attitude changes towards sustainable farming practices than those exposed to a fact-based narrative on the same issue, regardless of the medium of narrative delivery. While past research demonstrates stories' capacity to encourage engagement with climate change by eliciting changes in environmental beliefs, attitudes and emotions, there is little evidence on whether stories have the practical capacity to influence *behaviours.*

Pro-environmental behaviour (PEB) is defined as any behavioural response that aims to protect the environment or limit harm posed to the environment (Stern, 2000). These behaviours span environmental activism (e.g., petitioning), non-activist support of environmental objectives (e.g., support for carbon taxes), private-sphere pro-environmental behaviours (e.g., reducing consumption of material goods), and other environmentally significant behaviours in the context of organizations (e.g., considering environmental factors in making corporate decisions) (Stern, 2000). If the knowledge-action gap is to be addressed, climate change communication must link attitudes and perceptions with action and be able to engage individuals at such behavioural levels.

Psychological action models can provide insight into the link between internal psychological processes and observable behaviour. These models provide systematic theoretical frameworks that propose psychological factors responsible for driving behaviour and specify the relationships among these factors. In the context of our research, psychological action models can help us understand individuals' response to communication strategies that seek to encourage

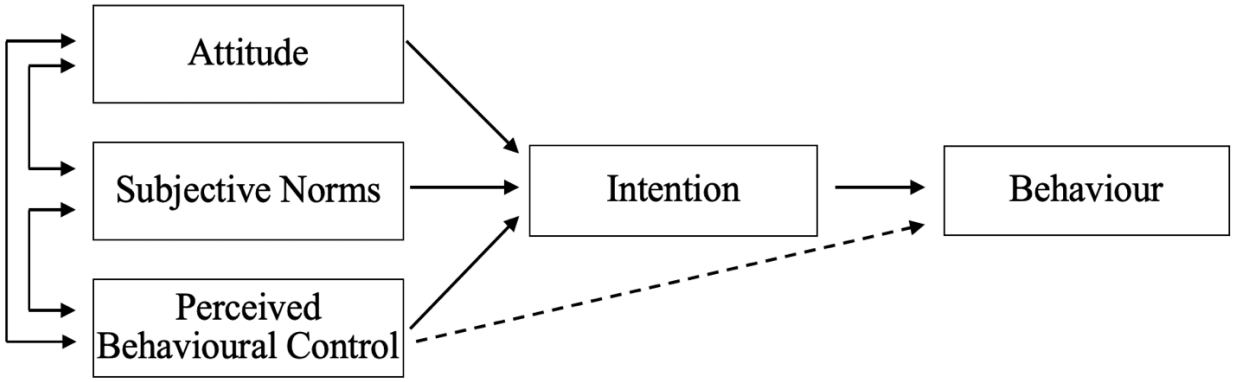
pro-environmental behaviour. They can also help us to bridge the knowledge-action gap by gaining an understanding of the factors that underpin pro-environmental behaviour. Examples of psychological action models, or behaviour change models, include the Social Norms Theory (Perkins & Berkowitz, 1986), Social Cognitive Theory (Bandura, 1989), Norm Activation Model (Schwartz, 1977), Value-Belief-Norm Theory (Stern et al., 1999) and the Transtheoretical or Stages of Change Model (DiClemente & Prochaska, 1998). Other psychological action models specific to pro-environmental behaviour are the Model of Responsible Environmental Behaviour (Hines et al., 1986) and the Social Identity Model of Pro-Environmental Action (SIMPEA; Fritsche et al., 2018). Arguably one of the most well-known theoretical frameworks for studying behaviour is the Theory of Planned Behaviour (TPB), developed by Ajzen (1991). The TPB has been widely used to predict and explain a variety of behaviours, such as health and consumer behaviour (Webb et al., 2010; Kalafatis et al., 1999). The theory incorporates attitudes, perception of social norms, perceived behavioural control, and behavioural intentions to predict behaviour. Given that prior research has demonstrated stories' effect on environmental beliefs, the TPB may be best situated to explain any potential links between changes in environmental beliefs, including behavioural beliefs, normative beliefs and control beliefs, and changes in behaviour as a result of narrative exposure.

Theory of Planned Behaviour and Pro-Environmental Behaviour

The TPB aims to explain behaviour using a parsimonious model composed of informational and motivational components (Connor & Azrmitage, 1998). The theory assumes that individuals decide whether to perform a behaviour, that behavioural choices are made rationally, and that individuals can give reasons for their choices (East, 1993). The TPB posits that that behavioural intention is the primary antecedent to behaviour (Ajzen, 1991). Behavioural

intention is a motivational factor that indicates an individual's planned effort to engage in a behaviour. Stronger intentions to engage in a behaviour will increase the likelihood of engaging in that behaviour. Behavioural intention is a function of the attitudes, subjective norms, and perceived behavioural control about a behaviour. Figure 1 provides a visual depiction of the TPB model (Orzana, 2015).

Figure 1. *Theory of Planned Behaviour*



In the TPB model, *attitude* refers to the individual's appraisal of a behaviour (Ajzen, 1991). The behaviour may be evaluated favourably or unfavourably, and the attitude towards the behaviour is formed by those evaluations. *Subjective norm* refers to the individual's perception of social norms about the behaviour. This is informed by whether an individual assumes the existence of social pressures to perform the behaviour, and whether the individuals and community closest to the person approve or disapprove of the behaviour. While *actual* behavioural control refers to having the resources and opportunities that allow an individual to engage in a behaviour, *perceived behavioural control* is an individual's perception on the level of difficulty of performing the behaviour. It involves judgements about their ability to perform. Perceived behavioural control is a psychological process that contributes to both forming a

behavioural intention and performing the behaviour itself. The TPB suggests that more positive attitudes and subjective norms about a behaviour, and greater perceived behavioural control, lead to stronger intentions to perform the behaviour. Each of these constructs may play a more or less important role in their impact on behavioural intentions.

It should be noted that the TPB is an extension of a previous model, the Theory of Reasoned Action (TRA), developed by Ajzen and Fishbein (1977). The theories differ in that, in TRA, behavioural intention was predicted by attitude and subjective norm only. Perceived behavioural control was added as a new component to the TRA model, such that it influences both intentions and behaviour. The new component was added in response to concerns that lack of access to opportunities, resources and skills can limit the performance of behaviours (Liska, 1984). In the extension of the TRA, Ajzen (1991) discusses that his concept of perceived behavioural control is closely related to Bandura's (1977) concept of self-efficacy. Bandura (1982) defines self-efficacy as judgements about one's ability to perform a course of action. It has been shown that the addition of perceived behavioural control and its hypothesized paths to intention and behaviour increased the predictive power of TPB by 8% (R^2) (Loo et al., 2013; Venkatesh et al., 2003).

The TPB has been applied to a variety of behavioural contexts. It has been used extensively in the study of health-related behaviour such as smoking (Godin et al., 1992; Rise et al., 2008), sexual behaviour (Protogerou et al., 2012), diet (Malek et al., 2017), and exercise (Norman et al., 2000). The TPB has also been used in studying different domains of PEBs, such as sustainable energy use (Liobikiene et al., 2021), green shopping (Yadav & Pathak, 2017), environmental activism (Fielding et al., 2008), household waste sorting and recycling (Wang et al., 2021; Nigbur et al., 2010; Aboelmaged, 2021), sustainable farming practices (Wauters et al.,

2010; Sok et al., 2021; Karimi & Saghaleini, 2021), sustainable food consumption (Vermeir & Verbeke, 2008; Wolstenholme et al., 2021; Ahmed et al., 2021), using sustainable tablewear (Tu et al., 2021), adoption of electric vehicles (Shalender & Sharma, 2021) and energy efficient appliances (Bhutto et al., 2021). The relative influence of each of the TPB components of attitudes, subjective norms, and perceived behaviour control on pro-environmental behavioural intentions and ultimately behaviour may differ amongst the types of PEBs and the samples used in the studies (Bamberg & Moser, 2007). For example, in a study on intentions to reduce eating red meat and processed meat, subjective norms and perceived behavioural control varied in their prediction of intentions to reduce meat consumption between a UK and an Italian student sample group, while attitude remained a strong predictor across both samples (Wolstenholme et al., 2021). In a study of the determinants of the intention behind engaging in sustainable energy use, Liobikiene et al. (2021) found that subjective norms and perceived behavioural control were significant predictors of intention for sustainable energy use, while attitudes towards sustainable energy use was only predictive of intentions through its interaction with environmental concern. Therefore, careful attention must be paid in interpreting the results of analyses using the TPB model, such that conclusions about the determinants of pro-environmental behaviour refer to the specific behaviour of interest, the research context, and the sample under study.

Despite heterogeneity in the relative contribution of the TPB variables for different behaviours and samples, the TPB remains a reliable model for predicting behaviour and behavioural intentions. Hines, Hungerford and Tomera (1986) conducted the first meta-analysis on the psychological determinants of PEB. They proposed behavioural intentions as having direct influence on PEB, with intentions as a function of similar psychological processes as in the TPB. In a later meta-analysis, Bamberg and Moser (2007) found similar results as Hines et al.

(1986), with intentions mediating the relationship of norms, attitudes and perceived control with PEB. The TPB components had similar influences on behavioural intentions in both meta-analyses. A meta-analytic review of the effectiveness of the TPB across various domains of health, social and environmental behaviour by Armitage and Connor (2001) found that TPB accounted for 27% of variance in behaviour, similar to Bamberg and Moser's (2007) meta-analysis of PEBs. Perceived behavioural control was found to be a strong predictor of intentions and behaviour across different domains of behaviour, and subjective norms were found to be the weakest predictor of intentions, though the authors determined that the weak effect is likely due to weaknesses in measurement and the operationalization of subjective norms in the primary studies (Armitage & Connor, 2001). The use of the TPB to study and predict behaviour has been largely supported and continues to this day, though expansions to the model by including additional variables, integrations with other psychological models, and improvements in measurement have been suggested and increasingly researched since the theory was first published (See Manstead & Parker, 1995; Hagger & Chatzisarantis, 2009; Hardeman et al., 2002).

Using the TPB to Examine Narrative Persuasion

Story-based narratives' capacity to influence attitudes and beliefs suggests that they can be leveraged as communication interventions to influence the determinants of pro-environmental behaviour intentions and lead to behaviour change. The TPB has been mostly used to predict intentions and behaviour, to measure the strength of the pathways between its component variables, and less commonly used to develop and evaluate behaviour change interventions (Hardeman et al., 2002; Sutton, 2002). Where the model has been used in the context of interventions, the majority of the interventions include information-provision and persuasion

efforts (Hardeman et al., 2002; Stead et al., 2005; Evans & Norman, 2002; Quine et al., 2001; Kothe et al., 2012; Jones et al., 2010). A limited number of interventions employed personal stories as part of the intervention (Reed & Claunch, 2017; Low et al., 2016 ; Larkey et al., 2015; Feenstra et al., 2014; Ashton et al., 2010; Fellnhofer, 2017a, 2017b). In two studies, the TPB was used to develop stories as communication interventions for behaviour change, but the effectiveness of the stories was not measured (Ashton et al., 2010; Low et al., 2016). In a study of cancer patients, those exposed to a video story intervention displayed increases in cancer screening behaviours, and changes in behaviour were associated with positive changes in attitude (Larkey et al., 2015). Twelve to fourteen-year-old school children exposed to a video story about traffic safety showed significant positive changes in attitude, but not in social norms, self-efficacy, intentions and behaviour (Feenstra et al., 2014). In a study aimed at increasing social norms for engaging in safe farming practices among senior farmers, exposure to plays about safe farming practices led to 67% of the participants making intentions about implementing safety changes and 42% changing their farming behaviour, though changes in the other components of TPB were not reported (Reed & Claunch, 2017). In the context of commerce, it has been demonstrated that watching stories about other entrepreneurs increased entrepreneurial intentions (Fellnhofer, 2017a). However, few studies have examined how narrative interventions impact the TPB processes in the context of pro-environmental behaviour.

Given the lack of research using the full TPB model in story-based interventions and in the context of pro-environmental behaviour, we can look to studies that examine different components of the TPB separately. Various studies have examined the influence of narratives on pro-environmental attitudes and behavioural intentions. For example, Rhodes et al. (2016) assessed the efficacy of entertainment programs with pro-environmental messages on increasing

intentions to engage in ecological behaviours. They found that students exposed to entertainment programs with ecological messages were more likely to report intentions to engage in PEB than those exposed to programs without environmental messaging, including intentions to engage in PEBs not explicitly depicted in the narrative program. They also found that the influence of the ecological narratives on pro-environmental intentions occurred through enhancing the accessibility of existing positive attitudes towards PEB. In their study on narrative engagement with eco-dystopian fictional film, Bilandzic and Sukalla (2019) found an effect of narrative on forming behavioral intentions to act against climate change and this effect was pronounced for participants who experienced higher engagement with the narrative. In another study examining the narrative persuasion effects of a nature conservation film, students exposed to the narrative film reported more positive attitudes and more intentions to engage in conservation efforts than a control group (Chen & Lin, 2014). Narrative transportation and identification were significantly associated with attitudes towards conservation, which was associated with forming behavioural intentions to engage in conservation efforts. Baytar and Ashdown (2013) developed a video that depicted the story of a fashion design student's personal transformation after learning about the environmental impacts of the textile industry. Students exposed to this narrative were more likely to report positive attitudes towards sustainable garment design and consumption compared to a control group. While most research on narrative influence examines pro-environmental attitude and behaviour intention components of the TPB, to date, few research studies have directly examined the influence of stories on perceived behaviour control and subjective norms for PEB. Slater (2002) argues that narrative persuasion and social influence are integrated processes. He suggests that witnessing others' behaviours through a narrative may lead to forming beliefs about social norms through the process of identification. The process of identification with story

characters can also influence control beliefs. Some support for these ideas exists outside of the field of environmental research. Studies in health research have found that narratives positively influence perceived social norms around pap testing (Moran et al., 2013), and HPV (Lee & Su, 2019). One study on generalized self-related control beliefs found that story-based narratives increased control beliefs through narrative transportation and identification (Isberner et al., 2019). Another study found that narratives of entrepreneur role models positively influenced perceived behavioural control (Fellnhofer, 2017b). Therefore, while existing research on the efficacy of narratives shows a promising persuasive effect of story-based narratives on the TPB components, more research on narrative effects on perceived behavioural control and subjective norms is needed, especially in relation to PEB.

It is important to note that the majority of the research using story-based narratives to communicate environmental issues focuses on the antecedents of behaviour, such as attitudes and intentions, as the outcomes of interest (e.g., Rhodes et al., 2019; Daly, 2020; Chen & Lin, 2014; Bilandzic & Sukalla, 2019). As a traditional linear behavioural change model, the TPB (Ajzen, 1991), posits that attitudes, personal control, norms and behavioural intentions are pre-cursors of behaviour (Armitage & Christian, 2003). This widely used model, despite warnings by its theorists (Fishbein & Ajzen, 1977), has unintentionally fueled the incorrect assumption that these precursors are good *indicators* of environmental behaviour (Chung & Leung, 2007). This limitation is evident in the present field. For example, in a study by Daly (2020) on the influence of narratives on mortality salience and PEB, the behavioural measures were not those of behaviour, rather reported willingness and interest to engage in PEB. Only two recent studies (Morris et al., 2019; Haman & Reese, 2020) have studied PEB as an outcome of interest, with only the Morris et al., (2019) study including a comparison of fact-based and story-based

narratives. Given that the precursors of behaviour may not indicate the occurrence of PEB, investigations of this topic must include measures of behaviour itself. This study will address this gap by comparing the effects of fact-based and story-based narrative structure on pro-environmental behaviour.

Incorporating the precursors of behaviour and their relationships in our examination of the influence of stories on PEB can help us achieve a more comprehensive understanding of how story-based narratives can change environmental behaviours. Using the TPB as a lens to study the influence of narratives on pro-environmental beliefs and behaviour permits a more nuanced understanding of how narratives exert their influence on PEB. Such knowledge can guide the design of story-based interventions that utilize and target the components of TPB for more effective behaviour change. Given that the relative contributions of the precursors of behavior to the behavior itself vary across different domains of behaviour, it is important that research studies employing the TPB examine specific types of PEBs.

Measuring Pro-Environmental Behaviour

To study pro-environmental behaviour, various considerations in specifying a behaviour of interest and choosing an appropriate and accurate measurement method must be considered. Although previous research by Morris et al. (2019) found that story-based narratives were effective in influencing PEB, their lab-based measures of PEB were simple and immediate actions. For example, whether participants used fewer papers to complete their tasks, recycled their used papers, turned off their computer/light, subscribed to a newsletter, and donated their earnings were observed (Morris et al., 2019). Measuring PEB in controlled settings is difficult and limited because laboratory observations are often not reflective of more complex real-life environmental actions (Lange & Dewitte, 2019). This study will employ self-report measures of

multiple dimensions of a real-world and more complex PEB, namely pro-environmental consumption behaviour.

In the field of psychology, sustainable consumption or pro-environmental consumption behaviour generally refers to individual behaviours that aim to reduce negative environmental impacts by reducing unsustainable consumption or consumption itself (Richardson et al., 2020). In this study, pro-environmental consumption behaviour is defined as reducing the purchase and use of unnecessary or unsustainable material goods, such as clothing, electronics and home items. This excludes groceries and immediate necessities. This behaviour was chosen because of the major implication of overconsumption in environmental degradation and its contribution to climate change. Over the decades, industries responsible for producing material goods have increasingly repositioned their manufacturing headquarters overseas, accelerated their process of production, increased the variety and technological upgrades of their products, and reduced their prices. While this has created an abundance of affordable goods in the market and ensured the accessibility of products to the public (see Wiedmann et al., 2020), it has also resulted in mass overconsumption and a throwaway culture where goods are not considered to be of significant worth but instead are seen as disposable and replaceable (Cooper, 2013; Claudio, 2007). What is often overlooked while engaging in consumption behaviour is that each stage from the production of goods to packaging, transportation, consumption and disposal carries significant environmental costs (Baytar & Ashdown, 2014). These include high usage of water, toxic chemicals, and fossil fuels, emission of large amounts of CO2 and lasting non-composable waste in the landfills after disposal, especially in developing countries where a large portion of production takes place (Wiedmann & Lenzenm, 2018). To prevent further environmental harm, it is imperative that we significantly reduce our rate of consumption of material goods and

cultivate a consumption culture that values a minimalistic approach to shopping, views goods as valuable possessions to be taken care of, fixed or upcycled, and considers sharing of goods as the norm. Therefore, our study will investigate the influence of narratives on dimensions of pro-environmental consumption behaviour such as reducing consumption of material goods (non-consumption), reusing or upcycling old items, choosing environmentally friendly products, socially encouraging others to reduce their consumption and contributing to related environmental causes.

This study uses a few different dimensions of pro-environmental consumption behaviour to study the influence of narratives on PEB. However, Ajzen (2002) suggests that, when using the TPB model, the outcome behaviour of interest must be specified. Additionally, different dimensions of each type of pro-environmental behaviour have been shown to have different behavioural antecedents (Dangelico et al., 2021). Therefore, our TPB analysis examines only the *non-consumption* dimension of pro-environmental consumption behaviour. Research on the psychological processes underpinning pro-environmental consumption behaviour has mostly focused on green purchasing behaviour (e.g., Anisimova, 2016; Costa et al., 2021; Li et al., 2021; Dangelico et al., 2021; Paul et al., 2016; Hameed et al., 2019). However, intentional non-consumption, choosing not to consume certain products that can potentially incur harm to the environment, is also an essential aspect of pro-environmental consumption behaviour (Hassoun, 2015; Cherrier et al., 2011; Sandikci & Ekici, 2009). Intentional non-consumption has been described in terms of "consumer resistance", "anti-consumption", and "voluntary simplicity" among others (Stammerjohan & Webster, 2002; Cherrier et al., 2011; Cherrier & Murray, 2007). Some psychological factors that influence intentional consumption have been proposed. For example, Zavestoski (2002) argues that anti-consumption attitudes are formed in response to a

failure in feeling authentic from engaging in consumption behaviour. This argument aligns with research suggesting that anti-consumption or voluntary simplicity are behavioural choices that aim to tackle unhappiness and improve well-being (Hoffman & Lee, 2016; Lee & Ahn, 2016). Others have proposed that anti-consumption is related to a need for identity formation (Cherrier, 2009) and self-actualization (Iyer & Muncy, 2009). However, the underlying psychological processes of intentional non-consumption as a PEB are not well studied. This study will explore the psychological processes driving non-consumption, using the TPB. Additionally, to our knowledge, non-consumption and its behavioural antecedents have not been studied in the context of story-based communication interventions. Therefore, the results of this study will contribute not only to our understanding of non-consumption as a PEB, but also to communication interventions that address this behaviour. The results of our investigation can have important implications for social marketing campaigns that aim to address the non-consumption dimension of sustainable behaviour (see Peattie & Peattie, 2009).

Objectives, Hypotheses and Predictions

The current study uses the Theory of Planned Behaviour (TPB) (Ajzen, 1991) to explore the influence of narrative structure on PEB. First, an experimental design will be utilized to compare the influence of different communication conditions on PEB. Specifically, we will examine whether PEB differs among participants who were exposed to fact-based versus story-based narrative structures. PEB will be measured using self-reported pro-environmental consumption behaviour. Given the hypothesis that story-based narratives are more readily accepted by their audience, it is predicted that (1) individuals who read the story-based narratives will report more pro-environmental consumption behaviour than those who read the fact-based and control narratives. (2) Individuals who read the fact-based narrative are also expected to report more PEB than those who read the control narrative.

In order to examine how the theoretical model of TPB applies to non-consumption behaviour specifically, a mediation model will be used to determine whether non-consumption is predicted by the TPB processes. Based on the hypotheses put forth by the TPB model, it is predicted that (3) non-consumption intention is a function of attitudes, perceived behavioural control and subjective norms about reducing consumption. It is also predicted that (4) non-consumption behaviour is a function of non-consumption intentions and perceived behaviour control.

Finally, we will use the TPB model to examine and compare groups of individuals who were exposed to different narrative structures. We will take an exploratory approach to investigate how narrative structure affects attitudes, perceived social norms, perceived behavioural control, behavioural intentions, and behaviour, and compare the strength of the pathways between these constructs across the groups. Story-based narratives are (5) predicted to

have a more pronounced and positive effect than fact-based narratives on attitudes towards reducing consumptions behaviour, perceived social norms about reducing consumption, and perceived behavioural control on reducing consumption. Individuals exposed to the story-based narrative are predicted to report more behavioural intentions to reduce their consumption behaviour than the fact-based group. Where any differences in consumption behaviour are found between the groups, (6) narrative structure is predicted to moderate the influence of TPB components on behaviour, such that the story-based narrative is associated with stronger relationships between the TPB components compared to the fact-based narrative. It is predicted that the magnitude of the effect in the pathways between attitudes, norms, and perceived behavioural control with intentions, and between perceived behavioural control and intentions with behaviours, are larger in the story-based narrative group compared to the fact-based group.

This study constitutes one of the first investigations into the influence of story-based narrative structures on PEB, and the first to study narrative effects on pro-environmental consumption behaviour. It expands on existing knowledge of pro-environmental consumption behaviour by using the TPB to explore the psychological processes by which non-consumption takes place. It is also the first to use the TPB to examine the mechanism underlying non-consumption in the context of a narrative intervention.

Method

Participants

North American adults (18 years of age or older) were recruited using Amazon's Mechanical Turk, an online panel recruitment agency. Six hundred and fifteen participants (42% female, 52% male, 6% other) from Canada and the United States participated in the first phase of the study. Three different attention check items, including both qualitative and multiple-choice questions, were used to detect bots (Mason & Suri, 2012). After screening out individuals who did not complete the second phase of the study (n=233) or failed any of the attention check questions (n=90), responses of 291 participants were included in the final analysis.

Participants were compensated up to $1.80 based on similar study rates on Amazon's Mechanical Turk, and a human research ethics board approved the study (University of Victoria Protocol Number: 19-0461).

Design

A mixed-design was developed for this study. Narrative types were manipulated to explore the influence of story and fact-based narratives on behaviour. Random assignment to narrative type was used to examine between-group differences. The study was conducted in two phases and utilized pre- and post-test surveys to examine within-subject effects of narrative type on behaviour as well.

Measures and Materials

All items and scales used in the surveys were developed or adapted specifically for the purpose of studying pro-environmental consumption behaviour, as no relevant behaviour-specific scales were found in the literature. To avoid order effects, all individual survey items were randomized.

Pre-test Behavioural Survey

The 7-item pre-test survey included items such as “Over the past 2 weeks, I fixed damaged items instead of replacing them with new items” and “Over the past 2 weeks, I only bought items that I really needed” (for the full list of items, see Appendix A). Participants were asked to rate their agreement with each item on a 5-point Likert-type scale, with 1 indicating “Not at all”, 2 indicating “Rarely”, 3 indicating “Sometimes”, 4 indicating “Often”, 5 indicating “All of the time”.

Post-test Survey

The post-test survey included measures of subjective norms, perceived behavioural control, attitudes and intentions as described below. Participants were asked to rate their agreement with each item on a 6-point Likert-type scale, with 1 indicating “Strongly Disagree” to 7 indicating “Strongly Agree”. Some of the responses varied in wording, such as “Not at all useful” to “Extremely Useful”, “Not at all Beneficial” to “Extremely Beneficial” (Refer to Appendix C for a complete list of items and related references).

Subjective norms. Perception of social norms for reducing consumption behaviour was measured using 8 items. An example item was “Most people who are important to me support my efforts to buy fewer new items”. Three of the items were adapted from Clement, Henning and Osbaldiston (2014), measuring the extent to which people who are important to an individual approve, support and have taken steps to perform a pro-environmental behaviour.

Perceived behavioural control. Perception of control over changing consumption behaviour was measured using 7 items. An example item was “I am not very confident that I will be able to buy fewer new items”. Ajzen (1991) suggests that perceived behavioural control consists of situational beliefs about access to resources, time, money, and knowledge that allow

the individual to perform the behaviour. Therefore, three items were adapted from Ajzen's (1991) operationalization of perceived behavioural control.

Attitudes. Attitudes towards reducing consumption behaviour was measured using 7 items. The items asked whether buying fewer items was good, wise, beneficial, and desirable, and whether buying new items was useful or bad for the environment. For example, one item asks, "I believe it is wise to buy fewer new items". Three items were adapted from Van den Berg et al.'s (2006) list of affective and cognitive attitude items.

Behavioral intentions. Intention towards changing consumption behaviour by buying fewer material goods was measured using 6 items. An example item asks:" I definitely plan to change my shopping behavior by purchasing fewer new items". Two items were adapted from Soderlund and Ohman's (2005) approach for measuring intentions as expectations, plans and wants. One item was adapted from Mancha and Yoder 's (2015) approach to an intention as "trying".

Post-test Behavioural Survey (Follow-up survey)

The 33-item post-test behaviour survey included items related to 5 dimensions of reported pro-environmental behaviour related to consumption, including: (1) non-consumption behaviour (e.g. "I reduced my purchases of new items"), (2) purchasing green products (e.g. "I chose to shop for products that were least likely to pollute the environment", (3) reusing old items (e.g. "I found new ways of using items that were old or broken", (4) encouraging others to engage in greener consumption behaviour (e.g. "I encouraged other people to buy fewer things"), and (5) environmental activism (e.g. "I joined a group concerned about the environment"). Some items regarding green purchasing behaviour and activism were adapted from Minton and Rose (1997) and Tilikidou et al. (2002). For the full list of items and sources of adaptation, see

Appendix D. Some of the survey items were reverse scored. A similar Likert-type scale as the pre-test survey was used each individual item.

Narratives

Original narrative material was developed for use in the study. The narrative structure closely followed Morris et al.'s (2019) study material for consistency. The fact-based narrative contained information regarding the impact of retail consumption on the environment, presented as facts and statistics. The story-based narrative described the story of a main character who becomes aware of the environmental impacts of retail consumption and implements lifestyle changes to overcome these issues. The story contained the same information on the environmental impact of retail consumption as the fact-based narrative, except that it did not include numbers and statistics. Eight important components of an effective story, identified by Grace and Kaufman (2013), were incorporated in the story, including structure, time sequence, plot, character, meaning, emotion, struggle and details. The control text was unrelated to environmental issues and described the characteristics of a shopping mall. All textual material had a similar word count and number of paragraphs (see Appendix B).

Procedures

The study was conducted in two phases, which were 14 days apart (Kearney & De Young, 1995). In the first phase of the study, participants were presented with a letter of information for implied consent. Once consent was obtained, participants were presented with the pre-test survey and were asked to report their consumption behaviour over the previous two weeks. Participants were then randomly assigned to read a story (n=104) or fact-sheet (n=95) about the environmental consequence of retail shopping, or a non-relevant text (n=92).

Demographic information was gathered at the end of this phase. Participants were provided with an Amazon Mechanical Turk code to receive compensation for completing the first phase.

Two weeks following the administration of the interventions, participants were sent email reminders to complete the second phase of the study. A second letter of implied consent was provided. Participants completed the post-test behavioural questionnaire and were asked to report their consumption behaviour over the past 2 weeks. As the data were collected during the onset of the COVID-19 pandemic in March, 2020, participants were also asked whether the pandemic influenced their shopping behaviour. Participants were provided with an Amazon Mechanical Turk code to receive compensation for completing the second survey.

Analytic Method

Measurement Assessment

To assess the reliability of our measured constructs, we began by performing factor analyses using our post-test psychological and behavioural measures and calculating the Cronbach's alpha values for each construct. Factor analysis is a statistical method that models observed (manifest) variables in terms of an underlying unobserved (latent variable) factor structure. The items used to measure the constructs of attitudes, perceived behavioural control, subjective norms and behavioural intentions were either developed originally for this study or adapted from past studies and reworded to fit the context of the study (Please refer to the Materials section or Appendix C for more details on the adaptations). Therefore, a confirmatory factor analysis (CFA) with the four TPB constructs was conducted to ensure that items for each subscale load adequately on related factors and that items with weak loadings are removed from further analysis. An exploratory factor analysis (EFA) was performed for the measure of pro-environmental consumption behaviour to identify existing behavioural dimensions underlying the post-test behavioural questionnaire items. Determining the potential dimensions of pro-environmental consumption behaviour allowed us to examine whether the experimental manipulation influenced the various dimensions of PEB differently.

The analysis proceeded in three stages, addressing each of the research questions.

RQ1: Is there an influence of narrative-structure on pro-environmental behaviour?

To examine whether story-based, fact-based, and control narratives influenced overall PEB differently, the effect of narrative structure on total post-test PEB scores was assessed using one-way analysis of variance (ANOVA). ANOVA compares two or more group means to determine significant group differences, and this comparison is based on estimates of differences

in scores within each group and differences in group means. Given that there was one independent variable (narrative structure) with three levels (fact-based, story-based, and control narrative structures), using a one-way ANOVA in this study was warranted. Tukey's post hoc test was conducted to examine pairwise group differences in follow-up to the ANOVA.

To determine whether the experimental manipulation influenced different dimensions of PEB differently, a Multiple Analysis of Variance (MANOVA) was performed. The MANOVA examines group differences between the three types of narratives on a linear combination of the factors identified in the EFA of the behavioural measure. A significant effect of narrative-structure on reported consumption behaviour suggests that narrative structure predicts PEB measured by a combination of the factors. A Discriminant Function Analysis (DFA), a follow-up to the results of the MANOVA, was performed to investigate which combination of the PEB factors predict treatment group membership.

RQ2: How does the Theory of Planned Behaviour explain non-consumption behaviour?

To answer this question, path analysis was conducted to evaluate the TPB model of non-consumption behaviour. Path analysis is used to evaluate models by estimating the magnitude and significance of causal relationships between manifest variables, including direct and indirect relationships between a dependent variable and two or more independent variables. As previously described, the TPB posits clear causal relationships amongst its variables. Therefore, the use of path analysis to predict behaviour from intentions, attitudes, perceived behavioural control and subjective norms was reasonable.

Participants' reports on whether they reduced their consumption of material goods, which includes 8 items (e.g., "Over the past two weeks, I stopped buying new items"), constituted the behavioural measure in the model. Total composite scores for each of the attitudes, perceived

behavioural control, subjective norms, behavioural intentions, and non-consumption behavior were calculated. Scores were used as manifest variables within the structural model. The structural model was specified so that non-consumption behaviour was predicted from perceived behavioural control and behavioral intentions. Behavioural intentions were predicted from attitudes, perceived behavioural control and subjective norms. Correlational relationships between norms, attitudes and control were also indicated. Additionally, indirect effects of attitudes, norms and control on behaviour were indicated through intentions (Phipps, 2019).

The *lavaan* package (Rosseel, 2012) in R was used to test the fit of the hypothesized structural model based on the TPB. The estimator used was Full Information Maximum Likelihood (FIML, Lawley & Maxwell, 1963), which utilizes all the available data without removing any cases and maximizes the power of the analyses when missing data are unavoidable.

Model fit was evaluated based on comparative fit indices (CFI, Bentler, 1988), root-mean square error of approximation (RMSEA, Browne & Cudeck, 1992), standardized root-mean square of the residual (SRMR), and Tucker-Lewis Index (TLI; Tucker & Lewis, 1973). CFI value of .95 or greater, RMSEA value of .06 or less, SRMR value of .08 or less, and TLI of .95 or above, all indicate good model fit (Hu & Bentler, 1999; Bentler & Bonnet, 1980). Model fit indices, and standardized estimates of the specified paths and covariances were examined and reported.

RQ3: How does narrative structure influence the TPB model for pro-environmental behaviour?

To understand the effect of narrative-structure on behaviour using the TPB, a multigroup path analysis was performed. Multigroup path analysis helps to determine whether there are

significant differences in parameter estimates between groups with identical models (Matthews, 2017). Using multigroup path analysis allowed us to compare the differences between the three narrative groups in the causal pathways of the TPB.

The TPB model was specified similar to RQ2, this time grouped by the three levels of the independent variable (fact-based, story-based and control narrative structures). Model fit indices were assessed based on the criteria mentioned above. A second multigroup path analysis was conducted, this time constraining all pathways between variables as equal across the groups. The unconstrained and constrained models were compared using model fit indices. A significant difference between the constrained and unconstrained models suggests that there is a moderation by narrative structure type, and that the narrative groups differ statistically in the magnitude of the pathways between the TPB constructs.

Sample size

Minimum sample-size requirements for each of the planned analysis were met with the present sample of 291 participants. Our sample-size calculations suggested that for a significance level of a = .05, adequate power (power = 0.8) and a medium effect size (f =0.25), a minimum of 159 participants were required for the between-subject analyses using the ANOVA. The sample size calculation for ANCOVA with similar parameters recommended 158 participants. The sample-size calculation for MANOVA for a significance level of a = .05, adequate power (0.95) and a medium effect size (f^2=0.06) recommended 186 participants. Tanaka (1987) suggests a ratio of 10 cases to each free parameter for simple structural equation models. Given that our TPB path analysis had 5 defined parameters and only used manifest variables, the minimum sample size to conduct this analysis was met. Kline (2005) recommends 100 observations per

group for multigroup path analysis. Our sample size roughly met this criterion (fact-based group n=95, story-based group n=104, control group n=92).

Results

Data Screening

Data from 634 cases was exported from Qualtrics (Qualtrics, 2020) and analyzed using R© (R Core Team, 2020). Participants with duplicate Amazon Mechanical Turk Worker IDs were identified and removed from the analyses (19 cases). This was done because all duplicate entries with the same ID's differed in their task duration and responses, had failed to complete the questionnaire and failed attention check questions. Of 615 participants, those who failed at least one of the five attention-check items, including three check questions in the initial survey and two check questions in follow-up survey, and those whose country of residence was not indicated were removed from analysis. This was done to remove bot entries from observations (Mason & Suri, 2012). Participants who completed the initial survey but did not complete the follow-up study, as well as those who did not complete at least half of the items for each questionnaire were removed from analysis. Table 1 reports the numbers and percentages of participants for each exclusion criterion. Participants who were removed from analysis were similarly distributed across the three experimental groups, indicating that the manipulation did not influence the exclusion criteria. Although data on task duration suggested that a few participants took an unrealistically short time to complete their responses, these participants were not removed due to inaccuracies with the Qualtrics time measure.

Missing data at item-level were minimal (less than 5% of data were missing). Therefore, Full Information Maximum Likelihood estimation was used, and further action was judged unnecessary. Analysis of missing values showed no systematic pattern in the missing data.

Table 1. *Numbers and Percentages of Excluded Participants for Each Exclusion Criteria*

Criteria	N (%)
Did not complete follow-up behavioural survey	233 (37.8)
Failed at least 1of 5 attention and bot check questions	90 (14.6)
Missing Country of Residence	11 (1.7)
Total excluded	324 (52.7)

Descriptive Statistics

Responses to the items measuring each construct were summed to create composite scores. The Psych© package was used to compute the composite scores, which is set by default to impute missing data by replacing *NA* values with the item medians (Ravelle, 2021). Table 2 summarizes descriptive statistics of the composite scores for the measured variables, including attitude, subjective norms, perceived behavioural control, intention, and pre-test and post-test PEB. The internal consistency for each of the measured constructs ranged from acceptable to high (Cronbach's α ranging from .70 to .93).

Shapiro Wilk's normality test suggested that prior PEB scores, post-test PEB scores, and subjective norm scores were normally distributed. However, null of normality for attitude, perceived behavioural control and intention scores was rejected ($p < .05$). Table 3 depicts skewness, kurtosis, standard errors, and Shapiro Wilk's normality test statistic and significance for each construct. No extreme values or univariate outliers were identified.

Table 2. *Descriptive Statistics and Reliabilities (by group and overall)*

	Fact (N=95)	Story (N=104)	Control (N=92)	Overall (N=291)	Cronbach's Alpha (α)
Total PEB					
Mean (SD)	91.9 (21.3)	89.9 (19.9)	84.9 (20.3)	89.0 (20.6)	.93
Median [Min, Max]	91.0 [43.0, 140]	90.0 [47.0, 148]	86.5 [40.0, 128]	89.0 [40.0, 148]	
Prior PEB					
Mean (SD)	23.7 (5.37)	23.8 (4.75)	23.1 (5.26)	23.6 (5.11)	.70
Median [Min, Max]	24.0 [10.0, 37.0]	24.0 [14.0, 35.0]	22.0 [11.0, 40.0]	24.0 [10.0, 40.0]	
Behavioural Intention					
Mean (SD)	30.7 (6.17)	30.3 (7.12)	28.8 (7.41)	29.9 (6.94)	.85
Median [Min, Max]	32.0 [11.0, 42.0]	32.0 [8.00, 42.0]	30.0 [8.00, 41.0]	31.0 [8.00, 42.0]	
Attitude					
Mean (SD)	39.3 (5.78)	39.4 (6.13)	37.3 (6.52)	38.7 (6.20)	.79
Median [Min, Max]	39.0 [19.0, 49.0]	40.0 [21.0, 49.0]	37.0 [21.0, 49.0]	39.0 [19.0, 49.0]	
Subjective Norm					
Mean (SD)	34.0 (6.73)	34.4 (7.80)	34.2 (7.78)	34.2 (7.44)	.78
Median [Min, Max]	33.0 [18.0, 56.0]	35.0 [17.0, 51.0]	34.0 [18.0, 52.0]	34.0 [17.0, 56.0]	
Perceived Behavioural Control					
Mean (SD)	37.1 (6.28)	37.1 (5.83)	36.2 (6.16)	36.8 (6.08)	.89
Median [Min, Max]	37.0 [18.0, 49.0]	37.0 [20.0, 49.0]	37.0 [19.0, 47.0]	37.0 [18.0, 49.0]	

Table 3. *Normality Tests, Skewness, Kurtosis and Standard Error (SE)*

	Skewness	Kurtosis	SE	Shapiro Wilk's test statistic (W)	p
Total PEB	.03	-.24	1.21	.99	.29
Prior PEB	.13	-.12	.30	.99	.21
Attitude	-.52	.04	.36	.97	.00*
Subjective Norm	.15	-.22	.44	.99	.09
Perceived Behavioural Control	-.39	-.03	.36	.98	.00*
Intention	.-89	.76	.41	.95	.00*

Note. * indicates $p < .05$.

Demographic Information

Descriptive statistics for age and gender were calculated for 291 participants. Table 4 summarizes descriptive statistics of the total study sample and for each treatment group.

Table 4. *Descriptive Statistics for Study Sample*

	Fact (N=95)	**Story (N=104)**	**Control (N=92)**	**Overall (N=291)**
Age				
Mean (SD)	33.1 (11.5)	33.4 (10.6)	32.4 (9.73)	33.0 (10.6)
Median [Min, Max]	30.0 [15.0, 68.0]	32.0 [18.0, 74.0]	30.5 [15.0, 58.0]	31.0 [15.0, 74.0]
Gender				
Female	45 (47.4%)	57 (54.8%)	45 (48.9%)	147 (50.5%)
Male	49 (51.6%)	47 (45.2%)	45 (48.9%)	141 (48.5%)
Other	1 (1.1%)	0 (0%)	2 (2.2%)	3 (1.0%)
Country				
Canada	80 (84.2%)	87 (83.7%)	76 (82.6%)	243 (83.5%)
United States	15 (15.8%)	17 (16.3%)	16 (17.4%)	48 (16.5%)

Associations of demographic variables with the measured constructs were examined. Pearson's Product Moment correlation tests showed that composite scores for the measured constructs did not correlate significantly with age (range: r = -.008 to r = .145). We tested the effect of gender (male, female and other) on each of the constructs using one-way between-groups ANOVAs. Assumptions of homogeneity of variances was met for all constructs. As mentioned, assumptions of normality were met for pre- and pot-test PEB and subjective norm, but not for attitude, perceived behavioural control and intention. ANOVAs showed that the effect of gender on subjective norms, perceived behavioural control, and pre- and post-test PEB scores were not significant. However, the effect of gender on attitude and intention was significant (For attitude $F(2,288) = 7.83$, $p = .00$, for intention $F(2,288) = 6.29$, $p = .00$). Post-hoc Tukey's HSD were used to conduct pairwise comparisons between the means of the gender groups (male, female and other). It showed that participants in male and female identification groups differed significantly in their attitude scores (95% CI: -4.231, -0.851, d=-2.541, $p = .00$) and their intention scores (95% CI: -5.005, -1.236, d=-3.120, $p = 0.00$). Those who identified as female were more likely to report more positive attitudes towards PEB and higher PEB intentions. The small number of participants that identified as other (n=3) did not differ significantly from the female and male identification groups on any of the measured constructs. Table 5 summarizes the descriptive statistics for composite scores of each measure for each gender category. We tested the effect of country (Canada and the United States) on each of the constructs using one-way between-groups ANOVAs. The effect of location on the TPB constructs and pre- and post-test PEB measures was not significant.

Table 5. *Descriptive Statistics for Composite Scores for Each Gender Category*

	Female (N=147)	**Male (N=141)**	**Other (N=3)**	**Overall (N=291)**
Total PEB				
Mean (SD)	89.7 (19.2)	88.0 (22.1)	99.7 (13.6)	89.0 (20.6)
Median [Min, Max]	91.0 [40.0, 140]	88.0 [40.0, 148]	98.0 [87.0, 114]	89.0 [40.0, 148]
Prior PEB				
Mean (SD)	23.9 (4.84)	23.2 (5.35)	23.7 (7.51)	23.6 (5.11)
Median [Min, Max]	24.0 [12.0, 37.0]	22.0 [10.0, 40.0]	28.0 [15.0, 28.0]	24.0 [10.0, 40.0]
Behavioural Intention				
Mean (SD)	31.5 (6.60)	28.4 (7.01)	27.3 (3.79)	29.9 (6.94)
Median [Min, Max]	33.0 [8.00, 42.0]	30.0 [8.00, 42.0]	29.0 [23.0, 30.0]	31.0 [8.00, 42.0]
Attitude				
Mean (SD)	40.0 (6.04)	37.4 (6.17)	38.0 (2.65)	38.7 (6.20)
Median [Min, Max]	41.0 [21.0, 49.0]	38.0 [19.0, 49.0]	39.0 [35.0, 40.0]	39.0 [19.0, 49.0]
Subjective Norm				
Mean (SD)	35.2 (7.53)	33.3 (7.30)	32.3 (4.16)	34.2 (7.44)
Median [Min, Max]	35.0 [18.0, 56.0]	33.0 [17.0, 51.0]	31.0 [29.0, 37.0]	34.0 [17.0, 56.0]
Perceived Behavioural Control				
Mean (SD)	37.3 (6.21)	36.4 (5.93)	32.3 (4.73)	36.8 (6.08)
Median [Min, Max]	37.0 [19.0, 49.0]	37.0 [18.0, 49.0]	34.0 [27.0, 36.0]	37.0 [18.0, 49.0]

Measurement Assessment

Exploratory Factor Analysis of Measures of Pro-Environmental Consumption Behaviour

The items measuring pro-environmental consumption behaviour could be categorized a priori into behavioural domains such as 1) shopping for environmentally friendly items, 2) socially encouraging others to consume in more environmentally friendly ways, 3) supporting environmental groups through donations and volunteering, 4) reducing consumption, and 5) reusing, upcycling and fixing old items. Therefore, a polychoric exploratory factor analysis (EFA) was performed to identify existing factors underlying the questionnaire items and later determine whether the experimental manipulation influenced the domains of PEB differently.

Factorability of the 33-item PEB scale was assessed through multiple criteria. The correlational matrix of items revealed that many correlations were above 0.3, suggesting that the data are factorable. A Kaiser-Meyer-Olkin (KMO) factor adequacy test confirmed the factorability of the data with an Overall MSA of 0.92, well above the recommended cut-off of 0.6 (Kaiser, 1974). The test revealed that the sample size and data for each individual variable was adequate as the individual MSAs were also above 0.6, ranging from 0.77 to 0.96. Finally, the Bartlett test of sphericity was significant (χ^2 (528) = 5521.38, $p<0.05$), revealing that the matrix of correlations is not an identity matrix. It was therefore concluded that the data are factorable. A polychoric parallel analysis suggested that 4 factors can be retained from the scale items. Inspection of the scree plot also suggested that retaining 4 factors would be appropriate. An oblique promax rotation was chosen as different PEB items were theoretically related.

The EFA revealed that factor 1 items represent green shopping behaviour, factor 2 items represent non-consumption, factor 3 items represent reuse behaviour, and factor 4 items represent activism (see Table 1 in Appendix E). The 4 factors had eigenvalues over Kaiser's

criterion of 1 and combined to explain 59% of the variance. The factor correlation matrix revealed that factors of green shopping, activism and reuse behaviour had moderate positive correlations (see Table 6). Non-consumption behaviour was negatively and poorly correlated with green shopping and reuse behaviour separately. Non-consumption and activism factors were not correlated. The factor correlations confirm that using an oblique rotation was appropriate as the factors were not independent.

Table 6. *Correlations among the Factors (N =289)*

Factor	Activism	Green Shopping	Changes in Consumption	Reuse Behaviour
Activism	1.00			
Green Shopping	.58	1.00		
Non-Consumption	.02	-.25	1.00	
Reuse Behaviour	.43	.61	-.39	1.00

The item “I chose to shop for alternative versions of products that were made locally” had factor loadings between 0.3 and 0.4 on both the activism and shopping factors. “I encouraged other people to buy fewer things” had equal factor loadings between 0.3 and 0.4 on both activism and reuse factors. The item “I didn't try to buy fewer new products” did not meet the primary factor loading of 0.4 on any factor, most likely due to its negatively worded structure. The 3 items were removed to achieve a simpler factor structure. A polychoric EFA with a promax rotation was performed again with the remaining 30 items. The 4 factors had eigenvalues over Kaiser’s criterion of 1 and combined to explain 61% of the variance. The pattern of the remaining items with cross-loadings did not change, and the factor correlations

remained similar. Given that the improvement in the model fit was small after removing the mentioned items, analysis was continued with the original items.

An inspection of the structure matrix revealed that multiple variables loaded highly on more than one factor. Similar to the relationship between factors in the factor correlation matrix, multiple variables loaded highly on factors 1, 3 and 4 at the same time. Activism items loaded on both factors 4 and 2. The item "I tried to change my behaviour by buying fewer new items" also loaded highly on factors 1, 2 and 3. Each factor reliability was assessed, varying from 0.84 to 0.93. Removing the negatively worded item "I did not try to buy fewer new products" improved the raw Cronbach's alpha value of the consumption factor. Given that this item also failed to meet a primary factor loading of 0.4 on any factor it was therefore excluded from the factor from further analysis.

Confirmatory Factor Analysis of Measures of Attitude, Subjective Norm, Perceived Behavioural Control and Intention

Confirmatory factor analysis was performed for the four constructs of attitude, subjective norm, perceived behavioural control and intention in order to verify the factor structure of the questionnaire items developed to measure these constructs (Appendix B lists all items developed for the original questionnaire). Full Information Maximum Likelihood estimator was used. Assumption of multivariate normality based on Mardia's test for item level data was not met (skewness = 8327.02, $p < .05$ and kurtosis=37.70, $p < .05$). No multivariate outliers based on Mahalanobis' distance were detected. Examining all item-level pairwise scatterplots to assess linearity was not feasible. Randomly selected pairwise scatterplots suggested that observed variables were linearly related. The initial model showed inadequate model fit (CFI=0.864, TLI=.850, RMSEA=0.073, SRMR .081). Standardized factor loadings ranged from .433 to .860

for attitude, .481 to .716 for perceived behaviour control, .023 to .773 for subjective norm, and .629 to .839 for intention. Five items with low standardized factor loadings (<.5) were removed, including two attitude items ("I believe it is useful to buy more new items" and "Purchasing new items is not good for the environment"), one behavioural control item ("I do not have enough control over my shopping behavior to reduce my purchases of new products."), and two items aimed at measuring subjective norms ("My social situation makes it difficult for me to buy fewer products" and "Most people who are important to me buy new items regularly"). A second model specified without these items with weak loadings showed improvement in model fit (CFI=0.914, TLI=.903, RMSEA=0.068, SRMR .062). Standardized factor loadings ranged from .708 to .870 for attitude, .518 to .720 for perceived behaviour control, .685 to .773 for subjective norm, and .627 to .840 for intention. Refer to Table 2 in Appendix E for a list of factor loadings of all items included in the final analysis.

For the reliability and validity indices of model constructs refer to Table 7. Average measure of internal consistency and item reliability as indicated by Cronbach's alpha ranged from acceptable (0.7-0.8) to good (0.8-0.9). Amount of variance captured by each construct relative to the amount of variance due to measurement error as measured by Average Variance Extracted (AVE) was acceptable for all constructs (<.5). Composite reliability (McDonald's Coefficient) measures the total amount of true score variance relative to the total scale variance and indicates the shared variance among the observed variables representing each construct (Bruner & Sub, 2005; Fornell & Larcker, 1981). Composite reliability was acceptable for intentions and perceived behavioural control (0.5-0.6) and good for attitude and subjective norms (<.8).

For a summary of descriptive statistics for the composite scores for each of the TPB variables, refer to Table 8.

Table 7. *Reliability and Validity Indices of Model Constructs*

	Cronbach's Alpha	**Average Variance Extracted (AVE)**	**Composite Reliability**
Behavioural Intention	.89	.57	.51
Attitude	.88	.61	.88
Subjective Norm	.87	.52	.86
Perceived Behavioural Control	.76	.57	.56

Table 8. *Descriptive Statistics of the Variables of the TPB Model*

	Fact (N=95)	**Story (N=104)**	**Control (N=92)**	**Overall (N=291)**
Behavioural Intention				
Mean (SD)	30.7 (6.17)	30.3 (7.12)	28.8 (7.41)	29.9 (6.94)
Median [Min, Max]	32.0 [11.0, 42.0]	32.0 [8.00, 42.0]	30.0 [8.00, 41.0]	31.0 [8.00, 42.0]
Attitude				
Mean (SD)	28.9 (4.26)	28.7 (4.67)	27.7 (4.78)	28.5 (4.59)
Median [Min, Max]	29.0 [13.0, 35.0]	30.0 [10.0, 35.0]	28.5 [14.0, 35.0]	29.0 [10.0, 35.0]
Subjective Norm				
Mean (SD)	26.0 (6.27)	25.9 (6.88)	25.8 (7.00)	25.9 (6.70)
Median [Min, Max]	26.0 [12.0, 42.0]	26.0 [9.00, 41.0]	25.0 [9.00, 41.0]	26.0 [9.00, 42.0]
Perceived Behavioural Control				
Mean (SD)	31.8 (5.41)	31.8 (5.01)	31.1 (5.34)	31.6 (5.24)
Median [Min, Max]	32.0 [16.0, 42.0]	31.0 [18.0, 42.0]	32.0 [14.0, 40.0]	32.0 [14.0, 42.0]

RQ1: Is there an influence of narrative-structure on pro-environmental behaviour?

Assessing the Between-Subject Effects of Narrative Structure on PEB

Analysis of Variance (ANOVA)

To examine whether story and fact-based narratives influenced overall PEB differently, the effect of narrative structure on total post-test PEB scores was assessed using Welch's one-way analysis of variance (ANOVA). Assumptions of normality and homogeneity of variances were met. The one-way ANOVA showed that the effect of narrative structure was not significant, $F(2, 190) = 2.89$, $p = .058$.

Analysis of Covariance (ANCOVA)

An analysis of covariance (ANCOVA) was conducted to examine the effect of narrative structure on post-test PEB scores, controlling for differences in PEB before administering the experimental manipulation by taking prior PEB scores (Cronbach's alpha = .70) into account as a covariate. The main effect of narrative structure on prior PEB scores was not significant, F(2, 288) = 0.38, p = 0.7, which shows that the average consumption behaviour measured prior to administration of the narratives was roughly equal across the three groups. This suggests that the use of prior PEB as a covariate in the analysis is appropriate. Assumptions of homogeneity of variances and homogeneity of regression slopes were met. Prior PEB scores, the covariate, was not significantly related to post-test PEB scores, F(1, 287) = 1.35, p = .24, partial n2 = .005. This finding may be attributed to the fewer number of pre-test PEB items (7) compared to the post-test PEB items (32), which resulted in a restricted variance in the pre-test PEB scores.

There was a significant effect of narrative structure on post-test PEB scores after controlling for the effect of prior PEB scores, F(2, 287) = 3.08, p = .047, partial n2 = 0.02. Planned contrasts revealed that reading a fact or story-based narrative significantly increased

post-test PEB scores compared to the control group, t(287) = 2.39, p = .017, r = .14. There was not a significant difference between fact and story-based narratives, t(287) = -0.72, p = .47, r = 0.04. Tukey's HSD post hoc tests showed that the covariate adjusted mean of the fact-based narrative group was significantly greater than the control group (difference = -7.23, t = -2.412, p = .04, d = .35). However, there was no significant difference between the story and fact-based narrative groups (difference = -2.11, t = -0.72, p = .75, d = .10) and between the story-based and control narrative groups (difference = -5.13, t = -1.75, p = .19, d = .25).

Mixed ANOVA

A mixed ANOVA was conducted to examine the interaction effects of time and narrative structure on PEB. Six items included in both the pre- and post-test questionnaires were used in analysis. There were no extreme outliers. Assumptions of normality, homogeneity of variances, homogeneity of covariances, and sphericity were met ($p > .05$). No significant interactions between narrative structure and time were found, $F(2,288)=0.98$, $p = .38$. There was no significant main effect of time on PEB, $F(1, 288)=.99$, $p = .09$, nor a significant main effect of condition, $F(2,288)=2.84$, $p = 0.37$.

Multiple Analysis of Variance (MANOVA)

To determine whether the experimental manipulation influenced different dimensions of PEB differently, a Multiple Analysis of Variance (MANOVA) was performed. The MANOVA examined group differences between the three types of narratives on a linear combination of the four factors identified above (non-consumption, reuse, green shopping and activism). As mentioned, the four factors were moderately correlated, therefore using a MANOVA was warranted. A Box's M test suggested that the assumption of homogeneity of covariances was met, *Chi-Square* = 19.18, *df* = 20, $p = 0.51$. Assumption of multivariate normality and univariate

normality for each factor (except for factor 1) was not met. Using Pillai's Trace, there was a significant effect of narrative-structure on PEB, V=0.06, F(8, 572)=2.25, p =0.02. Since the sample sizes were not equal across conditions, a Hotelling-Lawley test was performed given its robustness to unequal sample sizes. Using Hotelling-Lawley, there was a significant effect of narrative-structure on PEB, t^2=0.06, F(8, 568)=2.27, p =0.02. The narrative structure predicted PEB measured by a combination of the four factors.

Discriminant Function Analysis (DFA)

A DFA was conducted in follow-up with the results of the MANOVA to investigate which combination of the four PEB factors predict treatment group membership. The DFA revealed two discriminant functions. DF1 accounted for 82% of the explained variance between groups, while DF2 accounted for only 18% of the explained variance between groups. However, the canonical correlation for both discriminant functions was low, r*=0.22 for DF1 and r*=0.11 for DF2, suggesting that a weak correlation exists between the groups and the DFs. The effect sizes for each DF, squared canonical correlations, were 0.05 and 0.01 respectively.

Wilk's Lambda peel-off significance test suggested that the combination of DF1 through 2 was statistically significant, Wilk's Lambda = 0.94, F(8,570) = 2.2594, p = 0.02. DF2 was not significant, Wilk's Lambda = 0.99, F(3,286) = 2.2594, p = 0.35, suggesting that DF2 is not necessary for analysis. The structure coefficients for DF1, the correlation between predictors and DF1, suggested that the treatment groups were primarily differentiated by the consumption factor (0.68) and shopping factor (0.52), and less by the reuse factor (0.23) and activism factor (-0.16). The standardized coefficients for DF1 were higher for the consumption factor (c = 0.99) and shopping factor (c = 0.56), and lower for the reuse factor (c = - 0.12) and activism factor (c = -0.81). It is concluded that pro-environmental consumption and shopping factors have the highest

association with DF1. Group means indicating average discriminant scores were highest for the story group (group 2) (mean = 0.25) and lowest for the control group (group 3) (mean = -0.3). Looking at DF1 on the mean standardized DF scores plot, the story group had the highest score, and the control had the lowest score on DF1 (Figure 2). It can be concluded that higher scores on the consumption and shopping factors were most associated with reading the story-based narrative.

The proportion of original grouped cases correctly classified, 0.43, was not high, but was better than the prior probabilities for groups, with prior probability of 0.33 for the fact-based group, 0.36 for the story-based group, and 0.31 for the control group. Most of the cases were misclassified as belonging to the story group, and the story group had the highest number of correctly classified cases across the groups (see Table 9).

Figure 2. *Mean Standardized Discriminant Function Scores for the Groups*

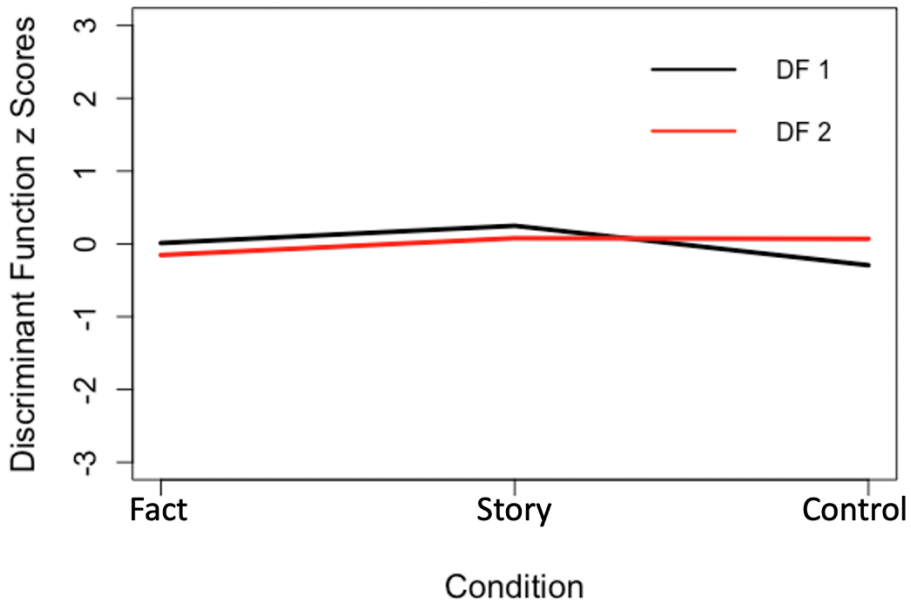


Table 9. *Cross-Tabulation of the Original and Predicted Group Memberships*

	Predicted		
Original	Fact	Control	Story
Fact	23	22	50
Control	18	39	35
Story	14	26	64

RQ2: How does the TPB explain non-consumption behaviour?

A path analysis was performed to estimate TPB's hypothesized relationships between attitude, subjective norm, perceived behavioural control, behavioural intention, and non-consumption behaviour. Direct paths were estimated between non-consumption behaviour and behavioural intention, as well as non-consumption behaviour and perceived behavioural control. Direct paths were also estimated between behavioural intention and attitude, subjective norm, and perceived behavioural control separately. Indirect paths were estimated between non-consumption behaviour and attitude, non-consumption behaviour and subjective norms, and non-consumption behaviour and perceived behavioural control through intentions. Assumptions of univariate and multivariate normality and linearity were evaluated. Visual examination of bivariate scatterplots showed that assumption of linearity was met for all bivariate relationships except between subjective norms and non-consumption behaviour. Assumption of univariate normality based on Shapiro-Wilk's tests was only met for subjective norm and it was not met for intention, attitude and perceived behavioural control (p <.05). Assumption of multivariate normality based on Mardia's test was not met (skewness = 231.435, p < .05 and kurtosis=8.775, p < .05). Three multivariate outliers were detected using Mahalanobis' distance (MD > 20.5,

a=.001, *df* =5). Analysis continued without removing observations from the dataset. Table 10 summarizes the composite scores on each construct for each of the multivariate outliers.

Table 10. *Composite Scores and Mahalanobis' Distance for Multivariate Outliers*

Outlier (Observation)	Attitude	Perceived behavioural control	Subjective norm	Intention	Non-consumption	Mahalanobis' Distance
1	29	23	31	11	27	22.03
2	10	37	19	8	18	29.58
3	27	41	23	14	26	21.23

The path analysis was performed using a robust Maximum Likelihood estimator. Bivariate correlations among all variables included in the TPB model are presented in Table 11. The results of the path analysis with the standardized regression coefficients are presented in Figure 3. The model had a good fit with chi-square = 316.77 (*df* = 10, *p* = .00), RMSEA = 0.040, SRMR = .019, CFI = 0.998, and TLI = .988. Behavioural intention to engage in non-consumption had a significant direct effect on non-consumption behaviour (β=.388, p=.000). Attitude had the highest direct effect on intentions and indirect effect on non-consumption behaviour through intentions among the TPB variables. Attitude towards non-consumption had a significant direct effect on behavioural intention (β = .617, p = .000) and a significant indirect effect on non-consumption behaviour through intention (β = .240, p = .000). Perceived behavioural control had a significant direct effect on intention to engage in non-consumption behaviour (β = .223, *p* = .000), and a significant indirect effect on non-consumption behaviour through intention (β = .086, *p* = .000). Perceived behavioural control had a non-significant direct effect on non-consumption behaviour (β = .107, *p* = .111). Subjective norm had a significant direct effect on intention to engage in non-consumption behaviour (β = .079, *p* = .027) and a

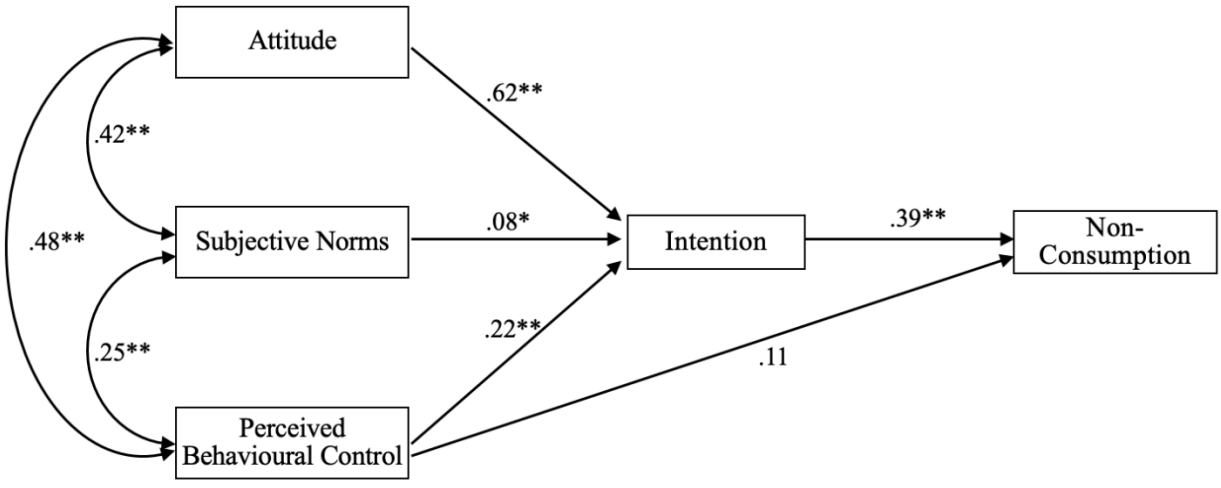
significant indirect effect on non-consumption behaviour through intention (β = .031, p = .038). R-square indicated that 61.7% of the variance in non-consumption intentions and 20.6% of the variance in non-consumption behaviour can be explained by the TPB model.

Table 11. *Means, standard deviations, and correlations with confidence intervals*

Variable	*Mean*	*Standard Deviation*	1	2	3	4
1. Attitude	28.45	4.59				
2. Subjective norms	25.91	6.70	.42** [.32, .51]			
3. Perceived behavioural control	31.57	5.24	.48** [.38, .56]	.25** [.14, .35]		
4. Intention	29.95	6.94	.76** [.70, .80]	.39** [.29, .49]	.54** [.45, .61]	
5. Non-consumption	28.48	6.47	.37** [.27, .47]	.11 [-.00, .22]	.31** [.21, .41]	.45** [.35, .53]

Note. * indicates p < .05. ** indicates p < .01.

Figure 3. *Path Analysis of Theory of Planned Behaviour*



Note. * indicates p < .05. ** indicates p < .01.

RQ3: How does narrative-structure influence the TPB model for pro-environmental behaviour?

Analysis of Moderation Effect of Narrative Structure on Relationships Between TPB Constructs

Multigroup path analysis was performed to explore differences in the relationships amongst TPB constructs between the different narrative structure groups. A chi-square difference test was conducted to compare the fit of a model with unconstrained pathways between the variables of the TPB model (i.e., intercepts and regressions were allowed to vary by narrative structure types) against the fit of a model with constrained pathways (i.e., intercepts and regressions were fixed to be equal across narrative structure types). The chi-square difference test was not significant ($\Delta X^2 = 17.82$, $\Delta df = 15$, $p > .05$) indicating that the pathways did not differ by type of narrative structure.

Between Subject Effects of Narrative Structure on TPB Constructs

To examine whether narrative structures influenced the TPB constructs differently, the effect of narrative structure on attitude, subjective norm, perceived behavioural control, behavioural intention and non-consumption was assessed using Welch's one-way ANOVA, which is robust to violations of assumption of normality. Assumption of homogeneity of variances was met. Results showed that the effect of narrative structure was not significant for attitude ($F(1, 289) = 3.36$, $p = .067$), subjective norm ($F(1, 289) = 1.78$, $p = .84$), perceived behavioural control ($F(1, 289) = .78$, $p = .378$), behavioural intention ($F(1, 289) = 3.51$, $p = .062$), or non-consumption ($F(1, 289) = 3.36$, $p = .067$).

Discussion

In this study, we investigated the influence of the narrative structure of climate change messaging on PEB. Specifically, we compared the effectiveness of story and fact-based narrative structures in encouraging pro-environmental consumption behaviour, and we used the Theory of Planned Behaviour (TPB) to examine how narratives exert their effect on non-consumption behaviour. Our study found that story-based narratives are effective climate change communication tools. Story-based narratives were more effective than fact-based narratives in increasing PEB by reducing consumption and purchasing environmentally friendly products. However, when looking at total PEB scores and after controlling for PEB prior to exposure to the narratives, both fact-based and story-based narratives were effective in encouraging PEB, providing support for the information deficit theory. The TPB provided a useful model to understand the psychological processes by which non-consumption behaviour takes place. However, the different narrative structures did not moderate the TPB processes such that the magnitude of the TPB mediational pathways was similar across narrative conditions.

Narrative Persuasion and Pro-Environmental Behaviour

Overall, the results suggest that story-based narratives are effective tools for encouraging changes in PEB. Specifically, our analysis of the various dimensions of pro-environmental consumption behaviour showed that story-based narratives were more effective than fact-based narratives in increasing pro-environmental consumption behaviour, by encouraging non-consumption and purchasing environmentally friendly products. This finding provides some support for past research findings (e.g., Morris et al., 2019) that suggest story-based narratives are more likely to encourage PEB than fact-based narratives. Therefore, the way climate change messages are structured may play a role in their capacity to persuade PEB. After taking the

participants' non-consumption behaviour prior to reading the narratives into consideration, both story and fact-based narratives were more effective than the control narrative in increasing non-consumption practices. Given that no differences between groups were found when looking at total PEB scores, but differences were found based on the types of behaviour, we can conclude that the effects of narrative structure type may vary based on the behaviour targeted in a communication intervention. Additionally, post-hoc tests after controlling for prior PEB showed that fact-based narratives may be more persuasive than story-based narratives. This finding is contrary to past studies, such as that by Morris et al. (2019), that found individuals exposed to the fact-based environmental narrative were *less* likely to engage in PEB than those in the control group. While our study used similar narrative structures as those of Morris et al.'s (2019) for the sake of consistency, this discrepancy in findings may reflect the studies' differences in recruitment methods (online vs. in person) and behavioural measure (pro-environmental consumption behaviour vs. immediate lab-based behaviours such as turning off a light). Nevertheless, this observation provides support for the information deficit model, suggesting that fulfilling a knowledge deficit can lead to behavioural changes (Wynne, 2006). Therefore, while story-based narratives are effective in changing behaviours, the influence of fact-based narratives on behaviour should not be discounted. Meaningful behavioural changes can result once individuals are provided with the necessary information that they require regarding the PEB of interest.

Grace and Kaufman (2013) found that individuals open to hearing about climate change showed similar levels of attitude change after exposure to fact-based and story-based narratives, while resistant individuals were more likely to change their attitudes in response to story-based narratives. Therefore, these results may also reflect the participants' openness to climate change

messages. Future research should assess how participants' initial receptivity to climate change messaging contributes to the link between stories and behaviour.

In this study, individuals who were exposed to the story-based narrative were more likely to engage in non-consumption and green shopping behaviour, but no differences between groups were found regarding activism and reuse behaviour. Steg and Vlek (2009) argue that informational interventions are most effective for convenient and low-cost PEB in terms of time, money, effort, social disapproval, and external constraints on the behaviour. Activism and reuse behaviour are relatively more effortful, resource-dependent, time-consuming, and complex behaviours in comparison to reduced consumption and green shopping decisions. Our study used a two-week period to allow for enough time for engaging in consumption behavior and maintain reporting accuracy. However, this period may have been too brief for some behaviours, such as fixing broken items or volunteering with an environmental group, to take place. Additionally, it is possible that individuals require more information on how to go about engaging in activism and reuse behaviour. Stories tailored to specific behaviours of interest, which tap on to their relevant psychological processes and include information that guide behaviour, may prove useful in encouraging more complex behaviours.

Understanding Non-Consumption Behaviour Using the Theory of Planned Behaviour

We evaluated non-consumption through the framework of the TPB, by examining how non-consumption-related attitudes, subjective norms and perceived behavioural control lead to forming non-consumption intentions and engaging in non-consumption. The results of our analysis confirmed the usefulness of the TPB as a framework for understanding non-consumption behaviour. Attitudes, subjective norms, and perceived behavioral control accounted

for a large proportion of the variance in non-consumption intentions. Intentions and perceived behavioral control accounted for some of the variance in non-consumption.

Non-consumption intention was a significant predictor of non-consumption behaviour, and non-consumption intention was predicted by attitude, subjective norms, and perceived behavioural control. Perceived behavioural control as measured by control beliefs was a significant predictor of non-consumption intentions. However, in these data, our analyses suggested that perceived behavioural control was not a direct predictor of non-consumption behaviour, contrary to the TPB's hypothesized link between control and behaviour. Similar to attitudes and subjective norms, perceived behavioural control had an indirect effect on behaviour through intentions. Non-consumption intentions mediated the relationships of attitudes, subjective norms and perceived behaviour control with behaviour, underscoring the importance of intention formation in facilitating the influences of normative, control and outcome beliefs about the behaviour on the behaviour itself.

Our study found that attitude was the strongest predictor of non-consumption intentions compared to perceived behavioural control and subjective norm. Individuals' positive evaluations of non-consumption behaviour were strongly predictive of forming non-consumption intentions. This finding suggests that emphasizing the positive outcomes of non-consumption is key for developing effective interventions aimed at encouraging non-consumption.

Subjective norm was the weakest predictor of non-consumption intentions amongst the TPB constructs. This outcome reflects prior conceptualizations of non-consumption as resistance (Stammerjohan & Webster, 2002) and a personally meaningful endeavour (Iyer & Muncy, 2009). In these conceptualizations, the individual as a consumer is acting in opposition to the current social norms surrounding consumption. Forming non-consumption intentions is in this

case a challenge posed to the *status quo* of overconsumption, which can explain the low predictive power of subjective norms for non-consumption intentions. Future research may benefit from formulating measurement items for subjective norms of non-consumption, which incorporate conceptualizations of non-consumption as resistance. It is also worth noting that Armitage and Connor's (2001) meta-analysis of studies using the TPB model found that subjective norms were the weakest predictor of behavioural intentions and suggested that the weak effect was due to poor measurements of subjective norms in the primary studies. Further research on appropriate measures of subjective norms is needed to conduct accurate assessments of this construct.

Together, the knowledge attained from these findings can guide the design of interventions that utilize and target the most important precursors of non-consumption behaviour, attitudes, perceived behavioural control and intentions, for more effective behaviour change in this behavioural domain.

Narrative Persuasion and the TPB

In addition to examining the persuasive effects of story-based narratives on pro-environmental behaviour, this study used the TPB as a framework to explore the influence of narrative structure on non-consumption behaviour. We examined whether the TPB constructs and the pathways between them were influenced by different narrative structures.

We did not find any differences in mean levels of non-consumption intention, attitude, norm and behavioural control by narrative structure. These results contradict past research that has demonstrated the persuasive effects of story-based narratives on attitudes and intentions towards engaging in PEB (e.g., Grace & Kaufman, 2013; Rhodes et al., 2016; Bilandzic & Sukalla, 2019; Chen & Lin, 2014; Baytar & Ashdown, 2013). This lack of narrative effect may

be specific to the narrative material used and the specific behaviour of interest in this particular study. It is also possible that non-consumption attitudes and intentions are not easily influenced by the narrative structure of environmental communication interventions. Currently, research on the influence of narratives on PEB-related subjective norms and perceived behavioural control (or self-efficacy) is lacking. Future research on the effects of communication interventions and narrative structure on normative beliefs, control beliefs and self-efficacy is encouraged.

While non-significant, both the fact and story-based narrative groups reported higher non-consumption attitudes and behavioural intentions than the control group who were not exposed to an environmental narrative. This finding provides further support for the information deficit theory (Wynne, 2006), in that provision of information was effective in changing pro-environmental attitudes and intentions. This again suggests that information, regardless of the narrative structure it is presented in, is required for changing pro-environmental attitudes and behaviours.

In addition to examining narrative effects on the constructs of the TPB, we explored the influence of narrative structure on the relationship amongst the TPB constructs. Story-based and fact-based narratives did not differ in their influence on the strength of the pathways specified in the TPB model. This suggests that the psychological mechanisms of non-consumption behaviour operate similarly under different environmental narrative conditions and that narrative structures do not impact how the TPB constructs work together. The fixed nature of the relationships amongst the TPB constructs in the presence of different communication interventions further supports the results of our analysis of non-consumption behaviour using this model.

Narrative Transportation and Emotions as Potential Mechanisms of Narrative Influence

The story-based narrative in this study communicated the same environmental

information as the fact-based narrative, yet it employed story components, such as main character(s), plot, goals, and setting, (Haven, 2007), rather than facts and statistics. Additional story components suggested by Grace and Kaufman (2013), such as meaning, emotions, and struggles experienced by the main character were also incorporated in the story-based narrative. The persuasiveness of the story in encouraging pro-environmental consumption behaviour can be attributed to the combination of these components. Gerrig (1993) proposes that stories, as built by these components, allow individuals to experience a process called narrative transportation. Narrative transportation is defined as the process of identification with the main characters of a story, which elicits emotional responses that help absorb the reader into the narrative and leads them to develop beliefs consistent with the story (Gerrig, 1993). More research is needed to examine whether narrative transportation can explain the mechanism underlying narrative influence. Morris et al. (2019) have found that emotional responses to environmental stories as measured by cardiac activity are associated with PEB. However, they found no link between narrative transportation and emotions, or narrative transportation and behaviour. Instead, emotions may serve as the main mechanism by which narratives exert their persuasive effects. This warrants further examination of the role of emotions in environmental communication.

Past research has shown that hearing a story about an individual's personal experience with climate change elicits emotional responses, which are then associated with changes in environmental beliefs, risk perceptions and behaviour (Gustafson et al., 2020; Morris et al., 2019). Various types of emotions involved in processing climate change information can influence pro-environmental attitudes and behaviour. Emotional appeals, such as fear, hope and humour, are common tactics used by communicators to increase the persuasiveness of environmental messaging (Chapman et al., 2017; Skurka et al., 2018). Nabi and colleagues

(2018) found a mediating role of emotions in the relationship between environmental messages and environmental attitudes and behaviours, such that environmental messages evoked feelings of hope and fear which in turn increased pro-environmental attitudes and advocacy behaviour.

Further, the TPB components can potentially be influenced by emotions elicited by different environmental stories. For example, in a qualitative study by Baden (2019), individuals exposed to solution-focused stories about climate change as opposed to catastrophic stories reported forming intentions to adopt PEBs, positive changes in their behavioural beliefs and normative beliefs, and increased self-efficacy. On the other hand, most individuals exposed to the catastrophic story reported feeling anxiety, fear and were less likely to report forming intentions to engage in PEB. Additionally, past research has used extended models of the TPB by incorporating emotions as precursors of behavioural intentions and PEB. For example, Moons and De Pelsmacker (2015) found that emotions towards electric cars, in addition to subjective norms and attitudes, were good predictors of intentions to use electric cars. Future research should further explore the role of emotions in facilitating the influence of story-based narratives on the TPB constructs and specific environmental behaviours.

Limitations

The self-report measures of PEB used in this study allowed for the collection of more complex consumption behaviour data as opposed to immediate and simple lab-based behavioural observations. However, self-report measures suffer from limitations of their own in collecting accurate behavioural data. These limitations include desirability bias, inaccurate memory recall, and individual subjectivity (van de Mortel, 2008). It is possible that after reading the story and fact-based narratives, participants responded to the behavioural survey items in socially desirable ways. To prevent the participants from responding in this way, they were not told about the

content of the post-test questionnaire in advance. Given that participants were unaware that their consumption behaviour would be measured, their responses to the questionnaire may reflect some memory inaccuracies. In our surveys, pro-environmental behavior was measured based on frequency (e.g. rarely, sometimes, etc.). Another strategy to measure self-reported PEB is by using binary outcome measures (e.g., "Yes, I did stop buying retail items", vs. "No, I continued shopping as usual") to control for subjective responding (Lange & Dewitte, 2019). Future research on self-reported behaviour could also employ appropriate secondary records, such as energy bills and banking statements or shopping receipts, as corroborative evidence to increase the accuracy of participant responses (Bradburn et al., 2004). This study measured post-test pro-environmental consumption behaviour only at one time, 14 days after the provision of environmental narratives. More frequent (e.g., daily or weekly) records of consumption behaviour, such as daily self-reports, energy-usage data and banking transactions, can shed light on varying levels of change in pro-environmental behaviour over time in response to environmental messaging.

Additional factors related to existing consumption practices should be considered in future studies. Individuals may have already formed intentions to limit purchases of non-necessities prior to the study and this resolve may have potentially strengthened because of the intervention. Questions related to behavioural intentions that discern between continuing previous sustainable behaviour versus planning to change behaviour would be useful in addressing this issue. When looking at pre- and post-test differences in PEB, some individuals may show a lack of change in beliefs and behaviour as a result of the intervention because they were previously practicing sustainable behaviour at the maximum level possible. This factor should be taken into account to prevent hampering the results of the analysis due to lack of

change. Limited household income presents an external barrier to consumption for individuals who would like to consume new items but do not have the financial capacity to do so. Socioeconomic status and household income are important variables that should be controlled for in future studies on pro-environmental consumption behaviour.

A limitation of the present study and past research on story-based communication, and more generally in practices of environmental communication, is that individuals have been largely considered *recipients* of environmental messages and their role as active creators and protagonists of climate stories has been ignored (Hendersson & Wamsler, 2020). Consequently, communicators administer environmental messages to induce emotional and behavioural responses, rather than conscious reflections on experiences with the issues at hand (Chapman et al., 2017). Creating and telling one's own climate story, the dynamic act of storytelling itself, and its influence on subsequent pro-environmental behavior is not yet well understood. This warrants further research in the fields of social and environmental psychology.

It is important to note that the data on the post-test reported PEB was collected at the onset of the COVID-19 pandemic quarantines in North America in March 2020. As a result, the observation of the extent to which the narratives differed in their persuasive abilities may have been hindered by the structural limitations to pro-environmental consumption behaviour posed by the pandemic. In response to a qualitative question asking about the impact of the pandemic on consumption behaviour, most of the participants reported that their consumption practices have been mostly limited to purchasing only the necessities, such as groceries, citing financial constraints and social distancing measures as reasons for this change. These pandemic specific factors may have prevented participants from shopping for new and used items, accessing tools and resources for fixing and reusing old items and engaging in environmental activism.

Nevertheless, as the COVID-19 pandemic was an ongoing national and global event and participants were randomly assigned to experimental conditions, it can be assumed that the observed differences between groups reflect the effect of narrative structures. A replication study is encouraged to explore the full extent of the persuasiveness of narrative structure in shaping pro-environmental consumption behaviour outside of this unique situational context.

Implications and Future Research

This study was one of the first to assess the effect of narrative structure in climate change communication on behaviour. While most research on climate change narratives has focused on changing attitudes, our study has addressed the knowledge-action gap by demonstrating that stories play an influential role in translating knowledge into impactful PEB. Climate change communication research suggests that the most effective messages are tailored to specific audiences and their needs (e.g., Bostrom et al., 2013). However, audiences of climate change messages may not always be homogeneous and often represent diverse demographics with various needs, such as in mass media communication. Our study employed a sample of North American adults, and the narrative content and characteristics were chosen with this broad audience in mind. Based on our results, story-based narrative structures have the capacity to engage and influence a broad audience. Our investigation into pro-environmental behavior, together with prior research on environmental attitudes (Grace & Kaufman, 2013), intentions, and risk perception (Gustafson et al., 2020), suggest that structuring messages as stories is an effective general technique for delivering climate change messaging. Environmental educators, science communicators, campaigners and journalists are encouraged to utilize storytelling for designing effective and persuasive environmental communication interventions. The usage of fact-based and story-based narratives for communicating about climate change and promoting

pro-environmental behaviours are not mutually exclusive. The essential elements of both narrative structures can be combined, so that the resulting narrative includes both empirical evidence and engaging storytelling. Stories of individual and community experiences with climate change and their responses to environmental problems can be incorporated with scientific facts in reporting and has the potential to reach a wider audience and increase public reception of environmental messaging. Future research on this topic is needed.

While fact-based and story-based narrative structures can be broadly applied to environmental messages, communication interventions targeting pro-environmental consumption behaviour are encouraged to take contextual factors, such as geographical location, culture, community characteristics, socio-economic situation, and availability of resources into account when developing environmental narratives. Community clusters may differ in their propensity to respond to environmental narratives and in their willingness and ability to engage in the target behaviour. Communication interventions must emerge from an understanding of the community's existing social processes, values and communication practices and respond to the community's specific behavioural and environmental needs. Communities may also face structural barriers to engaging in pro-environmental consumption behaviour, such that access to more environmentally friendly alternatives of products, durable goods, or tools to engage in reuse behaviours may not be possible. Therefore, a one-size fits all approach to using narratives for changing pro-environmental beliefs and encouraging behaviour change may not be appropriate in all instances.

This study was also the first to examine non-consumption behaviour using the TPB. Past research on pro-environmental consumption behaviour (or sustainable behaviour) has largely focused on purchasing environmentally friendly alternatives of material goods, reducing energy

consumption, and substituting meat with plant-based diets. Non-consumption, the practice of reducing purchases of goods that are not immediate necessities, has received less attention in research on sustainable behaviour. The results of this study contribute to existing efforts for combatting the environmental impact of mass consumption and encouraging non-consumption practices, such as the Zero-Waste movement, by providing a deeper understanding of the psychological mechanisms by which non-consumption takes place. Future studies may consider specifically exploring interventions aimed at the non-consumption aspect of sustainable behaviour.

We also found that those who identified as female were more likely to report more positive attitudes towards non-consumption and stronger intentions to engage in non-consumption than those who identified as male. This is in line with the current literature on gender differences in pro-environmental behaviour, which suggests that women report stronger pro-environmental attitudes and are more likely to adopt pro-environmental behaviour (Zelzeny et al., 2000). Future research and interventions targeting non-consumption will benefit from taking gender differences in non-consumption beliefs and their contribution to non-consumption practice into account.

On a final note, we would like to emphasize the importance of understanding and encouraging pro-environmental consumption behaviour as an individual-level or small group phenomenon and its contribution to climate change mitigation efforts. We found that various items developed to measure green-shopping, reuse and non-consumption behaviour also tapped onto the activism domain of pro-environmental consumption behaviour, such as shopping for alternative versions of products that were made locally or encouraging other people to buy fewer new items. These acts can be considered more than mere consumption-related behaviours.

Rather, they represent volitions to enact change locally and within a community. This interpretation suggests that activism may be inevitably embedded in pro-environmental consumption behaviour. Therefore, while large-scale systemic changes for climate change mitigation are urgently required on the part of governments and corporations, individual-level changes in pro-environmental consumption behaviour are vital for preventing further harm to our planet and its inhabitants and pushing for these large-scale changes.

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Appendices

Appendix A: Pre-test Behavioural Questionnaire

Instructions:

How would you describe your purchasing behavior over the past two weeks? The first part of this survey explores this question in more detail. There are no right or wrong answers. So please respond in ways that reflect your true behavior over the past 2 weeks.

These questions make use of rating scales with 5 places; you are to select the option that best describes how often you engaged in each behaviour. Some of the questions may seem similar, but they address somewhat different issues. Please read each question carefully.

Items:

1. Over the past 2 weeks, I fixed damaged items instead of replacing them with new items.
2. Over the past 2 weeks, I found new ways of using items that were old or broken.
3. Over the past 2 weeks, I took good care of things I already own so that I won't have to replace them later.
4. Over the past 2 weeks, I purchased used items instead of new items.
5. Over the past 2 weeks, I bought upcycled items instead of new items.
6. Over the past 2 weeks, I only bought items that I really needed.
7. Over the past 2 weeks, I chose the environmentally friendly alternative of a product.
8. Over the past 2 weeks, I tried not to buy new products.

- Not at all
- Rarely
- Sometimes

- Often
- All of the time

Appendix B: Narrative Material

Instructions:

Please read the following passage carefully. Feel free to take as much time as you need.

Control narrative:

A shopping centre, also called a shopping mall or shopping plaza, is a 20th-century adaptation of the historical marketplace.

A modern shopping centre is a collection of independent retail stores, services, and a parking area to accommodate automobiles. Shopping centres may also contain restaurants, banks, theatres, professional offices, service stations, and other establishments. Shopping centres are designed, constructed, and maintained by a management firm as a unit.

Planners consider many different factors before building a shopping center. Firstly, the community in which the shopping centre is built must be able to support it. The centre also requires adequate access by commercial trucks and personal vehicles. The site on which the centre is built must have a large enough size, have access to utilities such as water and electricity, and be accessed from main roads in the area. Zoning laws and the type of land use also play an important role in deciding where to build a shopping centre. Secondly, the economic conditions of the specific area must also support the shopping center. Competition from local commercial businesses and community members' attitudes about the size of the center must also be taken into account. Different neighbourhoods may or may not support the opening of different types of stores within the shopping centre.

Shopping centres can be built at the neighbourhood, community, or regional level. The smallest type, the neighbourhood centre, is usually built as a supermarket, with daily

convenience shops such as a drugstore, shoe repair, laundry, and dry cleaner accompanying it. Such a centre can usually serve 2,500 to 40,000 people within a six-minute drive.

The community shopping centre contains all of the above-mentioned services in addition to a medium-sized department store or variety store. However, it still stands with the supermarket as the main focus. Wearing apparel, appliance sales, and repair stores are also found here. This centre will normally serve 40,000 to 150,000 people.

The regional shopping centre provides a full range of shopping services, similar to services found in a small central business district. It is built around at least one full-size department store and many chain stores. Specialty shops and boutiques are numerous, and there are usually several restaurants and perhaps a movie theatre. However, services for immediate day-to-day needs, such as grocery shopping, are minimized. It will serve as many as 150,000 or even 400,000 or more people. On larger sites motels, medical centres, or office buildings may also be provided.

Car-parking facilities are a major consideration in designing a shopping centre. The size of the centre, the type of tenants, and the number of visitors partly determine how much space is needed for parking. But it has been found that a ratio of 5.5 parking spaces per 1,000 square feet of space is usually adequate. Access to the lots must be broad and easy enough to avoid traffic jams. Sometimes, the parking spaces have multiple levels to allow for more vehicles to be parked.

Pedestrian and vehicular transportation needs are some of the primary design considerations. It is important to physically separate pedestrian paths from vehicular paths. This will ensure the

safety of tenants and visitors, and the efficient placement of different stores. Some exceptions to this rule include the placement of auto-accessory stores, movie theatres, and drive-in banks.

An example of a modern shopping center is the West Edmonton Mall. This centre contained more than 800 stores, multiple restaurants, a hotel, an amusement park, a miniature golf course, a church, a "water park" for sunbathing and surfing, a zoo, a 438-foot-long lake, and more than 500 kinds of trees.

Fact-based narrative:

Society's demand for material goods has grown rapidly over the past century. This has led to quick and cheap production of merchandise such as processed foods, clothing, and electronics. The speedy cycle of production and consumption of goods relies on the natural environment to provide the appropriate resources. This has resulted in many harmful environmental impacts, and ultimately the current climate crisis.

Greenhouse gas emissions are considered the main cause of climate change. Production, importation and distribution of products create high levels of greenhouse emissions. For example, the clothing industry emits about 1.2 billion tonnes of carbon per year. As society's demands for products continue to increase, the rate of carbon emissions will only get worse. As a result, extreme weather events become more likely and can jeopardize the survival and existence of humans and animals.

The short lifecycle of fast and cheaply-made products has led to a "throw-away" mentality. Processed foods are often packaged in single-use plastics, and many other goods are made from plastics. This results in the generation of 275 million metric tons of plastic globally each year.

Only 9% of all plastics are recycled, which mean that 91% of plastic waste is spread out in landfills and in the oceans. Discarded plastics may take thousands of years to decompose. Plastic particles often contain pollutants that can enter into the food chain. These micro-plastics are often toxic and can become ingested by marine life, which in turn are consumed by humans.

Additionally, chemical pollution from industrial plants are often dumped in bodies of water. For example, the textile industry itself pollutes 5,640,000 Olympic-sized swimming pools of freshwater every year. This endangers the lives of people, animals and plants who rely on the water source for survival, even those far away from the site of pollution.

High demand for products has other consequences for humankind. Reports show that at least $127.7 billion worth of garments are at risk of including slavery in their supply chain. Although they might not realize, consumers are often supporting modern slavery through purchasing imported clothing, technology and other goods.

To relieve the pressures placed on the environment, it has become even more important to reduce consumption and prevent waste. Zero Waste is a philosophy that promotes prevention of waste.

Zero Waste designs strive for reduced materials use, use of recycled materials, use of more gentle materials, longer product lives, repairability, and ease of disassembly at end of life. It supports sustainability by protecting the environment, reducing costs, and transporting wastes back into the industrial cycle.

At the individual level, Zero Waste is a growing movement of people who attempt to reduce the amount of waste they generate. Many people are joining this movement in an attempt to reduce and conserve materials. Some of the steps to Zero Waste include: refuse, reduce, and re-use.

Refuse means to buy fewer new things. It means buying only what you need, buying things that last a long time, and no longer trying to keep up with trends. Reduce means to say 'no' to waste by not even letting trash enter into one's life. This includes excessive packaging, disposable and single-use items, or things that contain hazardous chemicals. Re-use means to fix broken items and continue using them. Re-use also means finding new ways of re-purposing old things.

There are so many ways to reduce waste and the results can be surprising. Many find the Zero Waste a meaningful and simple lifestyle that can reduce negative environmental impacts.

Story-based narrative:

Kaya stepped into the spacious mall entrance. Underneath a sparkling chandelier, the mall patrons walked about her with shopping bags in hand.

Kaya gazed at the colorful window displays. The trendily dressed mannequins, sleek posters of the latest cellphone models, and the aroma of beauty shops lured her inside every store. Kaya found herself surrounded by thousands of objects. The shiny lights of the shops illuminated all the items they sold, each item competing for Kaya's attention. *"Buy me! Buy me!"* they seemed to scream to her.

Until she began to feel overwhelmed.

All of these new items were being constantly produced and brought here. There was always so much more to buy. It seemed like a never-ending cycle.

Who is even making all this stuff? She wondered, standing above a table of neatly folded sweaters. Kaya imagined highly polluting machines producing and spitting out fabric, and underpaid workers making the same sweaters she saw with their overworked hands. The fabric

dyes would stain pools of water, their chemical waste swirling around in tanks and pipes. The resulting grey chemical liquid poured out of huge pipes into a lively river, contaminating its pristine water. Somewhere down the stream, the contaminated water endangered the lives of people, animals and plants who depended on this water to survive.

In the store, Kaya leaned over and touched a light blue sweater and felt its soft texture. *How did this even get here?* She knew that many of the things she bought flew over in planes and rode on trucks to get to her, all the meanwhile releasing gases that polluted the air she breathed.

All of the new things she wanted would have to be wrapped in plastic packaging. Even the plastic shopping bags she used to take her new purchases home would end up in a foul-smelling landfill, or float for thousands of years on a huge garbage patch in the ocean. Tiny pieces of plastic were even floating around in her drinking water and in her body.

Feelings of worry about the high cost of shopping to the environment overcame her. What she bought here would end up as waste somewhere in the beautiful water and lands that she loved. With pollution and suffering animals in mind, she wondered if she even really needed these shiny new things.

It was right there that she decided to change her life. *I am going to stop buying new things.* As she walked away from the table of sweaters and out of the store, she was filled with a feeling of empowerment. *I can do this,* she thought. Since that day in the mall, Kaya has come a long way.

Making this change was hard at first. She had to resist the urge to buy new things. Over time, Kaya learned how to reuse some of the things she would usually throw away and replace. The internet was her biggest teacher in that area. Who knew there were so many people who

were trying to reduce their waste just like her? Learning to fix items she already owned also motivated her to take better care of everything she had.

If you speak to Kaya now, she will tell you that keeping up with the newest trends in home decor and upgrading to the newest laptop are no longer on her list of priorities. The way she shops has made her life simpler, and more meaningful. Instead of feeling worried and guilty about her impact on the environment, she feels inspired to be part of the solution.

Appendix C: Post-Test Questionnaire

Instructions:

What are your current shopping preferences? Are you thinking about changing your shopping behavior? This survey explores these questions in more detail. There are no right or wrong answers and your views, whatever they may be, are welcome. So please respond in ways that reflect your true opinions.

Many questions in this survey make use of rating scales with 7 places; you are to choose the responses that best describes your opinion. Some of the questions may seem similar, but they address somewhat different issues. Please read each question carefully.

Perceived behavioral control items:

1. I have enough knowledge to buy fewer new items. (Adapted from Ajzen, 1991)
2. I have enough necessary willpower to purchase fewer new items. (Adapted from Ajzen, 1991)
3. I have enough time or resources to purchase fewer new items. (Adapted from Ajzen, 1991)
4. If I really want to, I can change my shopping behavior by buying fewer new items.
5. I am not very confident that I will be able to buy fewer new items.
6. I do not have enough control over my shopping behavior to reduce my purchases of new products.
7. I am capable of reducing my purchases of new items.

Subjective norms items:

1. Most people who are important to me support my effort to buy fewer new items. (Adapted from Clement, Henning & Osbaldiston, 2014)

2. Most people who are important to me think I should buy fewer new items. (Adapted from Clement, Henning & Osbaldiston, 2014)
3. Most people who are important to me take steps to buy fewer items. (Adapted from Clement, Henning & Osbaldiston, 2014)
4. My social situation makes it difficult for me to buy fewer products.
5. Most people who are important to me would be pleased if I bought fewer new items.
6. Most people who are important to me buy new items regularly.
7. Most people who are important to me believe that people should buy fewer products.
8. Most people who are important to me believe that it is beneficial to buy less new products.

Attitude items:

1. I believe it is wise to buy fewer new items. (Adapted from Van den Berg et al., 2006)
2. I believe it is useful to buy more new items. (Adapted from Van den Berg et al., 2006)
3. People should reduce buying new items. (Adapted from Van den Berg et al., 2006)
4. Changing my shopping behavior by buying fewer new items would be: Extremely bad to good
5. Purchasing new items is not good for the environment.
6. Changing my shopping behavior by buying less new items would be: extremely harmful to beneficial
7. Saving energy and resources by buying fewer new items is: extremely undesirable to desirable

Behavioral intention items:

1. I want to reduce my consumption of material goods. (Adapted from Soderlund & Ohman, 2005)
2. I intend to reduce my consumption of material goods. (Adapted from Soderlund & Ohman, 2005)
3. I will try to reduce my consumption of material goods. (Adapted from Mancha & Yoder, 2015)
4. I definitely plan to change my shopping behavior by purchasing fewer new items.
5. I don't expect that I will be changing my shopping behavior.
6. I just can't see myself trying to buy fewer new items.

Check Question 1: Please choose strongly agree as the response to this question.

- Strongly disagree
- Disagree
- Somewhat disagree
- Neither agree nor disagree
- Somewhat agree
- Agree
- Strongly agree

Check Question 2: Please show that you are a human answering this question by choosing the response option that corresponds to the first letter in the fifth word of this sentence.

- a
- b
- c
- d

- e
- f
- g

Check question 3: Just so we know you are a person answering, what is the month that follows January?

_____

Gender: Would you describe yourself as:

- Female
- Male
- Other

Year: What is your year of birth?

_____

Attention check for follow-up survey: I understand that I will be asked to complete a follow-up survey 2 weeks after completion of the current survey.

- Yes
- No

Comments (Optional): please share any additional comments or opinions you have about this study.

_____

Appendix D: Follow-up Behavioural Survey

Instructions:

How would you describe your purchasing behavior over the past two weeks? This survey explores this question in more detail. There are no right or wrong answers. Your responses, whatever they may be, are welcome. So please respond in ways that reflect your true behavior over the past 2 weeks.

Many questions in this survey make use of rating scales with 5 options; you are to select the option that best describes how often you engaged in each behaviour. Some of the questions may seem similar, but they address somewhat different issues. Please read each question carefully.

Pro-environmental consumption behavioural items:

1. Over the past 2 weeks, I stopped buying new things.
2. Over the past 2 weeks, I reduced my purchases of new items.
3. Over the past 2 weeks, I bought the same amount of new products as I always do.
4. Over the past 2 weeks, I continued buying new things.
5. Over the past 2 weeks, I continued with my usual shopping habits.
6. Over the past 2 weeks, I bought more new items.
7. Over the past 2 weeks, I tried to change my behavior by buying fewer new items.
8. Over the past 2 weeks, I didn't try to buy fewer new products.
9. Over the past 2 weeks, I encouraged other people to buy fewer things.
10. Over the past 2 weeks, I encouraged other people to purchase used instead of new items.
11. Over the past 2 weeks, I encouraged other people to purchase upcycled instead of new items.

12. Over the past 2 weeks, I encouraged other people to find new ways to use old or damaged items.
13. Over the past 2 weeks, I encouraged other people to take better care of things they already own.
14. Over the past 2 weeks, I fixed damaged items instead of replacing them with new items.
15. Over the past 2 weeks, I found new ways of using items that were old or broken.
16. Over the past 2 weeks, I took better care of things I already own so that I won't have to replace them later.
17. Over the past 2 weeks, I purchased used items instead of new items.
18. Over the past 2 weeks, I bought upcycled items instead of new items.
19. Over the past 2 weeks, I only bought items that I really needed.
20. Over the past 2 weeks, I chose to shop for alternative versions of products with less plastic packaging.
21. Over the past 2 weeks, I chose to shop for alternative versions of products that were made locally.
22. Over the past 2 weeks, I chose to shop for products that were least likely to pollute the environment (Tilikidou et al., 2002).
23. Over the past 2 weeks, I signed a petition to support an environmental cause (Minton & Rose, 1997).
24. Over the past 2 weeks, I joined a group concerned about the environment (Minton & Rose, 1997).

25. Over the past 2 weeks, I volunteered with a group that is concerned about the environment (Tilikidou et al., 2002).
26. Over the past 2 weeks, I contributed money to an environmental organization (Tilikidou et al., 2002).
27. Over the past 2 weeks, I paid more money to buy some items that were less damaging to the environment (Tilikidou et al., 2002).
28. Over the past 2 weeks, I chose not to buy products from companies that are guilty of polluting the environment (Minton & Rose, 1997).
29. Over the past 2 weeks, I shopped for items with green sustainability labels instead of items without green labels (Tilikidou et al., 2002).
30. Over the past 2 weeks, I chose the environmentally friendly alternative of a product (Tilikidou et al., 2002).
31. Over the past 2 weeks, I asked about the environmental consequence of items before purchasing them (Tilikidou et al., 2002).
32. Over the past 2 weeks, I avoided buying environmentally harmful products (Tilikidou et al., 2002).
33. Over the past 2 weeks, whenever I shopped, I prioritized the durability of a product.
    - Not at all
    - Rarely
    - Sometimes
    - Often
    - All of the time

Check Question 1: Just so we know that you are a person answering, please choose often as the response to this question.

- Not at all
- Rarely
- Sometimes
- Often
- All of the time

Check Question 2: Just so we know that you are a person answering, what is the month that follows march?

- April
- December
- June
- July
- October

Pandemic item: Has your shopping behaviour changed due to the COVID-19 pandemic?

- Yes
- No
- Not sure

Comments (Optional): Please share any additional opinions or comments about this study.

_____

Appendix E. Tables of Results from the Factor Analyses

Table 1.

Results From the Factor Analysis of the Post-Test Pro-Environmental Behaviour Questionnaire

Scale Items	Factor Loading			
	4	1	2	3
1. I volunteered with a group that is concerned about the environment.	**0.94**	0.10	0.08	-0.29
2. I joined a group concerned about the environment.	**0.79**	0.16	0.05	-0.16
3. I contributed money to an environmental organization.	**0.75**	0.23	-0.02	-0.21
4. I signed a petition to support an environmental cause.	**0.74**	0.13	-0.11	-0.16
5. I encouraged other people to purchase used instead of new items.	**0.67**	-0.06	0.01	**0.38**
6. I purchased used items instead of new items.	**0.62**	-0.02	0.05	0.27
7. I encouraged other people to purchase upcycled instead of new items.	**0.57**	-0.09	0.11	**0.45**
8. I bought upcycled items instead of new items.	**0.53**	0.11	0.08	**0.31**
9. I paid more money to buy some items that were less damaging to the environment.	0.10	**0.82**	0.08	-0.07
10. I shopped for items with green sustainability labels instead of items without green labels.	0.16	**0.77**	0.04	-0.02
11. I chose not to buy products from companies that are guilty of polluting the environment.	0.06	**0.76**	-0.05	-0.01
12. I avoided buying environmentally harmful products.	0.06	**0.72**	-0.12	0.01
13. I chose to shop for products that were least likely to pollute the environment.	-0.03	**0.72**	-0.02	0.22
14. I chose the environmentally friendly alternative of a product.	0.15	**0.69**	-0.02	0.12
15. I chose to shop for alternative versions of products with less plastic packaging.	0.12	**0.62**	-0.01	0.16
16. I asked about the environmental consequence of items before purchasing them.	0.30	**0.61**	0.07	-0.02
17. I chose to shop for alternative versions of products that were made locally.	**0.32**	**0.35**	0.02	0.10
18. I stopped buying new things.	0.28	-0.09	**-0.82**	-0.11
19. I reduced my purchases of new items.	0.13	0.02	**-0.78**	0.00
20. I continued buying new things.	-0.04	0.00	**0.77**	0.07
21. I continued with my usual shopping habits.	0.02	0.01	**0.72**	0.02
22. I bought the same amount of new products as I always do.	0.03	0.03	**0.69**	0.11

23. I bought more new items.	0.11	0.05	**0.67**	0.10
24. I tried to change my behaviour by buying fewer new items.	0.10	0.16	**-0.57**	0.14
25. I only bought items that I really needed.	-0.23	0.04	**-0.55**	0.18
26. I didn't try to buy fewer new products.	0.21	-0.07	**0.36**	-0.16
27. I took better care of things I already own so that I won't have to replace them later.	**-0.39**	0.10	-0.05	**0.77**
28. I encouraged other people to find new ways to use old or damaged items.	**0.47**	-0.22	0.00	**0.71**
29. I encouraged other people to take better care of things they already own	0.15	-0.00	0.11	**0.69**
30. I fixed damaged items instead of replacing them with new items.	0.08	-0.04	-0.06	**0.61**
31. Whenever I shopped, I prioritized the durability of a product.	-0.27	0.26	0.15	**0.60**
32. I found new ways of using items that were old or broken.	0.22	0.01	-0.12	**0.52**
33. I encouraged other people to buy fewer things.	**0.37**	0.01	-0.24	**0.37**

Table 2.

Confirmatory Factor Analysis Items and Standardized Item–Factor Loadings

Variable	Item	Standardized Loading
Attitude		
	1. I believe it is wise to buy fewer new items.	0.770
	2. People should reduce buying new items.	0.713
	3. Changing my shopping behavior by buying fewer new items would be: Extremely bad to good.	0.870
	4. Changing my shopping behavior by buying less new items would be: extremely harmful to beneficial.	0.845
	5. Saving energy and resources by buying fewer new items is: extremely undesirable to desirable.	0.708
Perceived Behavioural Control		
	1. I have enough knowledge to buy fewer new items.	0.529
	2. I have enough necessary willpower to purchase fewer new items.	0.628
	3. I have enough time or resources to purchase fewer new items.	0.595
	4. If I really want to, I can change my shopping behavior by buying fewer new items.	0.627
	5. I am not very confident that I will be able to buy fewer new items.	-0.518
	6. I am capable of reducing my purchases of new items.	0.720
Subjective norms		
	1. Most people who are important to me support my effort to buy fewer new items.	0.721
	2. Most people who are important to me think I should buy fewer new items.	0.693
	3. Most people who are important to me take steps to buy fewer items.	0.716
	4. Most people who are important to me would be pleased if I bought fewer new items.	0.685
	5. Most people who are important to me believe that people should buy fewer products.	0.753
	6. Most people who are important to me believe that it is beneficial to buy less new products.	0.773
Intention		
	1. I want to reduce my consumption of material goods.	0.837
	2. I intend to reduce my consumption of material goods.	0.840

	3. I will try to reduce my consumption of material goods.	0.817
	4. definitely plan to change my shopping behavior by purchasing fewer new items.	0.803
	5. I don't expect that I will be changing my shopping behavior.	-0.668
	6. I just can't see myself trying to buy fewer new items.	-0.627